BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

UG 435

In the Matter of	)
	)
NORTHWEST NATURAL GAS COMPANY, dba NW NATURAL,	)
	)
Request for a General Rate Revision.	)
	)

OPENING TESTIMONY

OF THE

OREGON CITIZENS' UTILITY BOARD

April 22, 2022

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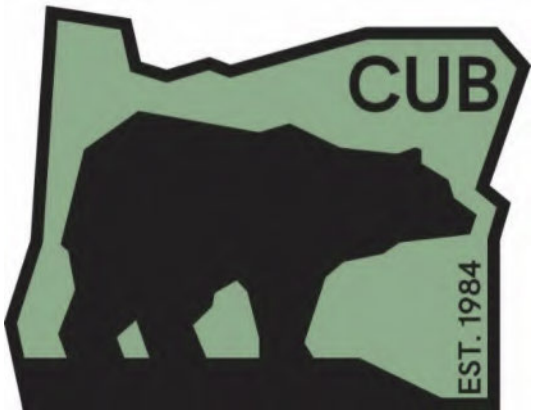

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In the Matter of NORTHWEST NATURAL GAS COMPANY, dba NW NATURAL, Request for a General Rate Revision.	REDACTED OPENING TESTIMONY OF THE OREGON CITIZENS' UTILITY BOARD

I. INTRODUCTION

Q. Please state your name, occupation, and business address.

A. My name is Bob Jenks. I am the Executive Director of the Oregon Citizens' Utility Board (CUB). My business address is 610 SW Broadway, Ste. 400 Portland, Oregon 97205.

Q. Please describe your educational background and work experience.

A. My witness qualification statement is found in Exhibit CUB/101.

Q. What is the purpose of your testimony?

A. My testimony addresses several policy issues related to the current challenges to the natural gas utility business model that are affecting NW Natural's (NWN or the Company) operations. Based on these challenges, I make several recommendations related to the Company's Line Extension Allowance, market research and advertising budgets, and practice of charging residential deposits.

II. NATURAL GAS UTILITY BUSINESS MODEL CHALLENGES

Q. Please describe the current natural gas business model.

A. NWN is a gas utility that has provided gas service for more than 150 years in the state of Oregon. Initially, the Company's gas was manufactured from coal or oil and was used for lighting. In fact, the early name for NWN was Portland Gas Light Company.[1] The Company's original business model of producing gas from coal or oil for lighting did not survive the introduction of electricity and electric light bulbs, and the production of manufactured gas was replaced when natural gas arrived in the region in the 1950s.[2] Today, the Company imports natural gas to the state and distributes it through a local distribution network to homes and businesses where it is primarily used for space and water heating, cooking, and industrial applications.

Q. What are the challenges to the natural gas utility business model?

A. Gas utilities across the country, including NWN, are facing three significant challenges to their business model. The first is technological. Using gas directly in buildings for space heat and hot water has generally been more efficient than alternatives, such as using fuel to generate electricity and then using the electricity to generate heat. However, natural gas's technological edge has changed with the introduction of heat pumps. Heat pump technology for both space heating and water heating has entered the market and is more efficient than natural gas. While a modern gas furnace is about 95-96% efficient—meaning that 95% of the BTUs in the fuel are turned into heat—a heat pump is closer to 250% efficient, because it uses energy to support a pump which moves heat from one place to another.[3]

[1] https://en.wikipedia.org/wiki/NW_Natural.
[2] https://en.wikipedia.org/wiki/NW_Natural.
[3] https://neep.org/sites/default/files/resources/ASHP_buyingguide_5.pdf.

Heat pumps, or "fuel pumps," can pump heat into or out of your building, which means that a single piece of technology provides both heating and cooling. Heat pumps provide efficient air conditioning, which is increasingly needed in Oregon, as evidenced by last year's heat dome event. In addition, induction cooktops are creating a new technological challenge to natural gas as a cooking fuel. Even without the issue of climate change, gas utilities face the challenge that, over time, customers will install heat pumps for efficient space heating and cooling. NWN's own market research bears this out. In 2015, natural gas furnaces were preferred by 17 percentage points (54% to 37%), while in 2019, gas furnaces were preferred by just 10 percentage points (48% to 38%).[4] A trend away from furnaces and towards heat pumps has begun. We have seen this before. Households historically replaced fuel oil furnaces with gas. Gas lighting was replaced by incandescent electric light bulbs, which were replaced by CFC light bulbs, and are now being replaced by LED light bulbs. The marketplace tends to favor the more efficient product offering.

The second challenge is climate change. Natural gas—the largest component of which is methane—is a fossil fuel that contributes to climate change. More than 98% of NWN's delivered fuel to customers is fossil gas, and less than 2% is renewable natural gas (RNG).[5] The impacts of climate change have already been felt locally through increased drought and wildfires and heatwaves, such as the

[4] CUB Exhibit 108.
[5] CUB's understanding is that when the current announced NWN RNG projects are all online that they will provide approximately 1.5% of the Company's sales.

one last summer that led to more than 500 deaths in the Pacific Northwest.[6] The effects of climate change are also felt internationally, and recent Intergovernmental Panel on Climate Change reports include dire warnings about the future unless urgent action is taken to curb greenhouse gas (GHG) emissions.[7] To address climate change, actions by individuals, local governments, state and national governments, and international agreements will continually push the combustion of fossil fuels, including natural gas, downward. The State of Oregon has adopted a rule, the Climate Protection Program (CPP), requiring gas utilities to reduce GHG emissions by 50% by 2035 and 90% by 2050.[8] NWN is suing the state in an attempt to sidestep this mandate, but, regardless of the outcome of this lawsuit, decarbonization of our economy is coming, and fossil gas use to heat buildings and hot water will be scrutinized and reduced.

NWN filed a plan to comply with the CPP as part of the Public Utility Commission of Oregon's (Commission) UM 2178 Natural Gas Fact Finding proceeding. CUB Exhibit 102 is our analysis of the CPP compliance modeling of the three gas utilities. CUB concluded that none of the three had a reasonable plan to comply with the CPP. One flaw in NWN's analysis is its reliance on a massive increase in energy efficiency spending, including installing new technologies that have not yet been commercialized. It should be noted that

[6] Amelia Templeton and Monica Samayoa, *Oregon medical examiner releases names of June heat wave victims*, Oregon Public Broadcasting (Aug. 6, 2021).
[7] *See, e.g.,* IPCC, Climate Change 2022, Mitigation of Climate Change *available at* https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_FullReport.pdf.
[8] Profita, Cassandra, *State approves new, 'more aggressive' Climate Protection Program,* Oregon Public Broadcasting (Dec. 16, 2021) *available at* https://www.opb.org/article/2021/12/16/state-approves-new-more-aggressive-climate-protection-program/.

NWN is already falling behind in their plans to meet the CPP. In its UM 2178 modeling, NWN's analysis forecasted that the average usage per residential customer would decline to 602 therms/year in 2022.[9] However, in this case, NWN's forecast of usage per residential customer in 2022 is 628.[10]

The third challenge is cost. In recent history, natural gas usage spread across our economy supported by cheap natural gas developed with unconventional drilling. But the era of cheap gas is passing. NWN's residential rates increased by 13.2% last fall and it is requesting an 11.8% increase for residential customers in this case. To reduce its carbon emissions, NWN is planning on spending billions of dollars that will be added to rates in upcoming years on energy efficiency, RNG, and hydrogen. The impact of these investments on rates is compounded by increasing natural gas prices in the market. The wholesale price of natural gas in 2021 was $3.89 per MMBtu, which was almost double the cost of 2020.[11] NWN is projecting that the cost of the least expensive RNG in 2022 to be $12.25/MMBtu, with additional quantities available at $18.75 and hydrogen available at a cost of $23.24.[12] Replacing gas that costs less than $4/MMBtu with gas that costs 3 to 6 times that amount will send retail prices skyward. NWN has also identified additional energy efficiency to reduce GHG emissions and plans to increase its spending on energy efficiency by more than 20-fold. In 2022, NWN will spend about $22 million on energy efficiency. In 2025, it forecasts

[9] CUB Exhibit 103.
[10] UE 425 – NWN Exhibit 1303.
[11] www.eia.gov/todayinenergy/detail.php?id=50778.
[12] CUB Exhibit 103.

expenditures of about $124 million.[13] In 2030, it is forecasting around $200 million in energy efficiency, and it keeps growing to more than $400 million/year. While the electric industry also faces the need to decarbonize, it has renewable energy options that can be generated at similar (or in some cases less) cost as fossil electricity. As NWN attempts to decarbonize its system, its costs will likely rise significantly in contrast with electric utilities.

Q. What are the implications of this business model challenge?

A. There are several implications. The technology challenge suggests that there will be a trend away from gas for space and hot water heating. This means that we should not assume a customer will replace a gas furnace with another gas furnace. This calls into question whether we should assume that the useful life of a pipe is 60 or more years, given shifting economics and regulatory policy. The challenge of climate change has similar implications. This could accelerate the move toward heat pumps and non-gas equipment. The implications of the cost increases could further accelerate this transition.

Q. Are there regulatory implications from this business model challenge?

A. Yes. Regulated utility business models change. Much of the regulatory focus in the 1990s concerned ratemaking for landline phone service. But there are significant risks to customers from changing business models. For example, if gas usage shrinks, this could lead to stranded investment in pipelines and a utility could ask for recovery of this from customers. The number of customers remaining on the natural gas system in the future is likely to shrink, meaning that

[13] CUB Exhibit 103, shows $102 million in incremental spending above the current programs.

the customers left on the system will be asked to pay a higher proportion of any potential stranded asset. NWN could ask customers to fund efforts to defend their business model. NWN also could promote policies which make it difficult for consumers to switch from gas to electricity. Regulators are going to have to pay close attention to how NWN responds and ensure that customers are appropriately protected. It is inappropriate for customers to fund efforts to defend NWN's business model.

Q. How is NWN responding to these challenges to its business model?

A. NW Natural's response is worrisome. There is a constant cycle of gas furnaces and gas hot water heaters reaching the end of their useful life. Consumers are put in a position to have to decide about what kind of new equipment to install. These customers need good information upon which to make an informed decision. They need to understand the risks associated with continuing gas service to fully explore their options, such as the cost of converting to heat pumps or even installing rooftop solar. The problem NWN faces is that if it provides good education to its customers about the environmental risks of fossil gas, the uncertainty around decarbonizing the gas system, and the cost of decarbonization, this information will negatively affect its corporate image, reduce its sales volume, and its bottom line. The Company acknowledged as much in its 2021 Annual Report:

> [i]f customers, legislators, or regulators have or develop a negative opinion of us and our services, or of natural gas as an energy source generally, this could make it more difficult for us to achieve favorable legislative or regulatory outcomes. Negative opinions could also result in sales volumes reductions or increased use of other sources of energy, or additional difficulties

> in accessing capital markets. Any of these consequences could adversely affect NW Holdings' or NW Natural's financial position, results of operations and cash flows.[14]

This is a revealing statement. If customers develop a negative opinion of natural gas as an energy source generally, this could harm NWN's shareholders. NWN's market research shows that the public's opinion of NWN has declined and NWN has responded with a "political campaign"[15] to counter negative impressions and protect their business model. The problem is that political campaigns are designed to influence opinion and behavior, and not designed to give the public objective information upon which the public can rely to make an informed decision.

Q. Please explain.

A. NWN is beginning to see cracks in its image. It regularly surveys people in its service territory to gauge their approval of natural gas. From 2015 to 2019, the percentage of people who believed that natural gas was more energy efficient than electricity fell by 6 percent, the percentage of people who viewed gas as more environmentally friendly than electricity fell 12 percent, and the percentage of people who believed that gas had a greater negative environmental impact than electricity grew 21 percent.[16] Meanwhile, the percentage of NWN customers who prefer a natural gas furnace over a heat pump declined by 10 points in the same timeframe.[17]

[14] Northwest Natural Holdings 2021 Annual Report, p. 20
[15] CUB Exhibit 104, quote from NWN CEO David Anderson at Northwest Gas Association's Annual Energy Conference.
[16] CUB Exhibit 108.
[17] CUB Exhibit 108.

NWN's response was to launch a campaign that is "broader than marketing" and is comparable to "a political campaign."[18] Much of this political campaign, from market research to advertising, is inappropriately being funded by customers under the Company's proposal. Like a lot of political campaigns, it is not giving customers factual information. Growing out of the Company's market research are recommendations to influence perceptions that natural gas is affordable. Simultaneously, the campaign seeks to influence public opinion about RNG from the Company's perspective in an attempt to minimize the perception of NWN's impact on climate change. As discussed above, relying on RNG and other investments to address climate change will significantly increase the cost of gas. Reinforcing perceptions that natural gas is affordable while claiming that it is on the path to a clean system can mislead consumers about the potential costs of decarbonizing the gas system. It is inappropriate for customers to be funding a campaign that is directed at improving the Company's image. My testimony will address recommendations around the Company's campaigns and advertising in a later section.

III. GROWING THE GAS SYSTEM

Q. Explain how growing the gas system protects the Company's shareholders but is not in the interests of existing customers.

A. NWN's Annual Report clearly states that reductions in future sales volumes could adversely affect NW Natural's results of operations,[19] which is a calculation of

[18] *Supra,* see note15.
[19] Northwest Natural Holdings 2021 Annual Report, p. 20

earnings. It is through this lens that NWN evaluates local government policies like a ban on expanding fossil fuel infrastructure. However, existing customers are much more likely to be concerned with how expanding the gas system affects the costs of service to their home.

Traditionally, it has been assumed that when utilities grow, there is a benefit to customers. Load growth has been associated with allowing the utility to spread its fixed costs across a wider footprint, thereby lowering the rates charged to all customers. It is important to recognize that customers benefitting from load growth is an assumption, not an empirical fact. If this was inherently true, a small utility like Cascade Natural Gas would have higher rates than a larger utility like NWN. However, Cascade's 2020 residential rates were 21% lower than NWN's.

When a layer of carbon regulation, such as the CPP, is placed on the gas industry, adding new customers no longer provides a benefit to existing customers. NWN is suing the state of Oregon in an attempt to get rid of this regulation in order to protect its business model. But the CPP is only one example of carbon regulation. If the DEQ program is struck down, there are likely to be others. And even if it is not struck down, there is likely to be additional regulations at local, state, and federal levels. Carbon regulation is coming, and carbon regulation will require significant reduction in the combustion of fossil fuels—including natural gas. Asking customers to invest in fossil fuel infrastructure as fossil fuels are phased out creates economic risks for customers.

The CPP is useful to model how carbon limits affect NWN's operations and, thereby, its customers. Under the CPP, emissions must be reduced by 50% from current levels by 2035. The CPP establishes a baseline based on average emissions from 2017 to 2019 and requires a 50% reduction from that baseline. All load growth after 2019 is above the baseline, so the rule will require 100% of emissions from post-2019 load growth be eliminated. NWN is projecting adding 137,378 new residential customers in Oregon by 2035, a 23% increase in the number of residential customers.[20] Even if we assume that new customers being added to the system are more energy efficient than an average customer's usage, the projected growth in the number of customers will increase the required GHG reductions from 50% of current load to 69% of current load.[21]

Gas system costs and revenues are often broken down into commodity costs/revenue and margin costs/revenue. Commodity costs represent the costs of the actual gas that customers use. If a customer uses an additional therm of gas, the Company must procure an additional therm. These costs vary directly with usage. Margin costs represents the rest of the system: the pipes, the call center, the officers, the advertising, and all the other costs of the gas system. While these costs are often called fixed costs, this identification is an oversimplification. Enough new customers will cause an increase in some of these "fixed" costs, and this will likely happen if NWN achieves its projected customer growth.

[20] Exhibit 103.
[21] CUB Exhibit 105.

Let's look at the cost that a single new gas customer puts on the system. NWN assumes there will be a great deal of efficiency gains, so let's assign a new home the usage that NWN projects as the average usage in 2035. This would represent 532 therms/year (which is well below the 630 that is baked in the DEQ baseline) which equates to emissions of 2.82 metric tonnes/year.[22] If we assume that this home will have gas equipment and be on the system for the next 20 years, then that customer will add between $4,519 and $5,648 in carbon reduction costs[23] based on the costs in NWN's UM 2178 workpapers. This is equivalent to between 11 and 14 years of margin revenue from that customer. But this does not include the cost of the Line Extension Allowance (LEA) associated with this new customer. The current LEA for a customer with a gas furnace is $2,875. Adding this recognizes that a new customer adds costs that are equal to 19 to 22 years of margin. However, NWN's LEA is financed over 40 years.[24] The financing cost over the first 20 years on the system is $1,907, which adds another 5 years of margin (23 to 26 years). See Table 1 below.

Table 1

Cost Associated with a Single New Customer	Cost	Years of Margin
GHG Reductions	$4519 - $5648	11 - 14
Line Extension Allowance (LEA)	$2,875	7
Financing cost of LEA	$1,907	5
total	$9300 -$10430	23 - 26 years

[22] CUB Exhibit 105.
[23] Based on NWN's modeling in UM 2178, CUB is assuming carbon reduction costs of between $80 and $100 per metric tonne. In its decarbonization modeling in UM 2178, NWN projected the cost of CCI investments as between $80 and $100 per tonne of carbon and projected additional energy efficiency priced at $100 per metric tonne of carbon.
[24] CUB Exhibit 106.

If a new customer stays on NWN system for 20 years, the margin contribution that customer makes is not enough to pay for the GHG emission reductions associated with that load and the return of and return on the line extension allowance (LEA). If the customer installs a heat pump and leaves NWN's system after 20 years, there will also be stranded costs associated with the line extension that have not yet been recovered. The system loses money on this customer. And this is only dealing with *some* of the costs to serve this customer. If this customer (along with other load growth) leads to a need to expand the gas system's capacity, that is an additional cost that is not accounted for. If the number of new customers added increases the needs of the call center, that cost is not accounted for. If the advertising budget goes up because there are 100,000 more customers, those costs are not accounted for. If the CEO and other officers get additional compensation because of the larger system, those costs are not accounted for.

IV. RECOMMENDED ADJUSTMENTS

A. Customer growth.

Q. Is CUB proposing that the Commission prohibit NWN from expanding its system?

A. Not at this time. However, CUB believes that there is a fundamental question of whether it is prudent to keep adding pipe in the ground to serve new customers under an assumption that that equipment will be used for 40 to 65 years when the Company's own market research shows that there is an increasing expectation that a gas furnace will be replaced by a heat pump. Expanding the system does

not benefit other customers and could leave stranded costs that will fall on either Company shareholders or other customers. NWN's UM 2178 modeling does not show a reasonable path to meet CPP requirements while growing the system. Without being able to present a reasonable plan for meeting State decarbonization goals, expanding the gas system without limit cannot be found to be prudent.

Utilities are generally required to prove that new capital investments are prudent, based upon information available to the utility at the time it made the investment. LEAs to add new customers are an exception to this general rule. They are assumed prudent without any required demonstration from the utility. However, Oregon is in a housing crisis. It does not make sense to throw an immediate curveball into the new housing market, as removing NWN's line extension allowance may do. Instead, CUB requests that the Commission phase out the presumption of prudence associated with capital investments to add new customers.

Q. Doesn't this amount to a ban on new customers?

A. No. A lack of presumption of prudence does not mean that the Company cannot make such investments, it means that, in order to be granted cost recovery, the Company must prove that the expansion is prudent. NWN's modeling in UM 2178 shows that there are serious questions as to whether the Company can comply with the CPP while adding more than 100,000 new customers. CUB's analysis above shows that even if NWN can comply, the cost of that compliance is great enough that growing the system does not benefit existing customers.

Adding new customers adds to the cost of compliance. Currently, we are in a hole and need to stop digging – we must stop adding additional emissions. Discouraging expansion of the system without a demonstration of prudence allows for a pause in expansion of the gas system until such prudence can be demonstrated. In addition, without a presumption of prudence, growth related investments should not receive financing through a LEA.

Q. What is an LEA?

A. An LEA is the construction allowance associated with connecting a new customer to the utility system. It can be seen as a cap on the amount that a utility can spend to hook up a new customer or the utility can pay a housing developer to connect a new home to the gas system. That cap is based, in part, on the revenue the new home is expected to bring to the system. Here is how the PUC described it to the legislature in 2016:

> The natural gas utilities decide whether to build pipelines and extend their distribution systems into unserved areas, subject to the PUC's review. The utilities also establish their own distribution extension policies, which the PUC reviews and approves to help ensure that the rates paid by all ratepayers for these extensions are fair, just, and reasonable.
>
> The PUC does not require new customers to pay all the costs associated with an extension. Rather, extension policies allow the utility to recover a portion of the extension costs from all customers (usually referred to as a construction allowance), to recognize the increased revenue the new customer will provide through the rates they will pay in the future. Any costs above the construction allowance must be paid by new customers through a surcharge or through other funds secured by the utility or others to fund the expansion.
>
> Each utility currently calculates this allowance for new residential customers differently. NW Natural's construction allowance is five times the annual average margin expected from new customers.

> Avista's allowance is three times the estimated gross revenue expected from the new customers. Cascade's allowance is 4.5 times the estimated gross margin (gross revenue less cost of gas) to be derived from the new customer.[25]

Q. Is this still NWN's LEA?

A. No. In fact, this was not the LEA during the Senate Bill 32 Work Group that established the LEA policy. I served on that Work Group and the description above was my understanding of the LEAs of the various gas utilities, including NWN. But a few years before the SB 32 Work Group, NWN changed their LEA to make it much more generous. In a rate case in 2012, the Company changed to its current LEA, which looks out over 30 years and calculates an Internal Rate of Return. This amounts to $2,875 for a home with gas space heating. There are several problems with NWN's approach.

Q. What are they?

A. First, use of a 30-year analysis makes no sense. With the growing trend towards heat pumps for efficient heat and cooling, and NWN's own market research showing that a growing number of its customers intend to replace their gas furnace with a heat pump, it does not make sense to assume that a new customer will be on the system beyond the useful life of its gas appliances, particularly a gas furnace. The useful life of a gas furnace is generally considered to be 15 to 20 years.[26]

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[25] Oregon Public Utility Commission, Senate Bill 32 Work Group – Study of Natural Gas Expansion to Unserved Areas, page 9.

[26] https://a1mechanical.com/gas-furnace-lifespan/#:~:text=The%20average%20life%20expectancy%20of,evaluating%20your%20options%20for%20replacement.

Second, CUB believes that the LEA should recognize that new fossil fuel load will require the system to fund carbon reduction. We calculated these costs above as between $4,500 and $5,600. These costs should be incorporated when determining a LEA.

Q. What does CUB recommend for an LEA?

A. First, CUB would suggest rejecting the current 30-year methodology and returning to the old methodology of 5-years of margin. This will reduce the LEA to $2,330.[27] Second, CUB recommends that this be adjusted due to expected carbon reduction costs. However, doing so would create a negative LEA of between $2,200 and $3,300. CUB recognizes that moving from a positive $2,875 LEA to a negative one of a similar or larger amount is a drastic change. We also recognize that Oregon has a housing crisis, housing development takes some time, and developers may have already begun projects with an expectation of subsidization at the current LEA. Therefore, CUB recommends that the current LEA be reduced to $2,330 through the end of calendar year 2023 to accommodate existing housing projects, then be reduced in 2024 by 50% and be eliminated in 2025.

B. Market Research and Advertising.

Q. What are our concerns about NWN's market research and advertising?

A. Much of the Company's market research and advertising is aimed at shareholder interests, not customers' interests. NWN is concerned that negative attitudes

[27] CUB Exhibit 105.

about the company or the fossil fuel it sells "could adversely affect NW Holdings' or NW Natural's financial position, results of operations and cash flows."[28] CUB understands why the Company is doing so much market research and advertising designed to protect the corporate image of the Company but believes much of the market research and advertising is about promoting more sales and benefiting shareholders.

1. *Market Research*

Q. Can you explain how NWN's market research is designed to protect their corporate image?

A. CUB sent a data request to the Company for all customer surveys and focus groups that were booked to regulated accounts. Our concern is not that NWN's market research is designed to protect shareholder interests, but NWN is charging those costs to customers. The Company provided 13 responses from the last three years. CUB includes all 13 in CUB Exhibits 106 -119. Some of these relate to safety issues that are appropriately charged to customers, but many are trying to identify ways to market ideas that NWN's product is clean and affordable and is preferable to electricity. Since NWN competes against electricity to serve space and water heater loads, these comparisons to electricity are designed to protect shareholders by increasing sales. In addition, some of these contain misleading information that is not designed to help customers understand the actual benefits and risks of natural gas.

[28] Northwest Natural Holdings 2021 Annual Report, p. 20.

CUB Exhibit 107 DR 5 attachment 1a, b, and c are from a focus group and show the questionnaire, the transcript, and the results. The description of RNG that is used is misleading, suggesting that NWN was getting its RNG from local sources:

> Renewable Natural Gas is interchangeable with conventional natural gas. It's produced ***locally*** from waste streams that would otherwise be emitting methane directly into the atmosphere.[29]

This misleading statement led to additional misinformation. When one of the focus group participants raised the concern that RNG would be more expensive than conventional fossil gas, the moderator reacted by suggesting that it cannot be more expensive since it is local:

> [y]ou wouldn't be going off somewhere, you'd be going in your own local community, presumably, to get your waste products. Does that seem like it would be more expensive or not?[30]

With respect to local government gas bans, the focus group was asked whether they agreed with the premise in the following statement:

> [s]ome West Coast cities are passing bans on new natural gas hookups for homes and buildings, with the goal of eventually banning it altogether[31]

This is similar to a question that NWN asked in a different customer survey, whether they agreed with the following statement:

> [i]n Seattle, the city council is considering a ban on new natural gas hookups, and could try to eventually ban natural gas altogether – forcing homeowners to switch to electricity.[32]

While a number of cities, including Seattle, have banned new gas hookups as part of local climate plans, both of these questions conflate a ban on new gas with a

[29] CUB Exhibit 107 (emphasis added).
[30] CUB Exhibit 107.
[31] CUB Exhibit 107.
[32] CUB Exhibit 108 – DR 5, attachment 2a

full ban on gas which would force homeowners to switch to electricity. CUB is not aware of a city that is contemplating a requirement that homes that currently are served by gas switch to electricity. But, when reporting the results of these surveys, there no longer is a reference to requiring existing gas customers to switch. The results discuss customer/participants reactions to "gas ban" without any reference to whether they are referring to new hookups, existing customers, or both.

Overall, much of the surveys deal with attitudes about whether customers prefer gas or electricity, and how to improve NWN's environmental image. We see both as primarily about corporate image and promoting additional sales. We found 6 of the 13 surveys included significant questioning about safety, customer attitudes about services the company offers, and interactions with the company. Less than half appeared to be arguably linked to legitimate utility purposes.

Q. What is CUB's recommendation?

A. CUB is recommending that the budget for customer surveys and focus groups be cut in half to reflect that at least half of this activity is focused on concerns that primarily benefit shareholders. NW Natural is requesting $53,000 of Oregon allocated O&M associated with customers surveys in the test year.[33] CUB estimates a $27,000 revenue requirement reduction associated with this reduction, that reduces the Company's test year amount by 50%.

2. Advertising

[33] CUB Exhibit 126.

Q. Please summarize your recommendations.

A. NWN is proposing to increase its customer-funded advertising budget from $1,400,000 to $1,847,073[34]--a 32% increase. CUB recommends that the Commission reduce NWN's advertising down to the level that is presumed reasonable by rule, $796,789.[35] CUB estimates that the revenue requirement associated with this adjustment is $1.1080 Million

Q. Does NWN need to increase its advertising?

A. No. NWN is one of several utilities that serve the Portland market. NWN's advertising awareness – the percentage of customers recall seeing its advertising – is greater than the other utilities (PGE, Pacific Power and Clark Public Utilities) in the Portland metro area.[36] NWN's advertising therefore has more recall than peer utilities, demonstrating that it does not need to increase its advertising.

CUB is concerned that some of the advertising is not designed to provide customers good information about products and services from NWN, but is designed to counter perceptions that natural gas is harming the planet. For example, 49% of people who remember ads remember NWN saying that "natural gas is environmentally friendly" and 38% remember hearing the message that "natural gas plays a role in reducing greenhouse gas emissions."[37] There is little doubt that NWN advertises a lot and that customers are picking up the messages

[34] CUB Exhibit 120 - DR 274, Attachment 1, Tab "Total Cat A Budget"
[35] OAR 860-026-0022(3)(a) ("For rate-making purposes: Advertising expenses in Category "A" are presumed to be just and reasonable in a rate proceeding to the extent that expenses are twelve and one-half hundredths of 1 percent (0.125 percent) or less of the gross retail operating revenues determined in that proceeding.")
[36] CUB Exhibit 119 - DR 5, attachment 13b
[37] CUB Exhibit 119 - DR 5, attachment 13b

that NWN wants customers to hear. But some of the advertising does not meet the PUC definition of Category A, Category C, or Category E and should not be assumed to be recoverable from customers.[38]

Q. Can you explain how the PUC categorizes advertising?

A. Yes. There are 5 types of advertising:

- **Category A** – Energy efficiency or conservation advertising expenses that do not relate to a Commission-approved program, utility service advertising expenses and utility information advertising.
- **Category B** – Legally mandated advertising expenses
- **Category C** – Institutional advertising expenses, promotional advertising expenses and any other advertising not fitting into Category A, B or D.
- **Category D** – Political advertising and nonutility advertising; and
- **Category E** – Energy efficiency or conservation advertising expenses that related to a Commission-approved program.[39]

The important distinction between categories is that advertising that offers customers information about energy efficiency or about utility services or programs are Category A, and allowable at certain levels, and advertising that is institutional (corporate image) or promotional is Category C and is not recoverable. Advertising about energy efficiency, payment options, arrearage management programs, the call-before-you-dig program are all examples of advertising that fits Category A. Advertising that promotes the use of gas over electricity is promotional and should not be recoverable. Advertising that makes general claims about gas comfort is promotional. Advertising that claims that gas

[38] OAR 860-026-0022.
[39] OAR 860-026-0022(2)(a)-(e).

is environmentally friendly is promotional. From CUB's review, much of the advertising does not provide customers useful information about utility services and information, but instead is designed to promote NWN and promote natural gas both generally and as an alternative to electricity.

Generally, in Commission practice, Category A has been presumed to be reasonable to the extent that expenses are 0.125% of gross retail operating revenues. In the case of NWN, that allowable amount is $796,789.[40] The amount that NWN currently charges to customers, $1.4 million, is well above this presumed to be reasonable limit. Historically, NWN has asked for advertising above this amount, based on the fact that PGE gets to spend more on a per customer basis and that Portland is an expensive media market.

Q. Does NWN's advertising qualify as Category A?

A. Much of it does not. Ads that deal with safety, energy efficiency rebates, payment options, and energy assistance fit within Category A advertising, but a large amount of NWN advertising is not designed to provide customer with good information about programs or services, but instead is designed to promote NWN and the use of natural gas generally.

CUB asked the Company to provide copies of ads that were booked to regulated accounts that are charged to customers. CUB Exhibit 121 shows four digital ads. These are ads that generally promote gas for cooking and heating and should be

[40] The presumed allowable amount will fluctuate with NWN's final approved revenue requirement.

classified as Category C, promotional advertising. Each has a picture and the following words:

1. Put good on the table.
   Natural gas offers better control for better cooking
   LEARN ABOUT COOKING WITH GAS

2. More Control. Instantly.
   Natural gas offers better control for better cooking.
   LEARN ABOUT COOKING WITH GAS

3. Cozy on demand.
   Natural gas makes comfort easy and affordable.
   LEARN ABOUT HEATING WITH GAS

4. Instant, affordable comfort.
   Natural gas helps create the cozy comfort of home.
   LEARN ABOUT HEATING WITH GAS

CUB Exhibit 122 shows additional digital ads which again promote natural gas generally, but without a reference to programs of service. All three ads begin with the words:

Affordable,
Dependable,
Natural Gas.
A house just isn't a home without it.

One ad ends with the phase, LEARN MORE ABOUT COOKING WITH GAS. One ends with the phase, LEARN MORE ABOUT HEATING WITH GAS. The final one ends with the phase, LEARN WHY PEOPLE LOVE GAS.

CUB Exhibit 123 is a print ad in which the Company promotes natural gas for cooking with no reference to services or programs offered by NWN.

CUB Exhibit 124 are digital ads which state that 8 out of 10 homebuyers prefer natural gas. This is designed to enhance corporate image and is promotional but does not give customers good information about services and programs.

CUB Exhibit 125 is an ad about RNG that began running before NWN's system was delivering any renewable gas. NW Natural's corporate image on environmental issues is declining, and this ad is designed to promote a greener image even when NWN was not selling any RNG. This advertisement is misleading and does not reflect actual utility operations.

The heat you prefer
Becoming renewable
Less We Can
Renewable Natural Gas is on its way home

Q. What is CUB's recommendation for NWN advertising expense?

A. NWN currently mislabels some Category C, marketing and corporate image advertising, as Category A advertising and charges it to customers. At the same time, NWN's advertising is outperforming other utilities in the Portland market. There is no justifiable reason to raise NWN's customer-financed advertising budget. NWN's request to increase its advertising budget by 32% should be rejected.

Because NWN included non-recoverable advertising in its Category A advertising, this suggests that NWN's Category A advertising budget is already too high. NWN's business model is being challenged and the Company is

responding with a "political campaign" that is "broader than marketing."[41] Much of this campaign is built around promoting NWN and promoting natural gas. It is important that customers not be asked to fund this effort. CUB recommends that the Commission reduce NWN's advertising down to the level that is presumed reasonable by rule, $796,789. CUB estimates that the revenue requirement associated with this adjustment is $1.103 Million. If the Company wishes to go above this amount, it needs to first show that it can comply with the limits placed on allowable Category A. Some of the advertisements included in the test year of this rate case that go beyond the amount presumed to be reasonable do not comply with applicable advertising limits.

C. Low Income rates and customer deposits.

Q. HB 2475 provided the Commission with authority to consider income in rate setting. Does CUB have a recommendation relating to low-income ratemaking?

A. Last fall, NWN rates increased by 13.2%, and in this case NWN is proposing an additional 11.8% increase. Combined, these two increases could leave customers with rates that are 25% higher than when the legislature approved HB 2475. There is a real need to implement a program to help customers. CUB, however, recognizes that there is a larger group of stakeholders interested in the design of a program and supports an inclusive, collaborative effort for this design. We also recognize that there is a real need to get a program in place before next winter's heating season. The legislature passed this bill 11 months ago, and the heating

[41] *Supra,* see note15.

season is now just 6 or 7 months away. If nothing is done before then, low-income customers could go into that heating season with rates that are 25% higher than when the legislation allowing for discounts was passed. If no program is in place by the rate effective date of this order, the Commission should consider extending the NWN 20% employee discount to customers who self-certify that their income qualifies them for low-income assistance until a permanent program implemented.

Q. Please summarize CUB's position on deposits.

A. CUB recommends that after the effective rate of this general rate case, NWN no longer collect residential customer deposits. CUB also requests that the Commission order NWN to remove all rules from its tariff book that reference collecting deposits from residential customers.

Q. Please explain how and when the Company currently collects deposits from residential customers.

A. Residential customer deposits are collected subject to Rule 2 of NWN's Oregon Tariff Book.[42] Deposit requirements are further detailed in OAR 860-021-0200. Currently, NW Natural may request deposits for both new and existing customers, but they are not required to do so. New customers may be required to provide deposits unless they establish good credit.[43] Existing customers who struggle to pay their bills can be charged deposits.

Q. What is CUB proposal around residential customer deposits?

[42] https://www.nwnatural.com/about-us/rates-and-regulations/oregon-tariff-book
[43] OAR 860-021-0200(2). ("An applicant or customer *may* be required to pay a deposit . . . .") (emphasis added).

A. CUB is proposing to have NWN stop collecting residential customer deposits after the rate effective date of this general rate case.

Q. Why is CUB proposing this policy change?

A. Customer deposits increase energy burden for residential customers. Residential customer deposit polices explicitly target customers who are more vulnerable and can least afford a deposit. There is a housing crisis in the Oregon and deposits can make the situation worse. Low-income customers are often forced to choose which bills they can afford to pay, and deposits exacerbate this issue. CUB is also concerned that due to the COVID-19 pandemic shutdown, many customers have bill arrearage problems which could lead to more customers being subject to deposits.

Q. Please explain the link between energy burden and customer deposits.

A. The level of deposit required is based on an estimated 2 months of service. When there is no basis to forecast 2 months of service, a set amount of $125 is required for a customer with space and water heating ($100 for a customer with just space heating). After this rate case, deposits based on 2 months of service could be 25% higher than they were a year ago, greatly increasing the burden of the requirement. Deposits currently can be paid in full or over 90 days. If the deposit is paid over 90 days, 1/3rd of the amount is due immediately to establish service.[44] Essentially, the customer is required to pay for 5 months of service during the first 3 months after becoming a NWN customer. For a low-income customer, this is a significant burden.

[44] PGE, Rule E 20-44, Establishing Credit/Treatment of Deposits.

Further, NWN rates are highly seasonal. Adding additional charges onto winter heating bills makes it much more difficult for low-income customers. The threshold at which individuals are energy burdened is often defined as paying more than 6% of your household income on energy. This is often calculated on an annual basis, but for many customers who live paycheck-to-paycheck, bills and income need to balance every month. Customers who might not be energy burdened on an annual basis, still may struggle to pay winter heating bills. On an annual basis, about 433,000 Oregon households spent more than 6% of their income on their energy bills in 2018.[45] This represents 27% of households.[46] For households that are below 200% of the federal poverty level, the average amount by which actual home heating bills exceeded what is considered "affordable" was $577 per Oregon household.[47]

Q. Please explain how this can make the housing crisis worse.

A. According to the city of Portland, the average monthly rent in Portland was $1,491 in 2019 or $17,892 per year. A person working full-time for minimum wage in Portland earns $29,120. Before someone can confront the problem of utility deposits, they must first deal with the cost of housing.

It is expensive to move into a rental property. In order to even apply to rent a Portland apartment from American Property Management, an applicant must pay

[45] https://www.oregonenergyfund.org/oregon-energy-burden-study/.
[46] *Id.*
[47] CUB Exhibit 127, The Home Affordability Gap, Oregon, 2020.

a $45 screening fee. The applicant must verify that their income is 2-2.5 times the monthly rental amount. If an applicant has good credit, a positive rental history, has been at their current job for at least 6 months, and has adequate income, the applicant must still pay a $500 security deposit to move in. Applicants without good credit must pay as much as $900 for a security deposit.[48] Some rental units charge first and last month's rent to move in.[49] In total, a Portland resident may have to pay nearly $4,500 to secure housing. For low-income households, it can be extremely difficult to pay for the cost of moving into a new place. Having a utility charge a deposit for service, on top of fees and charges related to the rental unit, simply makes establishing shelter even more difficult. And this exacerbates the housing crisis.

Q. Why is CUB asking for this now?

A. There are two reasons.

First, there is a small revenue requirement impact from removing deposits. Utilities use deposits as working capital and customers receive a rate base credit associated with customer deposits net interest paid on the deposit. This issue is therefore relevant to this general rate case.

Second, in response to COVID-19, the Commission stopped having utilities charge deposits through October 2022, and allowed deposits to be applied to arrearages. By October 2022, NWN will not have charged new deposits for more

[48] http://rent.apmportland.com/screening-requirements/.
[49] Oregon Law Center, Landlord-Tenant Law in Oregon.

than 2 years. Customers who were able to pay their bills in a timely manner through COVID have had their deposits returned, and many customers who fell behind on their bill had their deposit applied to the bill. This means that the current level of deposits held by the Company should be at a historic low, so this change in deposit policy will have minimal affect.

Q. Have other utilities in North America suspended customer deposits for residential customers?

A. Yes. Since 2017, Hydro One, a Canadian utility has eliminated residential customer deposits. Natural gas and electric utilities subject to the jurisdiction of the Department of Public Utilities of Massachusetts are not allowed to collect customers deposits from residential customers.[50] Cascade Natural Gas does not charge deposits in its Oregon service territory. Portland General Electric has agreed to stop requiring deposits on the rate effective date of their recent rate case. Avista Utilities does not charge deposits to new customers, but still charges deposits to existing customers who struggle to pay bills. Earlier this year, the National Consumer Law Center joined with several other groups to issue a call for deposits for residential utility service to be eliminated.[51]

Q. What is the revenue requirement impact of removing customer deposits for residential customers?

A. It is important to recognize that deposits are not a direct contribution to revenue requirement. When NWN charges a deposit, it may utilize the revenue, but must

[50] https://www.mass.gov/doc/220-cmr-27-elimination-of-the-practice-of-gas-and-electric-companies-of-requiring-a-deposit/download.
[51] https://www.nclc.org/images/pdf/special_projects/covid-19/IB_Utility_Bill_of_Rights.pdf.

pay it back with interest. When customers contribute to revenue requirement, the utility spends the money on expenses and there is no money to return to customers. There is a minor revenue requirement effect because the Company can no longer utilize that deposit revenue during the year in which the company holds the deposit.

CUB estimates that the revenue requirement associated with removing deposits for residential customers is less than a 50-thousand-dollar increase.[52] CUB urges the Commission to accept this recommendation as a matter of policy and equity.

Q. Does this conclude your testimony?

A. Yes.

[52] Pending a data request, CUB will provide an exact number in the next round of testimony.

WITNESS QUALIFICATION STATEMENT

NAME: Bob Jenks

EMPLOYER: Oregon Citizens' Utility Board of Oregon

TITLE: Executive Director

ADDRESS: 610 SW Broadway, Suite 400
Portland, OR 97205

EDUCATION: Bachelor of Science, Economics
Willamette University, Salem, OR

EXPERIENCE: Provided testimony or comments in a variety of OPUC dockets, including UE 88, UE 92, UM 903, UM 918, UE 102, UP 168, UT 125, UT 141, UE 115, UE 116, UE 137, UE 139, UE 161, UE 165, UE 167, UE 170, UE 172, UE 173, UE 207, UE 208, UE 210, UE 233, UE 246, UE 283, UG 152, UM 995, UM 1050, UM 1071, UM 1147, UM 1121, UM 1206, UM 1209, UM 1355, UM 1635, UM 1633, and UM 1654. Participated in the development of a variety of Least Cost Plans and PUC Settlement Conferences. Provided testimony to Oregon Legislative Committees on consumer issues relating to energy and telecommunications. Lobbied the Oregon Congressional delegation on behalf of CUB and the National Association of State Utility Consumer Advocates.

Between 1982 and 1991, worked for the Oregon State Public Interest Research Group, the Massachusetts Public Interest Research Group, and the Fund for Public Interest Research on a variety of public policy issues.

MEMBERSHIP: National Association of State Utility Consumer Advocates
Board of Directors, OSPIRG Citizen Lobby
Telecommunications Policy Committee, Consumer Federation of America
Electricity Policy Committee, Consumer Federation of America
Board of Directors (Public Interest Representative), NEEA

BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

UM 2178

In the Matter of	)	
	)	
OREGON PUBLIC UTILITY COMMISSION STAFF,	)	COMMENTS OF THE OREGON CITIZENS' UTILITY BOARD ON MODELING AND ALTERNATIVE SCENARIOS
	)	
Natural Gas Fact Finding per Executive Order 20-04 PUC Year One Work Plan.	)	
	)	

COMMENTS OF THE

OREGON CITIZENS' UTILITY BOARD

September 24, 2021

BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

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I. INTRODUCTION

CUB appreciates the efforts of the natural gas utilities to model compliance with Oregon DEQ's proposed Climate Protection Program. CUB recognizes that the Oregon DEQ program is not finalized, the utilities had a limited amount of time to model compliance and that the modeling does not contain the depth and complexity that one would see in an Integrated Resource Plan. Despite this, CUB has found this modeling exercise extremely helpful and informative to understanding the costs and risks that decarbonization brings to the gas system.

The three utilities took different approaches, but all three rely on the development of new technology that currently is not commercialized, and the modeling therefore includes uncertain assumptions related to commercialization. In addition, the utilities modeling of energy efficiency as a compliance tool is drastically different between the three utilities. For example, one of the utilities includes some electrification of heating load as an energy efficiency measure. CUB continues to have concerns over the risks that decarbonization presents to natural gas customers, as detailed in our Executive Order 20-04 work plan comments.[1]

[1] Comments of the Oregon Citizens' Utility Board on Oregon Public Utility Commission Executive Order 20-04 Work Plans (Oct. 28, 2020) *available at* https://www.oregon.gov/puc/utilities/Documents/EO20-04-Comments-CUB.pdf.

II. RESPONSE TO UTILITY MODELING

A. *Technology Risk Related to RNG and Hydrogen.*

In their modeling, each of the utilities relies on technologies that are not currently commercialized. It is important to recognize the degree of risk that unproven and un-commercialized technology brings to the gas system. In the 1990s, the electric utility industry expected that geothermal power generation would be a renewable resource on a scale that is similar to wind and solar. However, while geothermal has been, and continues to be, developed, the rate is not near the scale of the old forecasts. The electric grid has fallen short by many gigawatts of the volumes of geothermal electricity that was once forecast. This is the nature of nascent and unproven technology.

The RNG and hydrogen forecasts which all three utilities rely on is technology that is not currently commercialized. With regards to RNG, anaerobic digestion is a technology that is currently commercialized, but the utilities' modeling also relies on thermal gasification, which is not. According to the American Gas Association:

> *There is considerable uncertainty around the costs for thermal gasification of feedstocks, as the technology has only been deployed at pilot scale to date or in the advance states of demonstration at pilot scale.*[2]

Utility scale green hydrogen production requires water, a large utility-scale electrolyzer and a great deal of renewable power.[3] The electrolysis process is currently not cost effective, which means the market for electrolyzers is small. Currently, big electrolyzers are in short supply.[4] While the levelized cost of renewable power sources has decreased, having enough supply of renewable generation at a low enough cost is necessary for hydrogen production. While there is an expectation that renewable overgeneration will supply power at an extremely low cost which may allow green hydrogen to become a cost-effective energy source, there are risks that commercialization will be slower, more difficult, and more costly.

The utilities disagree on the timeline for adding hydrogen. NWN begins adding 589,385 dekatherms of hydrogen in 2030.[5] Avista plans on adding 33,964 dekatherms of hydrogen in 2022 to its system and blend in 2,330,882 dekatherms by 2030.[6] Avista's early hydrogen blending seems to be driven by a need to maximize hydrogen use in the 2030s.[7]

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[2] American Gas Foundation/ICF, Renewable Sources Of Natural Gas: Supply and Emissions Reduction Assessment, December 2019 *available at* https://gasfoundation.org/wp-content/uploads/2019/12/AGF-2019-RNG-Study-Full-Report-FINAL-12-18-19.pdf.

[3] It has been estimated that 1 kg of Hydrogen requires 9 kg of water.

[4] Jason Deign, Greentech Media, So What Exactly Is Green Hydrogen, June 29, 2020

[5] UM 2178, Northwest Natural Workpapers, Base Case.

[6] UM 2178, Avista Utilities Workpapers, Supply Curves, Hydrogen

[7] Avista cites the Fisher-Pry model of technology substitution. This is based on a 1971 article that provided a model for forecasting how a new technology will replace an existing technology. It should be noted that the authors of this model state "the model, by our first assumption, is not to be applied to substitutions prior to their achieving a magnitude of a few percent, at which time a definite growth pattern is established.

Cascade's modeling relies heavily on renewable gas, but its forecast of available RNG is questionable. It assumes the amount that is available is the midpoint between what the American Gas Foundation says is the technical potential and what is the high potential.[8] The share available to Cascade and included in the forecast is based on this assumption. In addition, the largest source of Cascade's RNG is from municipal solid waste through thermal gasification. Due to the lack of commercialization of thermal gasification, CUB is concerned about the assumption that there will be an even greater supply available than the American Gas Foundation's high forecast.

B. *Price Risk Related to RNG and Hydrogen.*

While the utilities forecast future prices for RNG and hydrogen, there is a great deal of uncertainty with these price forecasts. Generally, when forecasting prices of future technology, there will be an attempt to forecast the cost of production and recognize that, as production increases, the cost of production will fall. There are two problems with this: First, there are inherent difficulties in forecasting the cost of production for a commodity that has not been commercialized. The second problem is the role that supply and demand play in establishing prices. The market for RNG and hydrogen will not begin as a mature market. There will be barriers to entry that restrict supplies. Feedstock for RNG is limited.[9] Excess renewable power is limited. Electrolyzers are expensive. There may not be adequate supply of RNG and hydrogen for the market.

The RNG and hydrogen market may be further worsened by excess demand as both electric and gas utilities will be competing for RNG and hydrogen to meet economy-wide decarbonization goals and mandates.[10] Under HB 2021, Oregon is not allowed to build new natural gas power plants. Hydrogen and/or RNG power plants are expected to be used as a potential capacity resource for the electric grid. Even the economy-wide decarbonization studies that assume electrification of buildings still assume that there is robust development of RNG and hydrogen.[11] But those studies see these fuels as being needed for energy uses where electricity is not an alternative: long haul freight, airlines, international shipping, industrial processes and peak electrical generation. There may be more demand than supply, which will increase the price.

C. *Energy Efficiency Assumptions and Risks.*

The three utilities used different approaches to modeling energy efficiency. From the workshop, CUB understands that Avista used the most recent Energy Trust of Oregon (ETO) forecast from

http://maecourses.ucsd.edu/MAE119/WI_2018/ewExternalFiles/Simple%20Substitution%20Model%20of%20Technological%20Change%20-%20Fischer%20Pry%201971.pdf

[8] UM 2178, Cascade Workpapers, RNG Potential Calculation Worksheet.

[9] Biogas and Renewable Natural Gas Inventory SB 334 (2017) – 2018 Report to the Oregon Legislature, Page ii.

[10] For example in the 2021 PacifiCorp IRP, PacifiCorp's initial optimized power portfolio includes 1,226 MW of Hydrogen resources.

[11] Evolved Energy Research, Oregon Clean Energy Pathways Final Report, June 15, 2021, https://uploads-ssl.webflow.com/5d8aa5c4ff027473b00c1516/60de973658193239da5aec7b_Oregon%20Clean%20Energy%20Pathways%20Analysis%20Final%20Report.pdf

their last IRP. Cascade asked the ETO for an accelerated (high ramp) energy efficiency forecast. Northwest Natural projected its own new energy efficiency supply curve.

While CUB appreciates the detailed work NWN did to create supply curves for new technology, their forecast is problematic for several reasons.

1. **NWN's forecast assumes viability of new technology.**

Much of NW Natural's new energy efficiency forecast is based on the following technologies: dual fuel heat pumps (DFHP), natural gas heat pumps (GHP), and gas heat pump water heaters (GHPWH). While the dual fuel heat pumps are commercially available, the GHP and GHPWH are not.

Gas heat pumps have a challenging road to commercial availability for various reasons:

- Gas heat pumps are "prohibitively complex, large, and costly. In addition to complex system architectures, these systems also tend to have complex control systems that are difficult to implement, which is generally counter to long-term reliability in the field."[12]
- Both electric and dual fuel heat pumps have a head start, are commercially available and generally work well in temperatures above freezing. Therefore, much of the work on further developing GHP technology is focused on cold climates. For example, the first pilot program to test GHPs is with FortisBC, a gas utility serving 1 million customers in Canada. In their materials, FortisBC stresses that the GHP worked when outdoor temperatures dropped to -13C. The pilot involves 5 residential and 5 commercial customers[13] with results expected in Spring, 2022.
- At the same time, cold weather electric heat pumps are now capable of performing well below -10 at twice the efficiency of electric resistance systems and have been tested in a pilot in Minnesota.[14]
- While there are some GHP designs that allow for air conditioning, many of them do not. Because they are being primarily developed and tested for cold climates, air conditioning is not considered essential.
- Due to recent heat events in Oregon, it is expected that air conditioning equipment to be standard in new building moving forward. Currently, EHP and DFHP can provide cooling and heating services to Oregonians.
- HVAC dealers, like most business, sell what they know and do not want to sell their customers unproven technology that could fail. It will take time for HVAC dealers to build confidence in these new products

[12] US Department of Energy, R&D OPPORTUNITIES FOR NATRUAL GAS TECHNOLOGIES IN BUILDING APPLICATIONS, August 2018.
[13] https://www.fortisbc.com/about-us/projects-planning/future-of-energy-efficiency/success-stories
[14] https://rmi.org/heat-pumps-a-practical-solution-for-cold-climates/

- A workforce that is trained to install GHPs will have to be developed. They represent a significant change from high-efficiency furnaces and it will take time to develop a network of trained installers. In addition, GHPs needs to have an established supply chain for repairs and maintenance in order to be widely adopted.
- An HVAC manufacturer is going to take a big risk if they move GHPs into commercial production. They will compete against electric heat pumps which are already present in the marketplace. To the degree that these technologies are developed, they may be targeted at colder climates, where existing electric heat pumps are less efficient (though cold climate heat pumps are changing this).

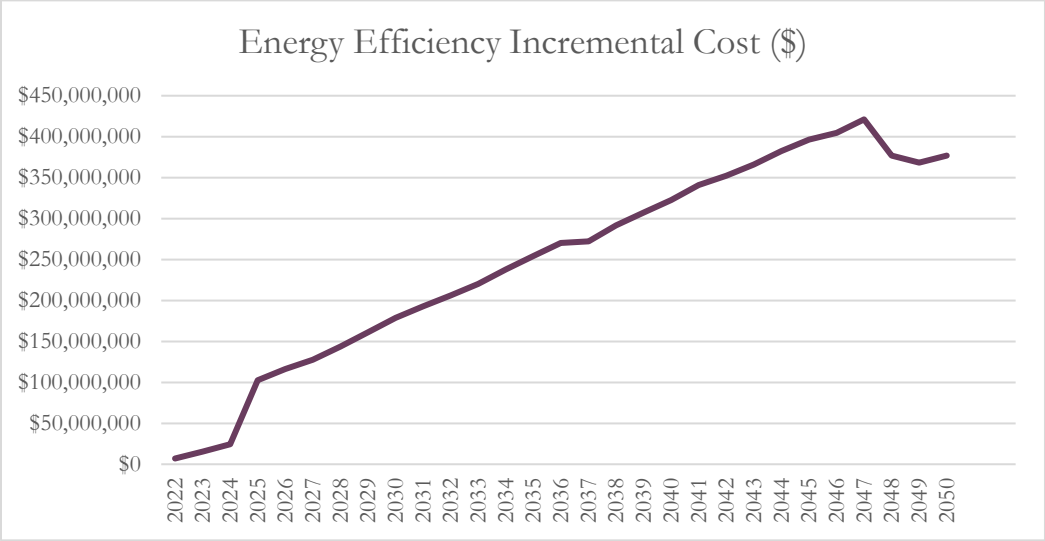
Gas heat pump water heaters are somewhat closer to being commercially available. The Northwest Energy Efficiency Alliance (NEEA) includes GHPWHs in its 2020-2024 Business Plan and is one of a set of partners that is working to field test GHPWH to provide data on performance, savings, costs and installation best practices. The fact that NEEA is involved with a field test is a helpful development but moving from a field test to commercialization usually takes years.

2. Market Transformation Adoption Curve

NW Natural is not only counting on new technology to drive energy efficiency, but it is expecting energy efficiency spending to increase in a significant manner. NWN currently spends about $20-22 million annually on energy efficiency. NWN's total annual utility revenue in Oregon was $669 million in 2020. Its modeling assumes a massive increase in spending to deploy this new technology. Figure 1 below shows NWN's projected incremental spending on energy efficiency. In 2022, NWN will spend about $22 million on energy efficiency. In 2025, it forecasts expenditures of about $124 million.[15] In 2030, it is forecasting around $200 million in energy efficiency and it keeps growing to more than $400 million/year.

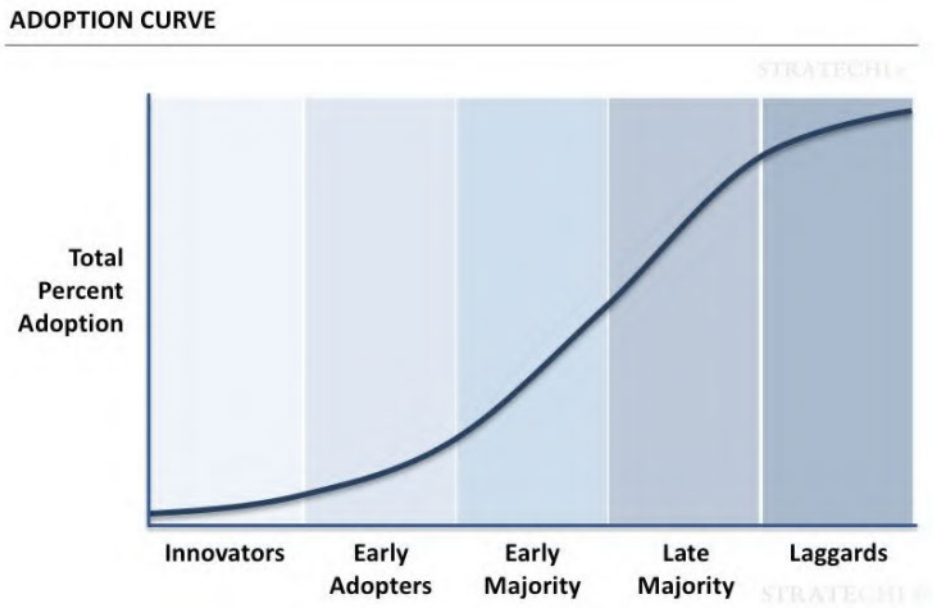
[15] UM 2178, NWN Workpapers, Base Case, shows $102 million in incremental spending above the current programs.

Figure 1



This ramp up in spending is problematic. It is based on unrealistic adoption curves. New technology traditionally follows a S-shaped adoption curve as shown in Figure 2:

Figure 2



NWN's market transformation curves for gas heat pumps (Figures 3, 4 and 5), however, look very different[16]:

Figure 3

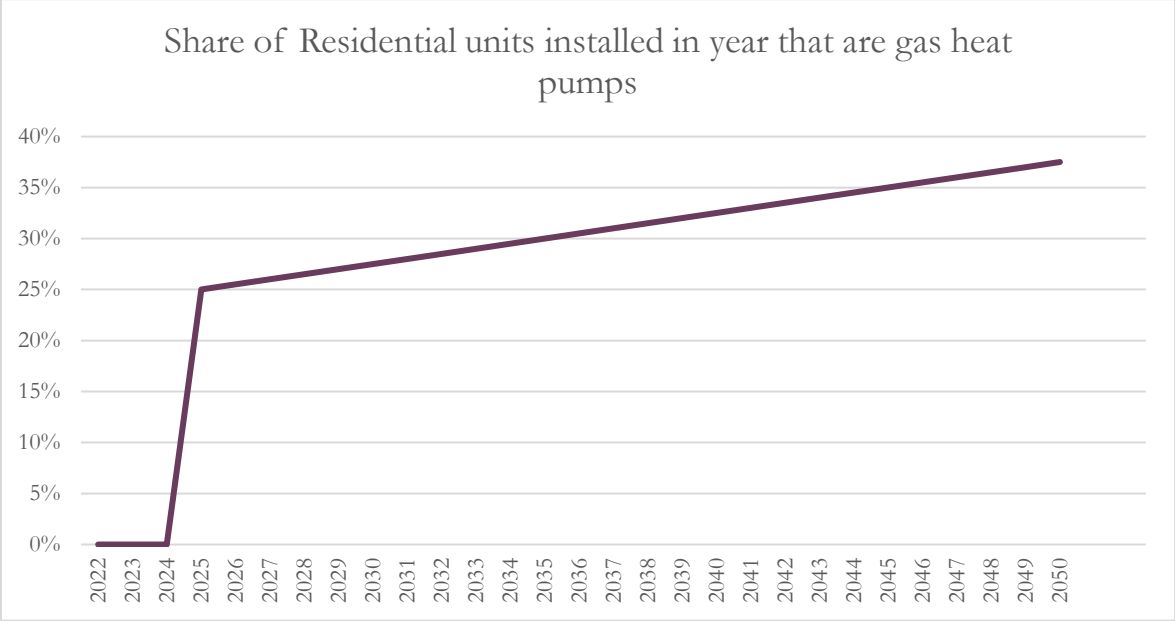
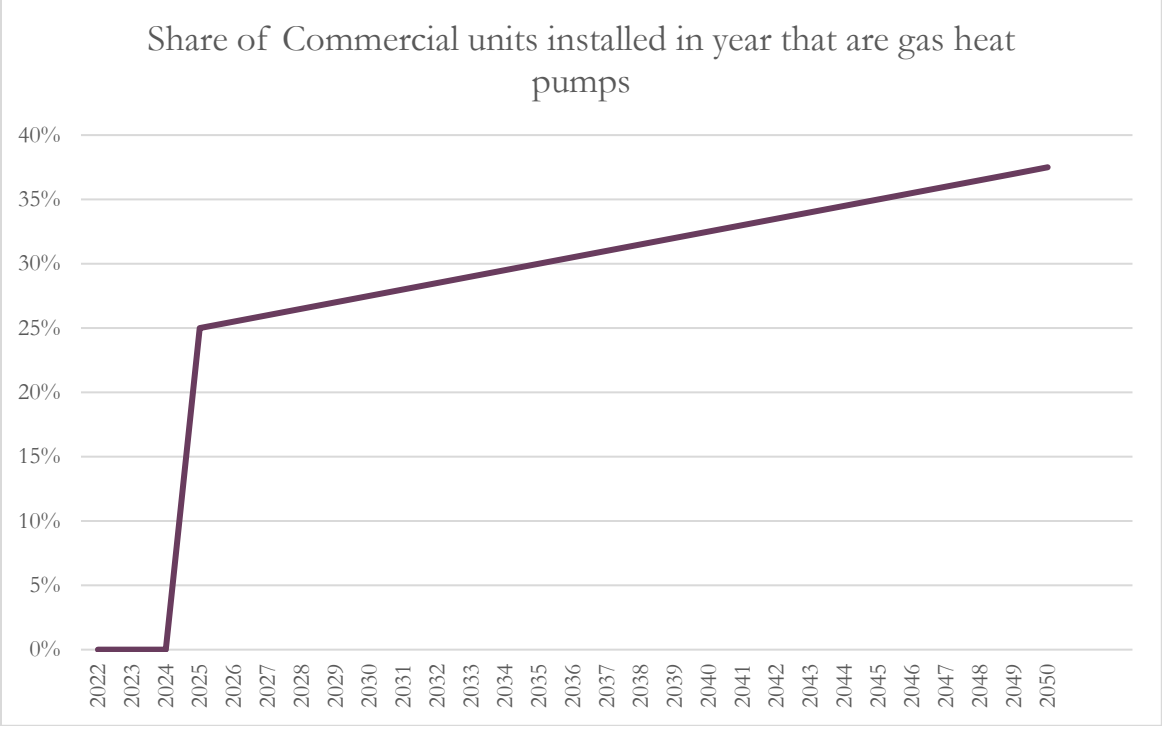
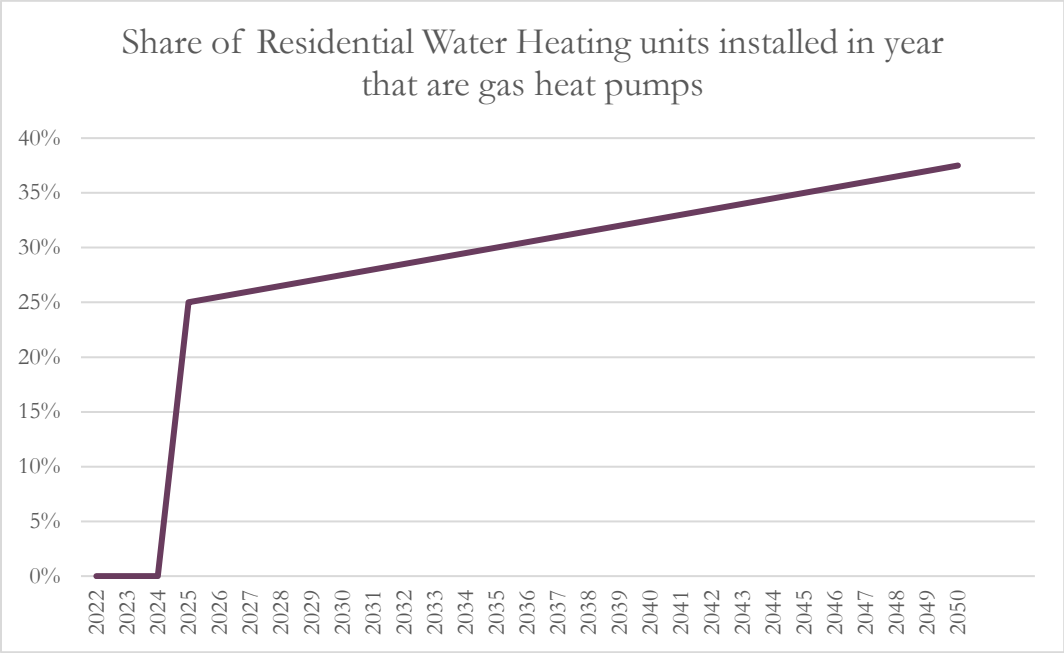


Figure 4



[16] UM 2178, Northwest Natural Workpapers, Base Case

Figure 5

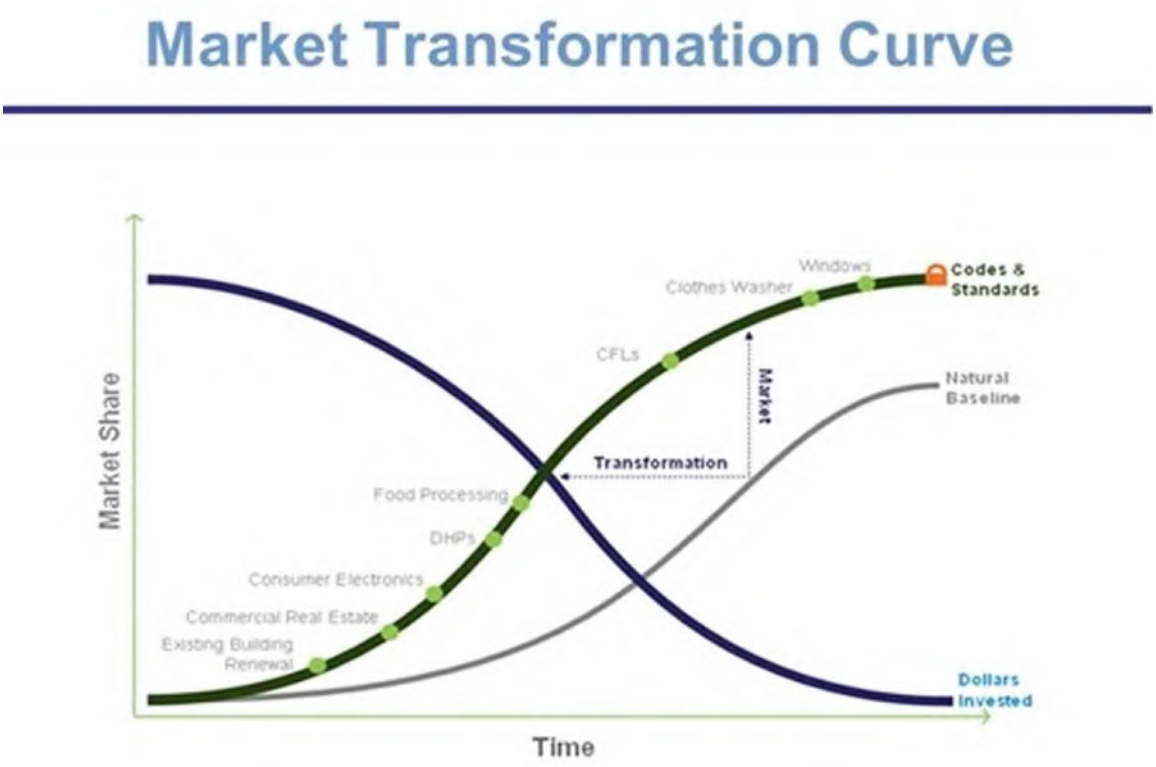


NWN's market transformation curves for gas heat pumps are not realistic. It is unlikely that by 2025 GHPs will have 25% of the market share for residential homes that replace their current gas equipment. For GHP, NWN assumes that the industry can move from a pilot program with 10 units in Canada that will not have results until 2022, to selling more than 9,000 in NWN's service territory in 2025. This is unlikely. While NEEA has looked at these as emerging technology, its Business Plan does not include a current program to move them to commercial availability.[17] No pilots have been planned in the region. Even if they become commercially available, it will take time to train HVAC dealers and installers.

This region has a lot of experience with market transformation, led by NEEA. But market transformation does not change the shape of the S-curve, it changes the timing – it moves the curve along the x axis. Below is an example of NEEA's market transformation curve (Figure 6). It shows that an upfront investment in market transformation can shift the curve causing the measure to be adopted in advance of its natural baseline. The difference between the two curves shows the benefit of the market transformation effort which ultimately produces a market share that is great enough to change the minimum requirements of codes and standards.

[17] Northwest Energy Efficiency Alliance, 2020-2024 Strategic and Business Plan

Figure 6



NWN's energy efficiency modeling has unrealistic adoption curves for residential and commercial dual fuel heat pumps, gas heat pumps, and heat pump water heaters.

D. ***Electrification.***

NWN was the only utility that included some electrification of heating load. CUB appreciates this inclusion, because electrification is a tool to reduce emissions and needs to be included in these discussions. NWN assumes that beginning in 2025, 30% of residential and commercial customers who are purchasing new gas heating equipment will choose dual fuel models and this will continue through 2050. These represent electric heat pumps with a gas furnace. The gas furnace only operates when the temperature is below 40 degrees Fahrenheit (settings vary, but this is the default setting). Within NWN's territory with relatively mild winters, CUB understands that a dual fuel heat pump will electrify approximately 80% of a home's heating load. This means that over time 30% of all NWN residential and commercial customers will electrify 80% of their heating load resulting in 24% of its overall heating load being electrified.

E. ***Role of Electric Heat Pumps.***

Dual fuel heat pumps (DFHP) and electric heat pumps (EHP) are both commercially available. Cold climate heat pumps (CCHP) are also available, but have a much higher cost (some midwestern utilities are currently giving rebates on CCHP). NWN models DFHP. But is it the best use of heat pump technology?

NWN service territory includes coastal communities with mild temperatures. On average, Lincoln City gets below freezing less than 18 nights per year. EHPs that turn to resistance heat in near freezing temperatures might be a better choice in these areas.

Rather than offering a rebate and having DFHPs randomly spread throughout the territory, there may be more bang for the buck by offering home builders even larger incentives to install EHP in new developments where electrification can reduce the need to expand the system. The same thing is true in areas where growth related upgrades are needed. By installing EHPs, new natural gas investment might be avoided. Once we begin incenting electrification, we should be asking ourselves what electrification make sense for Oregon's energy systems.

F. ***Rate Design Implications of a Dual Fuel System***

Expanding a dual fuel system to replace some gas in some parts of its service territory would also mean that there will likely be customers who only use gas on the coldest days of the year. How does this customer group share the cost of pipes and gas distribution network? To collect the fixed cost of the distribution network from customers with little usage could require significant increases in customer charges from these customers. DFHP customers may require a separate rate class to minimize cross subsidization within large firm sales classes like Residential or Commercial. But high fixed charges could then incentivize a residential customer to choose an EHP.

G. ***Compliance with Oregon expected DEQ regulation.***

CUB believes that the gas utilities have not shown compliance with expected DEQ regulations as their models contain some questionable assumptions. These include Avista's assumptions about hydrogen, Cascade's assumptions about RNG availability, and NWN's assumptions about energy efficiency.

CUB does recognize that DEQ regulations are not final and the utilities have not been able to apply IRP tools to this challenge. These are early attempts to model compliance. But the modeling is extremely helpful in demonstrating how challenging decarbonization is for Oregon's gas utilities and how current tools are not sufficient, and new technologies must be developed. But planning around these new technologies is particularly challenging while we continue to grow the gas system. The gas system is adding thousands of new customers every year who are adding to carbon emissions that we must find a way to eliminate.

The current alternative to growing the gas system is to build all-electric homes. Electrifying new homes might well be the best application of electrification today because it limits the growth of the gas companies' emissions problem.

This does not mean that new technologies will not be developed and offer additional solutions. In Massachusetts gas utilities are investing in a series of pilots to test a concept called

GeoMicroDistrict. The idea is to use their expertise with pipes to build interconnected district heat using ground source heat pump technology.[18]

III. FUTURE MODELING AND ANALYSIS

CUB believes that additional modeling and analysis in the following areas would be helpful.

Energy Efficiency. Energy efficiency normally starts with a conservation potential study that identifies technical potential and then applies analysis to identify an expected adoption curve. But this technical potential is usually based on commercialized technologies. NWN's energy efficiency forecast is based on aggressive application of technology that is not commercialized.

There are some different scenarios that could help demonstrate the risk of relying on an aggressive application of uncommercialized technology:

- Assume gas heat pump water heaters come to market, but gas heat pumps do not.
- Assume no gas heat pumps until after 2030 and assume a more traditional S-adaptation curve.
- Have the ETO or some other organization look at the conservation potential of GHPs and GHPWHs and create realistic adoption curves and require that GHP and GHPWH modeling be limited to these adoption curve.

Hydrogen. Hydrogen is a major resource in these models. We should consider scenarios which test some of these assumptions:

- Hydrogen is unavailable until 2030, except under pilot programs.
- The demand for hydrogen outstrips supply and the cost of hydrogen is twice what current forecasts suggest.

Electrification. NWN's modeling assumes 24% of its residential and commercial heat load be electrified through the offering of incentives to customers to purchase dual fuel heat pumps. There should be some attempt to look at the optimal ways to electrify. One potential way to look at this would be to ask the gas utilities to examine the impact of electrification of a specified percentage of their load when that electrification represents:

- Dual fuel heat pumps randomly through their system
- Electric heat pumps targeted at new growth on system
- Targeted electrification where network upgrades are expected within a few years
- Low-income weatherization programs

[18] https://heet.org/wp-content/uploads/2019/11/HEET-BH-GeoMicroDistrict-Final-Report-v2.pdf https://www.greentechmedia.com/articles/read/can-gas-companies-evolve-to-protect-the-climate-and-save-their-workers

Energy Optimization.
The introduction of dual fuel heat pumps as an energy efficiency measure also shows the need to reimage our approach to energy efficiency. Energy efficiency has been established as a demand side program that offers an alternative to supply side investments. However, with NWN's proposal to offer incentives on DFHP heat pumps, traditional energy efficiency is being augmented by fuel switching. For NWN, DFHPs perform like any other energy efficiency incentive program. But the local electric utilities, DFHPs are new load which increases future electric and capacity needs.

Energy efficiency analysis, therefore, requires an approach that cuts across fuels. Sometimes this is called Energy Optimization.[19] Rather than starting with a particular utility's load/resource balance, energy optimization focuses on buildings and tries to understand the optimal way to serve their energy. It considers energy efficiency, demand response, and fuel switching along with GHG emissions. An Oregon version of energy optimization should also include energy affordability as a key element. This kind of approach considers the implications on both the electric and the gas networks. It would help us identify the best applications of electrification and create a roadmap on how best to serve utility customers. This is not a scenario for gas utilities to consider in additional modeling but is something that is implicated by the introduction of electrification.

[19] https://www.ef.org/2019/08/20/energy-optimization-its-time-to-reimagine-energy-efficiency/

III. CONCLUSION

CUB appreciates the work of the gas utilities to produce these models on short timeline. The modeling demonstrates that RNG and hydrogen are probably not sufficient to decarbonize and that electrification is likely to play a role.

The modeling also shows real risks to gas customers. The modeling points to significant rate increases which could drive some customers – those who can afford it –to electrify their homes, leaving behind the set of customers who cannot afford to electrify.

It also needs to be recognized that this is modeling of a single climate regulation. Oregon has begun to feel the impact of the climate crisis and significant addition impacts are likely to be realized over the coming decade. Local governments may respond by using energy codes, zoning or building emission standards to push for reduced emissions. Elected officials at the state and federal level will want to push policies that respond to climate events by further reducing GHG emissions. DEQ's CPP is not the final decarbonization regulation that Oregon faces, just as this summer's record heat wave is not the last extreme weather event related to climate change that will impact Oregon households.

Dated this 24th day of September, 2021.

Respectfully submitted,

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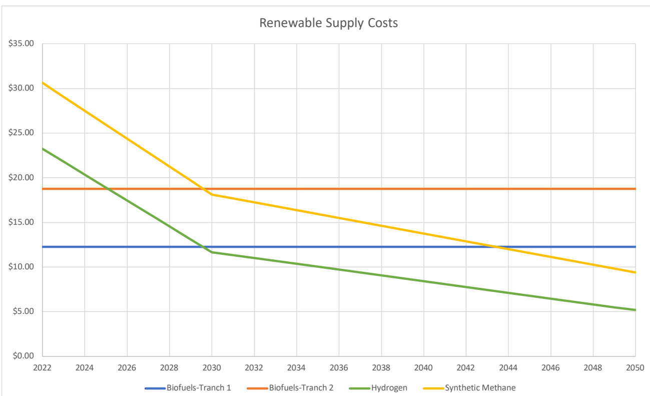
	OR-Resider	OR-Commercial	WA-Reside	WA-Commercial
2021				
2022	601	4091	612	3284
2023	596	4103	606	3263
2024	591	4111	600	3235
2025	586	4106	593	3210
2026	581	4108	586	3191
2027	575	4106	579	3170
2028	570	4109	572	3149
2029	564	4093	564	3116
2030	559	4086	556	3089
2031	553	4080	549	3061
2032	548	4081	541	3037
2033	543	4065	533	3002
2034	537	4055	525	2972
2035	532	4046	518	2943
2036	528	4045	511	2918
2037	522	4026	504	2883
2038	517	4016	497	2853
2039	513	4005	491	2825
2040	509	4003	485	2803
2041	504	3986	479	2771
2042	499	3976	473	2745
2043	495	3965	467	2720
2044	491	3962	462	2700
2045	486	3943	457	2672
2046	482	3933	452	2649
2047	477	3923	447	2626
2048	474	3921	442	2608
2049	469	3903	437	2582
2050	465	3893	433	2561

Oregon Population	4,218,000		
USA Population	328,200,000		
Oregon Share	1.29%		
USA Cost Curve			
Volume	Price		
-	7		
750,000,000	17.5		
2,250,000,000	20		
Current Deliveries			
NW Natural	110,000,000		
Avista	13,000,000		
Cascade	15,000,000		
Oregon Cost Curve			
Price ($/Dth)	$7.00	$17.50	$20.00
Oregon Total Biofuel	0	19,277,879	57,833,638
NW Natural	0	15,366,426	46,099,277
Avista	0	1,816,032	5,448,096
Cascade	0	2,095,422	6,286,265
	Price	Max Volume	
Portfolio Tranche 1	$12.25	15,366,426	
Portfolio Tranche 2	$18.75	30,732,851	
Share of Biofuels Inje	30%		
Share of Hydrogen o	50%		
Cost of Incremental Energy Efficiency ($/Metric Ton)			$100

	Biofuels-1	Biofuels-2	Hydrogen	Direct Air C	Synthetic M	Portlfolio	CCI Price
2022	$12.25	$18.75	$23.24	$7.37	$30.61	$12.25	$80
2023	$12.25	$18.75	$21.79	$7.26	$29.05	$12.25	$81
2024	$12.25	$18.75	$20.34	$7.14	$27.49	$12.25	$82
2025	$12.25	$18.75	$18.89	$7.03	$25.92	$12.25	$83
2026	$12.25	$18.75	$17.45	$6.92	$24.36	$12.25	$85
2027	$12.25	$18.75	$16.00	$6.80	$22.80	$12.25	$86
2028	$12.25	$18.75	$14.55	$6.69	$21.24	$12.25	$87
2029	$12.25	$18.75	$13.10	$6.58	$19.68	$12.25	$89
2030	$12.25	$18.75	$11.65	$6.47	$18.11	$12.25	$90
2031	$12.25	$18.75	$11.32	$6.35	$17.68	$18.75	$91
2032	$12.25	$18.75	$11.00	$6.24	$17.24	$18.75	$93
2033	$12.25	$18.75	$10.68	$6.13	$16.80	$18.75	$94
2034	$12.25	$18.75	$10.35	$6.02	$16.37	$18.75	$95
2035	$12.25	$18.75	$10.03	$5.90	$15.93	$18.75	$97
2036	$12.25	$18.75	$9.70	$5.79	$15.49	$18.75	$98
2037	$12.25	$18.75	$9.38	$5.68	$15.06	$18.75	$100
2038	$12.25	$18.75	$9.06	$5.56	$14.62	$18.75	$101
2039	$12.25	$18.75	$8.73	$5.45	$14.18	$18.75	$102
2040	$12.25	$18.75	$8.41	$5.34	$13.75	$18.75	$104
2041	$12.25	$18.75	$8.08	$5.23	$13.31	$18.75	$105
2042	$12.25	$18.75	$7.76	$5.11	$12.87	$18.75	$106
2043	$12.25	$18.75	$7.44	$5.00	$12.44	$18.75	$108
2044	$12.25	$18.75	$7.11	$4.89	$12.00	$18.75	$109
2045	$12.25	$18.75	$6.79	$4.77	$11.56	$18.75	$110
2046	$12.25	$18.75	$6.46	$4.66	$11.12	$18.75	$112
2047	$12.25	$18.75	$6.14	$4.55	$10.69	$18.75	$113
2048	$12.25	$18.75	$5.82	$4.44	$10.25	$18.75	$114
2049	$12.25	$18.75	$5.49	$4.32	$9.81	$18.75	$116
2050	$12.25	$18.75	$5.17	$4.21	$9.38	$18.75	$117

	Off-System	On-System	SB 98 Incremental Cost	SB 98 Blend	Non SB 98 Blended	
2022	$3.01	$0.50	$4.24	$4.90	$9.09	2
2023	$3.14	$0.50	$4.30	$4.71	$8.96	3
2024	$3.35	$0.50	$4.35	$4.45	$8.75	4
2025	$3.57	$0.50	$4.40	$4.17	$8.53	5
2026	$3.64	$0.50	$4.51	$4.00	$8.46	6
2027	$3.64	$0.50	$4.56	$3.94	$8.46	7
2028	$3.71	$0.50	$4.62	$3.82	$8.39	8
2029	$3.86	$0.50	$4.72	$3.56	$8.24	9
2030	$4.04	$0.50	$4.78	$3.33	$8.06	10
2031	$4.13	$0.50	$4.83	$9.69	$14.47	11
2032	$4.09	$0.50	$4.93	$9.63	$14.51	12
2033	$4.09	$0.50	$4.99	$9.57	$14.51	13
2034	$4.13	$0.50	$5.04	$9.48	$14.47	14
2035	$4.14	$0.50	$5.15	$9.36	$14.46	15
2036	$4.16	$0.50	$5.20	$9.29	$14.44	16
2037	$4.09	$0.50	$5.31	$9.25	$14.51	17
2038	$4.26	$0.50	$5.36	$9.03	$14.34	18
2039	$4.54	$0.50	$5.41	$8.70	$14.06	19
2040	$4.69	$0.50	$5.52	$8.44	$13.91	20
2041	$4.60	$0.50	$5.57	$8.48	$14.00	21
2042	$4.77	$0.50	$5.62	$8.26	$13.83	22
2043	$4.94	$0.50	$5.73	$7.98	$13.66	23
2044	$5.13	$0.50	$5.78	$7.74	$13.47	24
2045	$5.26	$0.50	$5.84	$7.56	$13.34	25
2046	$5.40	$0.50	$5.94	$7.31	$13.20	26
2047	$5.42	$0.50	$6.00	$7.23	$13.18	27
2048	$5.56	$0.50	$6.05	$7.04	$13.04	28
2049	$5.51	$0.50	$6.15	$6.98	$13.09	29
2050	$5.41	$0.50	$6.21	$7.03	$13.19	30

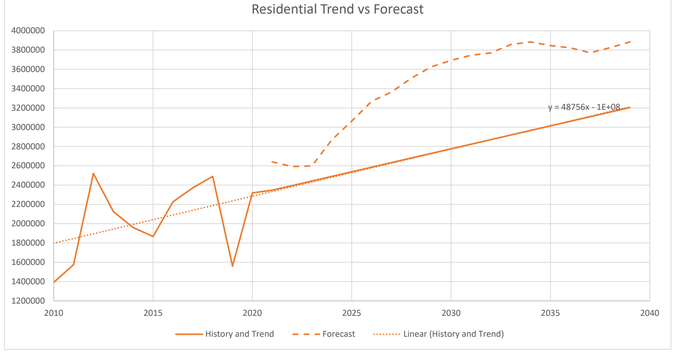
	CPP Iincren	CPP Increm	CPP H2 Inc	CPP SynGas Increment	SB 98 Incre	SB 98 Incre	SB 98 H2 In	SB 98 SynGas Incremental Cost
2022	$9.09	$15.59	$19.98	$27.35	$4.85	$11.35	$15.74	$23.11
2023	$8.96	$15.46	$18.40	$25.65	$4.66	$11.16	$14.10	$21.36
2024	$8.75	$15.25	$16.74	$23.89	$4.40	$10.90	$12.39	$19.53
2025	$8.53	$15.03	$15.07	$22.10	$4.12	$10.62	$10.67	$17.70
2026	$8.46	$14.96	$13.56	$20.48	$3.95	$10.45	$9.05	$15.97
2027	$8.46	$14.96	$12.10	$18.91	$3.89	$10.39	$7.54	$14.34
2028	$8.39	$14.89	$10.58	$17.28	$3.77	$10.27	$5.97	$12.66
2029	$8.24	$14.74	$8.98	$15.56	$3.51	$10.01	$4.26	$10.84
2030	$8.06	$14.56	$7.36	$13.82	$3.28	$9.78	$2.58	$9.05
2031	$7.97	$14.47	$6.94	$13.29	$3.14	$9.64	$2.11	$8.47
2032	$8.01	$14.51	$6.66	$12.90	$3.08	$9.58	$1.73	$7.97
2033	$8.01	$14.51	$6.34	$12.47	$3.02	$9.52	$1.35	$7.48
2034	$7.97	$14.47	$5.97	$11.98	$2.93	$9.43	$0.93	$6.94
2035	$7.96	$14.46	$5.64	$11.54	$2.81	$9.31	$0.49	$6.39
2036	$7.94	$14.44	$5.29	$11.08	$2.74	$9.24	$0.09	$5.88
2037	$8.01	$14.51	$5.03	$10.71	$2.70	$9.20	-$0.27	$5.41
2038	$7.84	$14.34	$4.55	$10.11	$2.48	$8.98	-$0.81	$4.75
2039	$7.56	$14.06	$3.94	$9.39	$2.15	$8.65	-$1.47	$3.98
2040	$7.41	$13.91	$3.47	$8.80	$1.89	$8.39	-$2.05	$3.29
2041	$7.50	$14.00	$3.23	$8.46	$1.93	$8.43	-$2.34	$2.89
2042	$7.33	$13.83	$2.74	$7.86	$1.71	$8.21	-$2.88	$2.23
2043	$7.16	$13.66	$2.25	$7.25	$1.43	$7.93	-$3.48	$1.52
2044	$6.97	$13.47	$1.73	$6.62	$1.19	$7.69	-$4.05	$0.84
2045	$6.84	$13.34	$1.28	$6.06	$1.01	$7.51	-$4.56	$0.22
2046	$6.70	$13.20	$0.81	$5.48	$0.76	$7.26	-$5.13	-$0.47
2047	$6.68	$13.18	$0.46	$5.01	$0.68	$7.18	-$5.53	-$0.98
2048	$6.54	$13.04	$0.01	$4.44	$0.49	$6.99	-$6.04	-$1.61
2049	$6.59	$13.09	-$0.27	$4.05	$0.43	$6.93	-$6.43	-$2.10
2050	$6.69	$13.19	-$0.50	$3.71	$0.48	$6.98	-$6.71	-$2.50

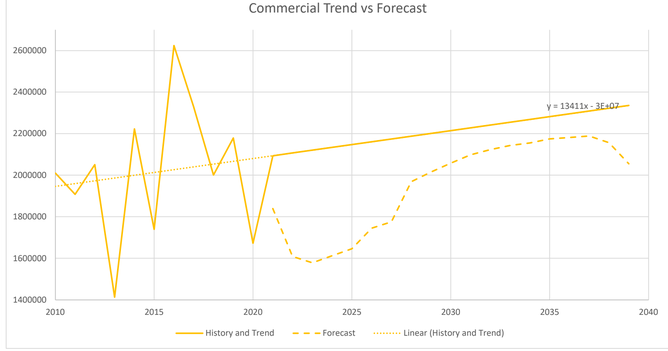


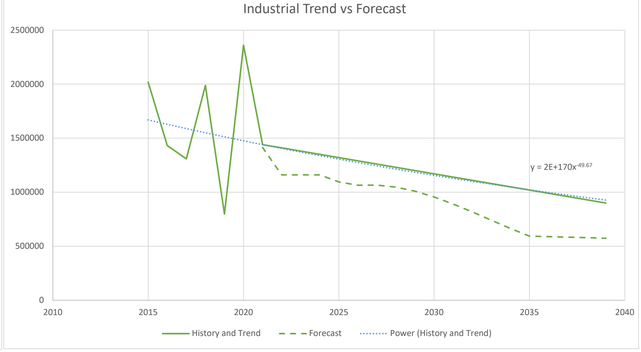
state	OR
measuregroupnam	(All)

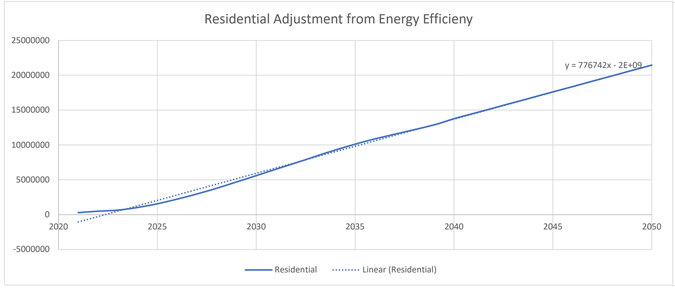
Sum of cummulati	Column Labels			
Row Labels	Residential	Commercial	Industrial	Grand Total
2003	608,519	2,422	-	610,941
2004	1,527,832	78,135	-	1,605,967
2005	2,482,348	516,607	-	2,998,955
2006	3,434,870	1,731,070	-	5,165,940
2007	4,561,266	2,823,787	3,067	7,388,120
2008	5,898,161	3,926,295	16,045	9,840,501
2009	7,098,885	5,030,395	203,803	12,333,083
2010	8,491,698	7,040,404	740,244	16,272,346
2011	10,066,793	8,948,150	1,752,072	20,767,015
2012	12,586,722	10,998,778	2,317,110	25,902,610
2013	14,712,489	12,412,292	3,254,507	30,379,288
2014	16,672,253	14,634,699	4,192,929	35,499,881
2015	18,539,402	16,374,404	6,210,538	41,124,344
2016	20,765,518	18,998,477	7,641,736	47,405,731
2017	23,136,252	21,327,223	8,950,758	53,414,233
2018	25,626,669	23,327,888	10,938,104	59,892,661
2019	27,185,920	25,506,791	11,736,123	64,428,834
2020	29,504,734	27,179,232	14,095,464	70,779,430
Grand Total	**232900331**	**200857049**	**72052500**	**505809880**

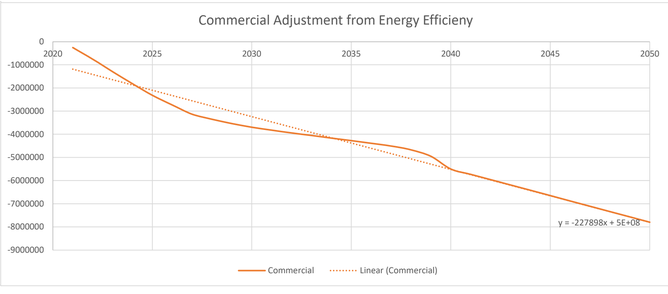
	Residential							Commercial							Industrial Sales						
Row Labels	Annual-History	Annual-Forecas	Cumulative- Histo	Cumulative Forec	Load Adjustment	UPC Load Adjustr	Change in Annual	Change in Annual	Annual-History	Annual-Forecast	Cumulative- Histo	Cumulative Forec	Load Adjustment	UPC Load Adjustr	Change in Annual	Change in Annual	Annual-History	Annual-Forecast	Cumulative Forec	Load Adjustment	Share of Load	Change in Annua	Change in A
2003	608,519		608,519					2,422		2,422							-	-				-	
2004	919,313		1,527,832				310,794	75,713		78,135					73,291		-	-				-	
2005	954,516		2,482,348				35,203	438,472		516,607					362,759		-	-				-	
2006	952,522		3,434,870				(1,994)	1,214,463		1,731,070					775,991		-	-				-	
2007	1,126,396		4,561,266				173,874	1,092,717		2,823,787					(121,746)		3,067	3,067				3,067	
2008	1,336,895		5,898,161				210,499	1,102,508		3,926,295					9,791		12,978	16,045				9,911	
2009	1,200,724		7,098,885				(136,171)	1,104,100		5,030,395					1,592		187,758	203,803				174,780	
2010	1,392,813		8,491,698				192,089	2,010,009		7,040,404					905,909		536,441	740,244				348,683	
2011	1,575,095		10,066,793				182,282	1,907,746		8,948,150					(102,263)		1,011,828	1,752,072				475,387	
2012	2,519,929		12,586,722				944,834	2,050,628		10,998,778					142,882		565,038	2,317,110				(446,790)	
2013	2,125,767		14,712,489				(394,162)	1,413,514		12,412,292					(637,114)		937,397	3,254,507				372,359	
2014	1,959,764		16,672,253				(166,003)	2,222,407		14,634,699					808,893		938,422	4,192,929				1,025	
2015	1,867,149		18,539,402				(92,615)	1,739,705		16,374,404					(482,702)		2,017,609	6,210,538				1,079,187	
2016	2,226,116		20,765,518				358,967	2,624,073		18,998,477					884,368		1,431,198	7,641,736				(586,411)	
2017	2,370,734		23,136,252				144,618	2,328,746		21,327,223					(295,327)		1,309,022	8,950,758				(122,176)	
2018	2,490,417		25,626,669				119,683	2,000,665		23,327,888					(328,081)		1,987,346	10,938,104				678,324	
2019	1,559,251		27,185,920				(931,166)	2,178,903		25,506,791					178,238		798,019	11,736,123				(1,189,327)	
2020	2,318,814		29,504,734				759,563	1,672,441		27,179,232					(506,462)		2,359,341	14,095,464				1,561,322	
2021	2,347,585	2,640,506	31,852,319	32,145,240	292,921	(0.5)		321,692	1,838,998	29,272,678	29,018,230	(254,448)	4.1		166,557		1,440,000	1,413,679	15,535,464	15,509,143	(26,321)		(945,662)
2022	2,395,170	2,592,655	34,247,489	34,737,895	490,406	(0.8)		(47,851)	1,608,539	31,379,570	30,626,769	(752,801)	12.0		(230,459)		1,410,000	1,160,100	16,945,464	16,669,243	(276,221)		(253,579)
2023	2,442,755	2,599,079	36,690,244	37,336,974	646,730	(1.0)		6,423	1,578,841	33,499,908	32,205,611	(1,294,297)	20.5		(29,698)		1,380,000	1,160,100	18,325,464	17,829,342	(496,122)		(0)
2024	2,490,340	2,869,474	39,180,584	40,206,448	1,025,864	(1.6)		270,395	1,612,630	35,633,692	33,818,241	(1,815,451)	28.4		33,789		1,350,000	1,160,100	19,675,464	18,989,442	(686,022)		0
2025	2,537,925	3,064,078	41,718,509	43,270,526	1,552,017	(2.3)		194,604	1,646,139	37,780,922	35,464,380	(2,316,542)	35.9		33,509		1,320,000	1,094,545	20,995,464	20,083,987	(911,477)		(65,555)
2026	2,585,510	3,267,062	44,304,019	46,537,588	2,233,569	(3.3)		202,984	1,744,805	39,941,598	37,209,185	(2,732,413)	42.0		98,666		1,290,000	1,063,760	22,285,464	21,147,747	(1,137,717)		(30,785)
2027	2,633,095	3,364,342	46,937,114	49,901,929	2,964,815	(4.4)		97,280	1,775,526	42,115,720	38,984,711	(3,131,009)	47.6		30,721		1,260,000	1,065,363	23,545,464	22,213,109	(1,332,355)		1,603
2028	2,680,680	3,508,865	49,617,794	53,410,794	3,793,000	(5.5)		144,523	1,968,310	44,303,288	40,953,021	(3,350,267)	50.5		192,784		1,230,000	1,046,954	24,775,464	23,260,063	(1,515,401)		(18,408)
2029	2,728,265	3,624,599	52,346,059	57,035,394	4,689,335	(6.7)		115,734	2,015,682	46,504,302	42,968,703	(3,535,599)	52.9		47,372		1,200,000	1,009,661	25,975,464	24,269,724	(1,705,740)		(37,294)
2030	2,775,850	3,693,153	55,121,909	60,728,547	5,606,638	(8.0)		68,554	2,057,851	48,718,762	45,026,555	(3,692,207)	54.8		42,170		1,170,000	955,480	27,145,464	25,225,205	(1,920,259)		(54,181)
2031	2,823,435	3,746,015	57,945,344	64,474,561	6,529,217	(9.2)		52,862	2,097,932	50,946,668	47,124,486	(3,822,182)	56.2		40,080		1,140,000	889,819	28,285,464	26,115,024	(2,170,440)		(65,661)
2032	2,871,020	3,770,195	60,816,364	68,244,757	7,428,393	(10.3)		24,181	2,122,943	53,188,020	49,247,429	(3,940,591)	57.5		25,011		1,110,000	817,170	29,395,464	26,932,194	(2,463,270)		(72,650)
2033	2,918,605	3,856,556	63,734,969	72,101,313	8,366,344	(11.5)		86,361	2,143,297	55,442,818	51,390,726	(4,052,092)	58.7		20,354		1,080,000	740,748	30,475,464	27,672,942	(2,802,522)		(76,422)
2034	2,966,190	3,884,410	66,701,159	75,985,723	9,284,564	(12.7)		27,853	2,155,220	57,711,062	53,545,946	(4,165,116)	59.9		11,923		1,050,000	664,779	31,525,464	28,337,721	(3,187,743)		(75,969)
2035	3,013,775	3,845,941	69,714,934	79,831,664	10,116,730	(13.7)		(38,469)	2,174,558	59,992,752	55,720,503	(4,272,249)	61.0		19,338		1,020,000	592,857	32,545,464	28,930,578	(3,614,886)		(71,923)
2036	3,061,360	3,822,549	72,776,294	83,654,213	10,877,919	(14.6)		(23,391)	2,181,506	62,287,888	57,902,009	(4,385,879)	62.2		6,949		990,000	588,888	33,535,464	29,519,466	(4,015,998)		(3,968)
2037	3,108,945	3,771,416	75,885,239	87,425,629	11,540,390	(15.3)		(51,133)	2,189,105	64,596,470	60,091,114	(4,505,356)	63.5		7,599		960,000	584,274	34,495,464	30,103,740	(4,391,724)		(4,614)
2038	3,156,530	3,824,070	79,041,769	91,249,699	12,207,930	(16.1)		52,654	2,156,696	66,918,498	62,247,810	(4,670,688)	65.4		(32,409)		930,000	579,218	35,425,464	30,682,958	(4,742,506)		(5,056)
2039	3,204,115	3,883,690	82,245,884	95,133,389	12,887,505	(16.9)		59,621	2,055,121	69,253,972	64,302,932	(4,951,040)	68.9		(101,574)		900,000	574,051	36,325,464	31,257,009	(5,068,455)		(5,167)
2040					13,769,828	(17.9)						(5,500,000)	76.1								(5,000,000)		
2041					14,539,656	(18.8)						(5,729,597)	78.8								(5,275,170)		
2042					15,309,484	(19.6)						(5,959,194)	81.5								(5,550,340)		
2043					16,079,312	(20.5)						(6,188,791)	84.2								(5,825,510)		
2044					16,849,140	(21.4)						(6,418,388)	86.9								(6,100,680)		
2045					17,618,968	(22.2)						(6,647,985)	89.5								(6,375,850)		
2046					18,388,796	(23.1)						(6,877,582)	92.1								(6,651,020)		
2047					19,158,624	(23.9)						(7,107,179)	94.7								(6,926,190)		
2048					19,928,452	(24.7)						(7,336,776)	97.3								(7,201,360)		
2049					20,698,280	(25.6)						(7,566,373)	99.8								(7,476,530)		
2050					21,468,108	(26.4)						(7,795,970)	102.3								(7,751,700)		

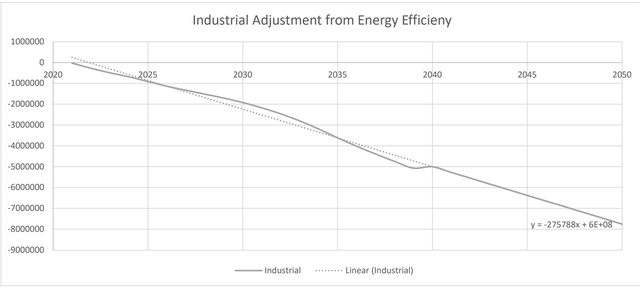












Total		Total-Cum		Adjustment	Change in Annual Total	
610,941		610,941			-	
995,026		1,605,967			384,085	
1,392,988		2,998,955			397,962	
2,166,985		5,165,940			773,997	
2,222,180		7,388,120			55,195	
2,452,381		9,840,501			230,201	
2,492,582		12,333,083			40,201	
3,939,263		16,272,346			1,446,681	
4,494,669		20,767,015			555,406	
5,135,595		25,902,610			640,926	
4,476,678		30,379,288			(658,917)	
5,120,593		35,499,881			643,915	
5,624,463		41,124,344			503,870	
6,281,387		47,405,731			656,924	
6,008,502		53,414,233			(272,885)	
6,478,428		59,892,661			469,926	
4,536,173		64,428,834			(1,942,255)	
6,350,596		70,779,430			1,814,423	
5,881,031	5,893,183	76,660,461	76,672,613	12,152		(457,413)
5,912,062	5,361,294	82,572,523	82,033,907	(538,616)		(531,889)
5,943,093	5,338,020	88,515,616	87,371,927	(1,143,689)		(23,274)
5,974,124	5,642,204	94,489,740	93,014,131	(1,475,609)		304,183
6,005,155	5,804,762	100,494,895	98,818,893	(1,676,002)		162,559
6,036,186	6,075,626	106,531,081	104,894,519	(1,636,562)		270,864
6,067,217	6,205,231	112,598,298	111,099,750	(1,498,548)		129,604
6,098,248	6,524,129	118,696,546	117,623,879	(1,072,667)		318,899
6,129,279	6,649,942	124,825,825	124,273,821	(552,004)		125,813
6,160,310	6,706,485	130,986,135	130,980,306	(5,829)		56,543
6,191,341	6,733,766	137,177,476	137,714,072	536,596		27,281
6,222,372	6,710,308	143,399,848	144,424,380	1,024,532		(23,458)
6,253,403	6,740,601	149,653,251	151,164,981	1,511,730		30,293
6,284,434	6,704,409	155,937,685	157,869,390	1,931,705		(36,192)
6,315,465	6,613,355	162,253,150	164,482,745	2,229,595		(91,054)
6,346,496	6,592,944	168,599,646	171,075,688	2,476,042		(20,411)
6,377,527	6,544,795	174,977,173	177,620,484	2,643,311		(48,148)
6,408,558	6,559,984	181,385,731	184,180,467	2,794,736		15,188
6,439,589	6,512,863	187,825,320	190,693,330	2,868,010		(47,121)
	6,311,258			3,269,828		
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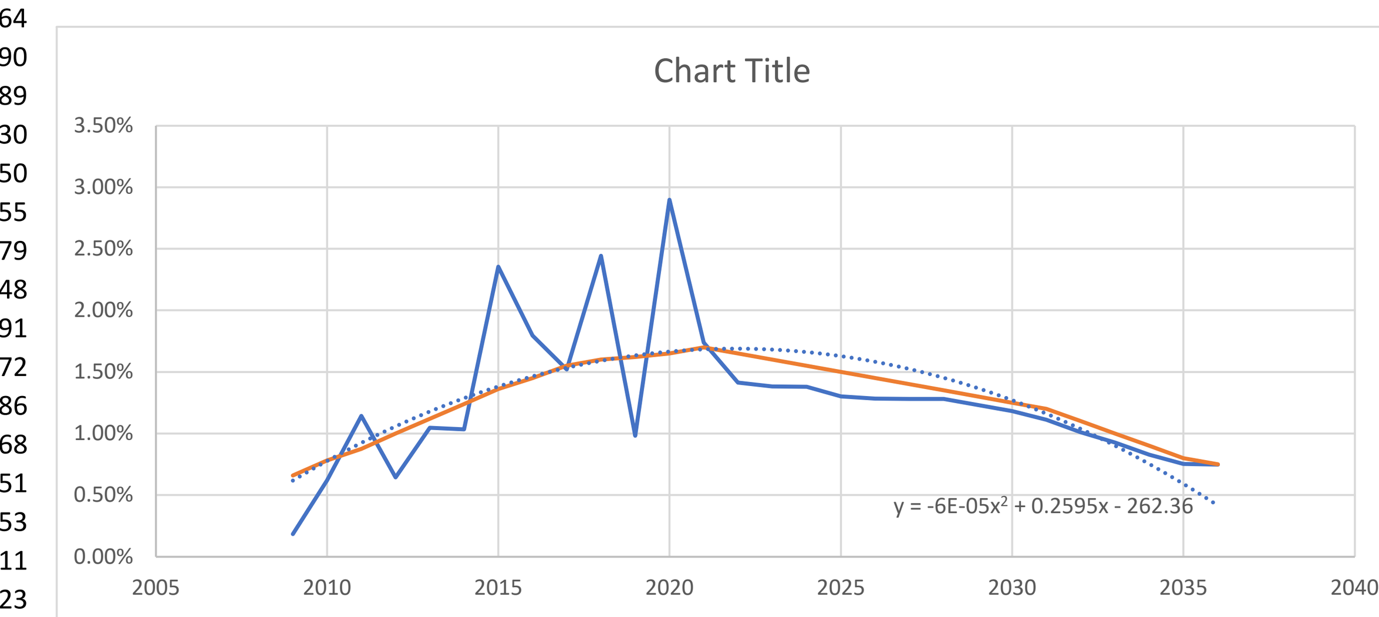
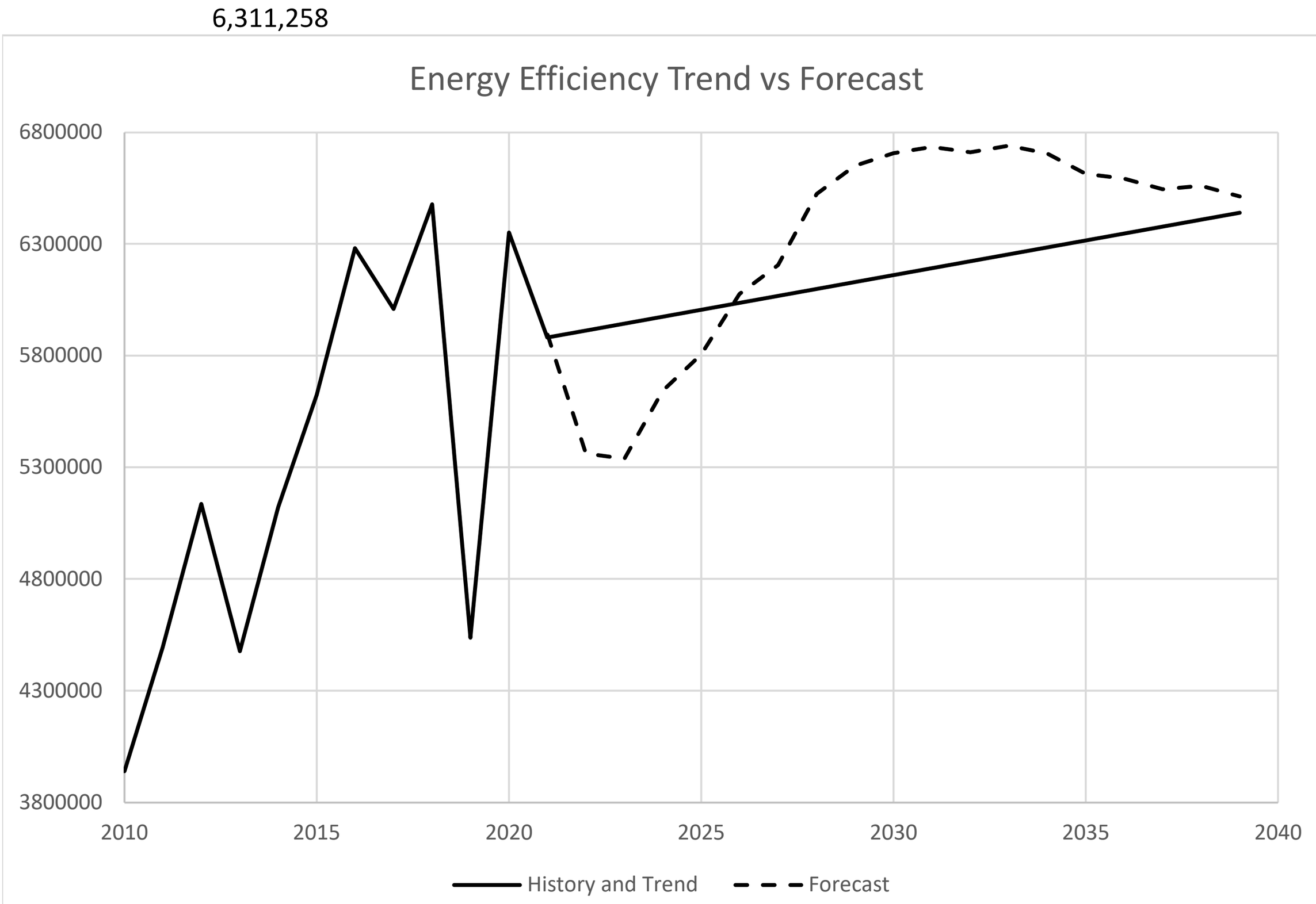
Scenario Comparison Differences

High Ramp	High CO2 F	High Ramp Factor	High Ramp Adj	Cumulative High Ramp Adjustment		Sales	Transport	Industrial S	Annual Sav	Annual Transpc	Cumulative Transport EE	Residential	Commercial Share
					2009	102,517,666	319,431,966	0.18%					
					2010	86,593,283	336,597,222	0.62%					
					2011	88,475,413	356,080,135	1.14%					
					2012	87,877,420	363,460,474	0.64%					
					2013	89,524,016	361,920,292	1.05%					
					2014	90,862,296	357,867,791	1.03%					
					2015	85,737,583	349,019,545	2.35%					
					2016	79,675,799	372,202,056	1.80%					
					2017	86,120,615	388,228,769	1.52%					
					2018	81,389,990	360,386,346	2.44%					
					2019	81,389,990		0.98%	0.10%				
					2020	81,389,990		2.90%	0.20%				
					2021	81,389,990		1.74%	0.40%			45%	31%
1.0858	1.079819	1.092649	505,637	505,637	2022	82,135,387		1.41%	0.66%	2,490,819	2,490,819	48%	30%
1.111601	1.077851	1.12029	598,327	1,103,964	2023	83,946,720		1.38%	0.78%	2,977,014	5,467,834	49%	30%
1.11003	1.072292	1.117984	587,341	1,691,305	2024	84,101,035		1.38%	0.88%	3,352,114	8,819,947	51%	29%
1.101104	1.076843	1.108873	570,449	2,261,754	2025	84,097,039		1.30%	1.00%	3,803,616	12,623,564	53%	28%
1.121062	1.055877	1.127827	702,738	2,964,492	2026	82,943,939		1.28%	1.12%	4,238,226	16,861,790	54%	29%
1.117619	1.043567	1.122743	714,607	3,679,099	2027	83,272,034		1.28%	1.24%	4,655,898	21,517,689	54%	29%
1.111948	1.059047	1.118558	694,663	4,373,762	2028	81,700,315		1.28%	1.36%	5,075,242	26,592,930	54%	30%
1.12129	1.045271	1.126781	791,314	5,165,076	2029	81,960,702		1.23%	1.45%	5,349,020	31,941,950	55%	30%
1.15889	1.04756	1.166447	1,056,611	6,221,687	2030	80,855,173		1.18%	1.55%	5,674,705	37,616,655	55%	31%
1.171859	1.047223	1.179975	1,152,570	7,374,257	2031	80,099,472		1.11%	1.60%	5,815,724	43,432,379	56%	31%
1.175816	1.049102	1.184448	1,183,901	8,558,158	2032	80,971,713		1.01%	1.62%	5,865,270	49,297,648	56%	32%
1.178074	1.050662	1.187095	1,194,928	9,753,086	2033	79,842,188		0.93%	1.65%	5,914,942	55,212,591	57%	32%
1.160391	1.05139	1.168633	1,081,130	10,834,216	2034	80,173,738		0.83%	1.70%	6,053,982	61,266,572	58%	32%
1.148494	1.051873	1.156197	995,565	11,829,781	2035	78,805,263		0.75%	1.65%	5,838,514	67,105,086	58%	33%
1.1242	1.053851	1.130888	821,378	12,651,159	2036	78,821,905		0.75%	1.60%	5,644,181	72,749,268	58%	33%
1.107134	1.042533	1.11169	706,325	13,357,484	2037	78,662,957			1.55%	5,419,283	78,168,551	58%	33%
1.115458	1.052151	1.121479	755,649	14,113,133	2038	78,035,725			1.50%	5,215,402	83,383,953	58%	33%
1.130633			856,953	14,970,087	2039	78,447,595			1.45%	5,015,259	88,399,211	60%	32%
1.130633			850,798	15,820,885	2040	78,239,963			1.40%	4,833,312	93,232,523	60%	32%
1.130633			824,462	16,645,346	2041	77,772,888			1.35%	4,625,892	97,858,415	60%	32%
1.130633			824,462	17,469,808	2042	77,782,559			1.30%	4,436,506	102,294,921	60%	32%
1.130633			824,462	18,294,269	2043	78,041,662			1.25%	4,250,530	106,545,451	60%	32%
1.130633			824,462	19,118,731	2044	78,656,756			1.20%	4,079,876	110,625,327	60%	32%
1.130633			824,462	19,943,192	2045	78,112,618			1.10%	3,719,324	114,344,651	60%	32%
1.130633			824,462	20,767,654	2046	77,850,261			1.00%	3,374,519	117,719,169	60%	32%
1.130633			824,462	21,592,116	2047	78,664,252			0.90%	3,032,982	120,752,151	60%	32%
1.130633			824,462	22,416,577	2048	78,745,784			0.80%	2,701,928	123,454,079	60%	32%
1.130633			824,462	23,241,039	2049	78,727,446			0.75%	2,526,007	125,980,086	60%	32%
1.130633			824,462	24,065,500	2050	78,943,499			0.70%	2,359,663	128,339,749	60%	32%





Incremental Demand-Side Measure Costs		Total After Adder
Residential Hybrid Heating Incremental Incentive (2020$/System Install)	$1,200	$1,600
Residential Hybrid Heating Share of Incentive paid by non-CCI funds (%)	25%	$400
Residential Gas Heat Pump Incentive (2020$/System Install)	$3,000	$4,000
Residential Gas Heat Pump Water Heater Incentive (2020$/System Install)	$1,200	$1,600
Commercial Hybrid Heating Incremental Incentive (2020$/System Install)	$3,000	$4,000
Commercial Hybrid Heating Share of Incentive paid by non-CCI funds (%)	25%	$1,000
Commercial Gas Heat Pump Incentive (2020$/System Install)	$10,000	$13,333
First Year High Ramp Incremental Cost (2020$/metric ton)	$5.06	
First Year Transport Load Savings Cost (2020$/1st year therm saved)	$1.79	
Share of Costs for Delivery (Incentives make up remainder)	25%	

Energy Trust NW Natural Industrial/Large Commercial Savings History	Savings (1st Ye	Expenditures	Cost of 1st Year Savings ($/1st Year Therms)
2018	1,742,313	$2,751,968	$1.58
2019	1,326,424	$3,581,285	$2.70
2020	2,730,218	$4,052,336	$1.48
Average	1,932,985	$3,461,863	$1.79

Energy Trust NW Natural Total Savings History			
2018	6,500,000	$21,201,859	$3.26
2019	5,020,669	$24,393,487	$4.86
2020	6,368,334	$23,993,460	$3.77
Average	5,963,001	$23,196,269	$3.89

	Customer Counts						OR Res Space Heating Stock Replacement			OR Res Water Heating Stock Replacement			OR Com Space Heating Stock Replacement						Low Customer Growth Scenario					
	OR Res	WA Res	Sys Res	OR Com	WA Com	Sys Com	Burnout Rep	New Units	Total Installs	Burnout Rep	New Units	Total Installs	Burnout Re	New Units	Total Installs	Average Spa	Change in Efficiency	Average W	Change in Efficiency		OR Res Cus	Com Res Cus	Residential	Residential	Commercial Space Heat Unit Installs
1988	248,996	6,546	255,542	33,032	1,576	34,608	8,705	10000	18,705	13,757	7500	21,257	1,321	1,500	2,821					1988	248,996	33,032			
1989	259,534	7,338	266,872	34,734	1,735	36,469	9,073	9,210	18,284	14,339	6,987	21,326	1,389	1,702	3,091	78%		55%	55%	1989	259,534	34,734			
1990	272,550	8,715	281,265	36,176	1,926	38,102	9,528	11,376	20,904	15,058	8,630	23,688	1,447	1,442	2,889	78%	0%	55%	0%	1990	272,550	36,176			
1991	285,758	10,197	295,955	37,733	2,072	39,805	9,990	11,544	21,534	15,788	8,757	24,545	1,509	1,557	3,066	78%	0%	55%	0%	1991	285,758	37,733			
1992	299,039	12,177	311,216	38,965	2,191	41,156	10,454	11,608	22,062	16,522	8,805	25,327	1,559	1,232	2,791	78%	0%	55%	0%	1992	299,039	38,965			
1993	314,335	14,822	329,157	40,288	2,369	42,657	10,989	13,369	24,358	17,367	10,141	27,508	1,612	1,323	2,935	80%	2%	60%	5%	1993	314,335	40,288			
1994	328,686	18,264	346,950	41,500	2,578	44,078	11,491	12,543	24,034	18,160	9,515	27,675	1,660	1,212	2,872	80%	0%	60%	0%	1994	328,686	41,500			
1995	342,660	21,243	363,903	42,657	2,745	45,402	11,979	12,213	24,193	18,932	9,265	28,197	1,706	1,157	2,863	80%	0%	60%	0%	1995	342,660	42,657			
1996	360,653	24,560	385,213	44,314	2,995	47,309	12,608	15,726	28,334	19,926	11,929	31,855	1,773	1,657	3,430	80%	0%	60%	0%	1996	360,653	44,314			
1997	378,954	28,107	407,061	47,106	3,209	50,315	13,248	15,995	29,243	20,937	12,134	33,071	1,884	2,792	4,676	85%	5%	60%	0%	1997	378,954	47,106			
1998	394,199	31,407	425,606	47,723	3,436	51,159	13,781	13,324	27,105	21,779	10,107	31,887	1,909	617	2,526	85%	0%	60%	0%	1998	394,199	47,723			
1999	412,712	34,947	447,659	49,188	3,682	52,870	14,428	16,180	30,609	22,802	12,274	35,076	1,968	1,465	3,433	85%	0%	60%	0%	1999	412,712	49,188			
2000	429,961	38,126	468,087	50,713	3,971	54,684	15,031	15,076	30,107	23,755	11,436	35,191	2,029	1,525	3,554	85%	0%	60%	0%	2000	429,961	50,713			
2001	443,816	41,391	485,207	50,993	4,103	55,096	15,516	12,109	27,625	24,521	9,186	33,707	2,040	280	2,320	85%	0%	67%	7%	2001	443,816	50,993			
2002	458,350	45,052	503,402	51,830	4,257	56,087	16,024	12,703	28,727	25,324	9,636	34,960	2,073	837	2,910	85%	0%	67%	0%	2002	458,350	51,830			
2003	470,744	48,683	519,427	53,570	4,399	57,969	16,457	10,832	27,290	26,009	8,217	34,226	2,143	1,740	3,883	85%	0%	67%	0%	2003	470,744	53,570			
2004	484,801	52,351	537,152	53,904	4,644	58,548	16,949	12,286	29,234	26,785	9,320	36,105	2,156	334	2,490	85%	0%	67%	0%	2004	484,801	53,904			
2005	500,757	55,910	556,667	54,717	4,826	59,543	17,506	13,946	31,452	27,667	10,579	38,246	2,189	813	3,002	88%	3%	67%	0%	2005	500,757	54,717			
2006	516,445	58,671	575,116	55,508	5,015	60,523	18,055	13,711	31,766	28,534	10,401	38,935	2,220	791	3,011	88%	0%	67%	0%	2006	516,445	55,508			
2007	528,889	60,787	589,676	56,250	5,147	61,397	18,490	10,876	29,366	29,221	8,250	37,471	2,250	742	2,992	88%	0%	67%	0%	2007	528,889	56,250			
2008	537,198	62,087	599,285	56,857	5,258	62,115	18,780	7,262	26,043	29,680	5,509	35,189	2,274	607	2,881	90%	2%	67%	0%	2008	537,198	56,857			
2009	541,795	62,879	604,674	56,842	5,307	62,149	18,941	4,018	22,959	29,934	3,048	32,982	2,274	(15)	2,259	90%	0%	67%	0%	2009	541,795	56,842			
2010	546,699	63,899	610,598	57,061	5,414	62,475	19,113	4,286	23,399	30,205	3,251	33,456	2,282	219	2,501	90%	0%	67%	0%	2010	546,699	57,061			
2011	551,038	64,632	615,670	57,432	5,482	62,914	19,264	3,792	23,057	30,445	2,877	33,322	2,297	371	2,668	90%	0%	67%	0%	2011	551,038	57,432			
2012	555,961	65,438	621,399	57,782	5,799	63,581	19,436	4,303	23,739	30,717	3,264	33,981	2,311	350	2,661	92%	2%	69%	2%	2012	555,961	57,782			
2013	561,589	67,045	628,634	59,092	6,140	65,232	18,284	4,919	23,202	31,028	3,731	34,759	2,364	1,310	3,674	92%	0%	69%	0%	2013	561,589	59,092			
2014	568,720	68,691	637,411	59,961	6,243	66,204	20,904	6,232	27,137	31,422	4,728	36,150	2,398	869	3,267	92%	0%	69%	0%	2014	568,720	59,961			
2015	576,247	70,592	646,839	60,074	6,342	66,416	21,534	6,579	28,112	31,838	4,990	36,828	2,403	113	2,516	92%	0%	69%	0%	2015	576,247	60,074			
2016	584,289	72,566	656,855	60,509	6,600	67,109	22,062	7,029	29,091	32,282	5,332	37,614	2,420	435	2,855	92%	0%	69%	0%	2016	584,289	60,509			
2017	593,998	74,805	668,803	61,156	6,959	68,115	24,358	8,486	32,844	32,818	6,437	39,255	2,446	647	3,093	92%	0%	69%	0%	2017	593,998	61,156			
2018	602,777	77,357	680,134	62,114	7,215	69,329	24,034	7,673	31,706	33,303	5,820	39,124	2,485	958	3,443	92%	0%	69%	0%	2018	602,777	62,114			
2019	611,896	80,116	692,012	62,613	7,310	69,923	24,193	7,970	32,163	33,807	6,046	39,853	2,505	499	3,004	92.4%	**0.35%**	70%	0.93%	2019	611,896	62,613			
2020	619,505	82,592	702,096	62,341	7,368	69,709	28,334	6,650	34,984	34,228	5,045	39,272	2,494	(272)	2,221	92.7%		71%		2020	619,505	62,341			
2021	627,578	85,473	713,051	62,612	7,503	70,115	29,243	7,056	36,299	34,674	5,352	40,026	2,504	271	2,776	93.1%		72%		2021	627,578	62,612			
2022	635,943	88,587	724,530	62,851	7,635	70,486	27,105	7,311	34,416	35,136	5,546	40,682	2,514	239	2,753	93.4%		73%		2022	635,943	62,851	34,416	40,682	2,753
2023	644,435	91,688	736,124	63,268	7,817	71,085	30,609	7,423	38,032	35,605	5,631	41,236	2,531	417	2,948	93.8%		74%		2023	644,435	63,268	38,032	41,236	2,948
2024	653,372	94,563	747,935	63,896	8,077	71,973	30,107	7,810	37,917	36,099	5,925	42,023	2,556	628	3,184	94.1%		75%		2024	653,372	63,896	37,917	42,023	3,184
2025	662,308	97,449	759,757	64,524	8,319	72,843	27,625	7,810	35,435	36,592	5,925	42,517	2,581	628	3,209	94.5%		76%		2025	653,372	63,896	27,625	36,099	2,556
2026	671,091	100,348	771,439	65,131	8,534	73,665	28,727	7,676	36,403	37,078	5,823	42,901	2,605	607	3,212	94.8%		77%		2026	653,372	63,896	28,727	36,099	2,556
2027	679,659	103,238	782,897	65,717	8,727	74,445	27,290	7,489	34,778	37,551	5,681	43,232	2,629	587	3,215	95.2%		78%		2027	653,372	63,896	27,290	36,099	2,556
2028	688,051	106,140	794,191	66,283	8,914	75,197	29,234	7,335	36,569	38,015	5,564	43,579	2,651	566	3,217	95.5%		79%		2028	653,372	63,896	29,234	36,099	2,556
2029	696,276	109,078	805,354	66,849	9,098	75,947	31,452	7,189	38,641	38,469	5,453	43,923	2,674	566	3,240	95.9%		80%		2029	653,372	63,896	31,452	36,099	2,556
2030	704,357	112,051	816,409	67,415	9,281	76,696	31,766	7,063	38,829	38,916	5,358	44,273	2,697	566	3,262	96.2%		80%		2030	653,372	63,896	31,766	36,099	2,556
2031	712,145	115,065	827,210	67,961	9,463	77,424	29,366	6,806	36,172	39,346	5,163	44,509	2,718	546	3,265	96.6%		81%		2031	648,471	63,417	25,083	32,579	2,057
2032	719,569	118,127	837,696	68,488	9,646	78,134	26,043	6,489	32,531	39,756	4,922	44,678	2,740	527	3,267	96.9%		82%		2032	643,608	62,941	21,792	32,335	2,042
2033	726,720	121,233	847,952	68,996	9,829	78,825	22,959	6,250	29,209	40,151	4,741	44,892	2,760	508	3,267	97.3%		83%		2033	638,781	62,469	18,740	32,092	2,027
2034	733,614	124,384	857,999	69,504	10,014	79,517	23,399	6,026	29,425	40,532	4,571	45,103	2,780	508	3,288	97.6%		84%		2034	633,990	62,000	19,211	31,852	2,011
2035	740,268	127,584	867,852	70,011	10,198	80,209	23,057	5,816	28,872	40,900	4,412	45,311	2,800	508	3,308	98.0%		85%		2035	629,235	61,535	18,901	31,613	1,996
2036	746,613	130,840	877,453	70,497	10,382	80,879	23,739	5,545	29,284	41,250	4,206	45,457	2,820	486	3,306	98.3%		86%		2036	624,516	61,074	19,614	31,376	1,981
2037	752,657	134,154	886,811	70,961	10,565	81,526	23,202	5,283	28,485	41,584	4,008	45,592	2,838	464	3,302	98.7%		87%		2037	619,832	60,616	19,109	31,140	1,967
2038	758,492	137,517	896,009	71,403	10,749	82,152	27,137	5,100	32,237	41,907	3,869	45,775	2,856	442	3,298	99.0%		88%		2038	615,183	60,161	23,074	30,907	1,952
2039	764,127	140,930	905,057	71,845	10,932	82,777	28,112	4,924	33,037	42,218	3,735	45,953	2,874	442	3,316	99.4%		89%		2039	610,569	59,710	24,080	30,675	1,937
2040	769,567	144,393	913,960	72,287	11,116	83,403	29,091	4,755	33,845	42,519	3,607	46,125	2,891	442	3,333	99.7%		90%		2040	605,990	59,262	25,088	30,445	1,923
2041	774,746	147,912	922,658	72,710	11,299	84,009	32,844	4,526	37,370	42,805	3,434	46,238	2,908	423	3,331	100.1%		91%		2041	601,445	58,818	28,871	30,217	1,908
2042	779,668	151,487	931,155	73,114	11,482	84,596	31,706	4,302	36,009	43,077	3,263	46,340	2,925	404	3,329	100.4%		92%		2042	596,934	58,377	27,764	29,990	1,894
2043	784,410	155,111	939,522	73,499	11,665	85,164	32,163	4,145	36,307	43,339	3,144	46,483	2,940	385	3,325	100.8%		93%		2043	592,457	57,939	28,250	29,765	1,880
2044	788,977	158,785	947,762	73,884	11,848	85,733	34,984	3,991	38,975	43,591	3,027	46,618	2,955	385	3,341	101.1%		93%		2044	588,014	57,504	31,101	29,542	1,866
2045	793,370	162,509	955,880	74,270	12,031	86,301	36,299	3,840	40,139	43,834	2,913	46,747	2,971	385	3,356	101.5%		94%		2045	583,604	57,073	32,445	29,320	1,852
2046	797,594	166,286	963,880	74,655	12,214	86,869	34,416	3,691	38,108	44,067	2,800	46,867	2,986	385	3,371	101.8%		95%		2046	579,227	56,645	30,591	29,100	1,838
2047	801,650	170,114	971,765	75,040	12,397	87,437	38,032	3,545	41,577	44,291	2,689	46,980	3,002	385	3,387	102.2%		96%		2047	574,882	56,220	34,235	28,882	1,824
2048	805,541	173,992	979,534	75,425	12,580	88,005	37,917	3,401	41,318	44,506	2,580	47,086	3,017	385	3,402	102.5%		97%		2048	570,571	55,798	34,149	28,665	1,810
2049	809,269	177,920	987,189	75,811	12,763	88,574	35,435	3,258	38,693	44,712	2,471	47,183	3,032	385	3,418	102.9%		98%		2049	566,291	55,380	31,695	28,450	1,797
2050	812,835	181,897	994,731	76,196	12,946	89,142	36,403	3,116	39,519	44,909	2,364	47,273	3,048	385	3,433	103.2%		99%		2050	562,044	54,965	32,691	28,237	1,783
	0.009409759	**0.02759918**	**0.01208631**	**0.0069443**	**0.0196252**	**0.0085153**																			

18th Annual Energy Conference - Northwest Gas Association and Alliance of Western Energy Consumers - Executive Panel - Embracing the Future - June 10, 2021

Excerpt

Has anyone done the cost comparison of a marketing campaign convincing consumers that we really do only have nine years left and they should just live up [sic] to BS spending money on new resources?
David Anderson -
Well you must have been at my *board meeting last week, but..*um. You know, So. We.
So what we have been talking about. We have been doing the education there has been marketing. Actually, the word "campaign" is exactly right.
Moderator:
Yeah:
David Anderson:
Um..and.."campaign" is broader than marketing. Um, and. So think about it as a political campaign. and so our team at least here in Oregon. And I know everybody's got a different situation. Um. But we are we are actually rolling out a campaign uh to kinda make sure not only do touch everybody in person. But uh if you live in Portland, you are about to see some ads on your television. Uh. Very soon that I think you are going to like. Uh That you know clearly lays out. And I think it's you know it's important. Because what we see is about an 85% product preference numbers down here. So in a very environmentally friendly part of the country. The product preference numbers for the product [natural gas] that these all of us serve is incredibly high. And so Building off of that. Making sure that message gets back. But I think its broader than marketing. It's the campaign that has to be all faceted uh uh across the board. And Yes, we are doing that. I don't know what the burst is spending money on other resources. But uh We are spending more money uh in this area. At least on my company's side. I will tell you that AGA has beefed up their side of the equation too for uh the bigger campaign on a national basis.

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NWN projected emissions 2022	5931657	UM 2178 workpapers based on DEQ cap
total delivered therms 2022	1098648341	UM 2178 workpapers
emission/therm	11.7 lbs/therm	
DEQ baseline residential emissions	2,016,290.67	
emission of residential load growth	387,974.38	
allowable emission 50% reduction from residential baselin	1,008,145.34	
emission reduction required after load growth	**69%**	
average new home therms/year in 2035	532.00	
average new home emissions lbs	6,224.40	
in metric tonnes (2204 lbs/metric tonne)	2.82	
assuming has gas equip for 20 years	56.48	
cost at 80/metric tonne	4,518.62	
cost at 100/metric tonne	5,648.28	
margin/year at 532 therms/year	394.74	
year of margin at $80/metric tonne	**11.45**	
years of margin at $100/metric tonne	**14.31**	
years of margin from LEA	**7.28**	
financing	1,907.00	from NWN LEA worksheet
years of margin from financing	**4.83**	

lbs emissions per 2022 furnance	4972.5	425 therms per 2022 furnance (from NWN UM 2078 workpapers)
per metric ton	2.26	
emission cost at 80/ metric tonne	180.49	
emissions cost at 100/metric	225.61	with margin
emission reduction per new furnace (20 year life) at $80	$ 3,609.80	
emission reduction per new furnace (20 year life) at $100	$ 4,512.25	
margin/therm	0.742	
2022 therms/furnance	425	
5 years furnance margin	1576.75	
weather normalized usage test year 2178 workpapers	628	
5 years of margin	**2329.88**	

DEQ baseline:

	2017	593,998
	2018	602,777
	2019	611,896
average residential customers		602,890.33
2035 residential customers		740,268
difference		137,377.99
%		0.227865632

Cost Associated with a Single New Customer		**Cost**	**Years of Margin**
GHG Reductions		$4519 -- $5648	11 -- 14
Line Extension Allowance (LEA)		$2,875	7
Financing cost of LEA		$1,907	5
	total	$9300 --$10430	23 to 26 years

CUB/106
Jenks/1

NW Natural
Determination of Cost of Service

Input Capital Costs and Rates			
Cost of Capital	**% of Capital**	**Cost**	**Weighted Cost**
Debt	50.00%	6.33%	3.17%
Preferred Equity	0.00%	0.00%	0.00%
Common Equity	50.00%	10.00%	5.00%
	100.00%		8.17%
State Tax Rate			7.60%
Federal Tax Rate			35.00%
Revenue Sensitive Rate (held to franchise rate)			2.30%
Depreciation Rate			2.50%
Property Tax Rate			1.50%
Incremental O&M			0.0
Bonus Tax Depreciation toggled (1 = yes, 2 = no)			2
Investment			2,900

Indicated Multiplier (Year 1) 5.9 Using distribution margin

			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
1	**Depreciation**		73	73	73	73	73	73	73	73	73	73
2	**O&M**		40	40	40	40	40	40	40	40	40	40
3	**Property Taxes**		43	42	41	40	39	38	37	36	34	33
	Taxes on Equity Return											
4	**State**		18	17	16	15	15	14	13	12	12	11
5	**Federal**		77	73	69	66	62	59	56	53	50	47
6	**Total Taxes**		95	90	86	81	77	73	69	65	62	58
	Return on Rate Base											
7	**Debt**		90	86	81	77	73	69	66	62	59	55
8	**Preferred Equity**		0	0	0	0	0	0	0	0	0	0
9	**Common Equity**		142	136	129	122	115	109	104	98	93	87
10	**Total Return**		233	222	210	199	188	179	169	160	151	142
11	**Subtotal Cost of Service**		483	467	449	432	416	402	387	374	360	346
12	**Revenue Sensitive Items**		11	11	11	10	10	9	9	9	8	8
13	**Total Cost of Service**	$4,264.95	$494	$478	$460	$442	$426	$411	$397	$382	$368	$354
		$4,393.46	372	$372	$372	$372	$372	$372	$372	$372	$372	$372
14	**Annual Cost of Service as % of Investment**		17.05%	16.49%	15.85%	15.26%	14.70%	14.18%	13.68%	13.18%	12.69%	12.20%
	Rate Base - net of deprec. & def. tax		$2,849	$2,722	$2,574	$2,436	$2,308	$2,188	$2,074	$1,962	$1,850	$1,738

NW Natural

CUB/106
Jenks/2

Income Statement		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
1 Revenue - Original		371	371	371	371	371	371	371	371	371	371
2 Operations & Maintenance	$40.00	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)
3 Depreciation	2.50%	(73)	(73)	(73)	(73)	(73)	(73)	(73)	(73)	(73)	(73)
4 Franchise Tax	2.30%	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)
4 Property Tax	1.50%	(44)	(42)	(41)	(40)	(39)	(38)	(37)	(36)	(35)	(34)
5 Interest Expense	6.33%	(92)	(86)	(81)	(77)	(73)	(69)	(66)	(62)	(59)	(55)
6 Net Income Before Tax		115	121	127	133	138	143	147	152	157	161
7 Income Tax	39.94%	46	48	51	53	55	57	59	61	63	64
8 Net Available to Common		69	73	76	80	83	86	88	91	94	97

Balance Sheet	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Assets										
9 Gross Plant	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900
10 Accumulated Depreciation	73	145	218	290	363	435	508	580	653	725
11 Net Plant	2,828	2,755	2,683	2,610	2,538	2,465	2,393	2,320	2,248	2,175
12 Total Assets	2,828	2,755	2,683	2,610	2,538	2,465	2,393	2,320	2,248	2,175
Liabilities and Equity										
13 Common Equity	1,399	1,322	1,251	1,185	1,123	1,065	1,009	953	897	841
14 Long Term Debt	1,399	1,322	1,251	1,185	1,123	1,065	1,009	953	897	841
15 Deferred Taxes	29	110	180	240	292	335	374	414	453	492
16 Total Liabilities and Equity	2,828	2,755	2,683	2,610	2,538	2,465	2,393	2,320	2,248	2,175

Cash Flow Statement	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Operating Activities										
1 Net Income	69	73	76	80	83	86	88	91	94	97
2 Depreciation	73	73	73	73	73	73	73	73	73	73
3 Deferred Taxes	29	81	70	60	51	43	39	39	39	39
4 Cash Provided by Operating Activities	170	226	219	212	207	201	200	203	206	209
Investing Activities										
5 Project	(2,900)	0	0	0	0	0	0	0	0	0
6 Cash Used in Investing Activities	(2,900)	0	0	0	0	0	0	0	0	0
Financing Activities										
7 Common Stock Issued	1,450	0	0	0	0	0	0	0	0	0
8 Long Term Debt Issued	1,450	0	0	0	0	0	0	0	0	0
9 Long Term Debt Retired	(51)	(77)	(71)	(66)	(62)	(58)	(56)	(56)	(56)	(56)
10 Common Stock Dividends	(120)	(150)	(148)	(146)	(145)	(144)	(144)	(147)	(150)	(153)
11 Cash Provided by Financing Activities	2,730	(226)	(219)	(212)	(207)	(201)	(200)	(203)	(206)	(209)
12 Net Cash Flow	0	(0)	0	0	0	0	0	0	0	0

Project Name: **5234-E190117 – NW Natural Safety Communications**
Location: **Eugene, OR**
Date: **10/30/19**
Segment: **Group 5**

All right, [INAUDIBLE] but everybody else can come this way. Make sure your cell phones are off or on silent and go ahead and find a spot at the table.

Hi there.

Hi.

Welcome.

Howdy.

Howdy, how are you? Fair to middling?

I feel all right. As well as can be expected.

As well as can be expected.

Yes, there you go.

Excellent. All right, still missing a couple people.

First you all want to check and make sure your pads are legal. If anybody has an illegal pad report that to the front.

That's right, yes. Make sure to do that. Actually, as you're all getting situated, if you could be sure to put your name tags out. Face them towards me, that would be great. And we lost somebody.

You've got two more out there.

All right. Welcome everybody, nice to have you all here. My colleague is going to be kind of jumping in and out just a little bit at the beginning just to make sure our video and the recording and all is working properly but in the meantime let me give you an overview of what we're all up to today. As you probably figured out, I'm going to be the moderator. My name is Rob and we are going to be talking about energy and energy sources tonight. Now, having

said all that, I want you to know, I'm not actually an employee of the sponsoring organization. I am an employee of an independent market research firm. And I go to the trouble of telling you that just so that you know I have no stake in the outcome of this research. So, if there's something that we talk about today that you love, that's great. And if there's something that we talk about that you hate, that's great. Basically, what I'm really trying to say is, I'm really just looking for you to give me your candid, honest opinions on the topics of today. Now, obviously, we're doing this in a group setting and we're doing that on purpose. And that is, we want to hear from everybody so nobody gets to sit here silently kind of nodding and agreeing and what have you. I expect to hear from everybody along the way. That said, I don't want you to think that I'm expecting you to come to consensus at any point. So, if you happen to all agree about something, that's terrific, but more than likely there'll be some things that there's some disagreement on. And I don't want you to be sitting there thinking, I don't know what these people are thinking, what kind of planet are they on? I want you to speak up in those situations because if you feel that way, more than likely there are people in the population that feel that way as well and that's what you're representing here. You are representing this larger population so we can get a better sense of how people think and feel about the topics of the day. OK? A couple other things about participating, I absolutely want to be sure that I hear from everybody, and that also means that I'm hoping that you will all be good sharing partners. So, that means I'm hoping that you'll jump in and do your part but you also won't dominate. You'll let other people have a chance to kind of have their say as well. It'd be great if when we have conversations we do one at a time. Sometimes people get so excited they're doing all these side conversations and it drives me nuts because I'm sure there's great stuff being communicated and I can't hear it all. And that, obviously, defeats the whole purpose. We want to be sure that we're getting all the nuggets of great information that you have to share with us. OK? A couple last things, just want to let you know we are in fact recording. I'm sure you figured this out. I also have a couple colleagues in the neighboring room that are watching, taking notes, that kind of thing. But I want to assure you that we're going to be maintaining your confidentiality, all this is being used for internal analysis purposes only. So, if you were hoping that this was going to be your breakout moment on YouTube you're going to be sorely disappointed. But maybe next time, you never know. All right, so without further ado, I think we've covered all we need to so what I'd like to do now is just kind of get to know each one of you a little bit better. So, what I've done is put a little handy, dandy cheat sheet up here for you to look at. Love to have you go around, just give us your name, tell us your occupation, or former occupation, or whatever it is you do when you're not coming to focus groups like this one. And then, if you could tell us what kind of energy sources you

have in your home today, whether it's electricity, gas, both, oil, rubbing two sticks together, whatever it might be. And then, has that changed at all since when you first moved in the home. Have you changed anything about it? Gone all gas, gone all electric, something in between. All right? Peter, would you mind starting us off?

[00:05:41]

Sure, my name is Peter, I work in a retirement community as the activities coordinator. A lot of fun, a lot of heartache. My home energy sources were ceiling electric and we got rid of that for natural gas some years ago. And driving my bicycle to work somebody decided to hit me so now we have a solar panel set on top of the house as well. That goes directly into the city stream so you folks are buying our power, thank you very much. But it's just gas heat and solar.

Solar is heat or just a source of electricity?

No, just a source of electricity. It goes right back into the grid. And we've lived in that house for 20 some odd years, the house was built back in 1967 or so hence the popcorn ceiling and the electric in the ceiling.

All right, great to have you here. Darren?

My name is Darren, I work as a park specialist for Lincoln which is the park district in Springfield. I've lived in my home for five years now and we have natural gas furnace heating. We also use some electricity, we have electricity as well so we have some space heaters and stuff for some zonal heating. And we have a wood burning fireplace.

All right.

It's just most of the heat goes out through the roof, it's more for ambiance than anything else.

And that's been pretty much consistent the whole time you've been there?

It's been consistent since we moved in.

All right, great.

Thought about a gas stove but haven't gotten there yet.

All right, great to have you here. Deb?

We just moved six months ago so our new house has gas heat and regular electric. Our prior home of 25 years had solar panels for hot water, but other than that it was also gas furnace.

But now hot water is through gas?

Right.

All right, great. Nice to have you here. Adrean?

I'm Adrean, I'm a gardener. I have a house that is heated both with natural gas as well as electric. The house was built in two separate phases so the back of the house has electric and the front of the house has a gas heated water heater. And the water heater heats coils which go around the roof of the house so it's really inefficient. Other than that, there's also a place for burning wood like a fireplace but it's very much just decorational and we don't use it anymore.

All right, nice to have you here. Sara?

Hi, I'm Sara. I'm a middle school teacher and we've lived in our house for about five or six months. And we have electric heat but then we have a gas water heater and we have a gas fireplace. And our hope is eventually to have gas stove and we put a propane stove on the back porch too.

So, electric stove currently?

Yes, but we would like to replace it with gas when we're able.

[00:08:48]

Great, thanks for being here. Jeff?

My name's Jeff. I've lived in my current house about ten years I'd say, a little over ten years. When we moved in it was all electric, electric heat pump. I'd say about four years ago we got a gas furnace, everything else was electric but the heating is all gas furnace at this point. I'm a financial planner, by the way.

Great, nice to have you here. Katie?

My name is Katie and I work at the military charter school in the special education department. I'm kind of a – that doesn't matter. We use gas appliances, the stove and fireplace, and then we have forced air throughout for – so electricity for the – we have this really cool system, it's called Nest, I don't know if you guys have heard of it. I'm still learning it.

The thermostat?

Mm-hmm.

The Nest intelligent, smart thermostat?

Yes, it's supposed to be really intelligent but I don't know.

Is it gas furnace or electric furnace controlled by the –

Electric. We just have gas fireplace and a gas stove.

All right, great. Nice to have you here. And last but not least, Paul?

I'm Paul. I'm retired.

What did you do before you retired?

My education was in geography so I worked in mostly cartography and geographic systems analysis and some surveying. I've lived in my present home for about 22 years and it has a gas furnace which it had when I moved in except I've upgraded to a more efficient furnace but it's still gas heat for the house. I have electric space heaters that I use when I don't want to heat the whole house, I can just heat one room with some kind of electric heater. I have an on demand gas water heater that I put in and I have a gas range. I converted those both to gas from electricity during the early part of the 22 years.

Great. What a great group. Very diverse and lots of great experiences here that I'm sure we're going to be able to tap into, that sounds great. The first activity we're going to kick off today is something called word association. And what that is I'm going to put up a word or a phrase and I just want you to just shout out for me whatever comes to mind. OK? So, let us begin. What of you think of when you think of clean energy?

Solar.

Solar.

Wind.

Wind.

Wind.

Green.

Hydro.

I'm sorry Deb, green first?

Green.

Green. Hydro.

Earth friendly.

Earth friendly.

Zero carbon.

Zero carbon? Is that what I heard?

[00:11:54]

Yes.

OK, zero carbon.

Renewable.

Wave energy.

OK, anything else?

What about the, what is it called, where you pump – you extract heat out of the earth?

Geothermal.

Geothermal.

Geothermal.

Hydrogen engines.

Hydrogen, OK. You're thinking of a car?

Yes.

So, hydrogen car maybe?

Yes.

OK. Is that good?

Volcanic in Iceland, what Iceland does where they extract – where they use the volcanic activity to create steam.

I think that's the geothermal, isn't it?

No, it's something different but in principle you're right, yes. Nevermind, scrub that.

That's all right, we'll throw volcanic in. That sounds impressive. Let's keep on going. How about electricity. What comes to mind when you think electricity?

Electrons.

Electrons.

Science teacher.

Heat.

Spoken like a teacher.

Are you positive?

I'm absolutely positive.

What else?

Tesla.

Tesla.

Tesla, nice.

Renewable.

Renewable.

Current.

Thermal generation.

Right now it's black out.

I heard current. I heard – what was the other one?

Thermal generation.

Thermal.

Unsightly when you look at all the –

Let me just catch up. I heard, what was it? Blackout.

Yes, blackout.

Expensive.

You guys keep getting ahead of me. Then what was yours?

Unsightly.

Unsightly. And then what, I'm sorry, what was the –

Expensive.

Expensive. Sorry, I just can write as fast as you guys coming up with ideas. That shows how creative you are. What else?

Public owned utilities.

Public owned utilities.

Dangerous.

Dangerous.

It cause those fires in California.

I would add clean. Like an electric motor versus a combustion engine.

And we had all those transformers explode in the snow. Sorry.

I think we got that with dangerous. Let's keep on going. How about natural gas? What do you think of with natural gas?

Fracking.

Fracking. What else?

[00:14:57]

Better for cooking.

Really? I hate it.

We could argue that one.

I'm so over it.

A pain to install. I installed my own.

I just think of it as a heat source.

I like that it's on demand. The fireplace is so wonderful.

That's true.

Is it specific to the fireplace or are you thinking about it just in general?

That's what it does at my house. The water heater is great too, the water is really hot, but the fireplace is just like, push the buttons, boom, fire. It's wonderful.

I love the idea of building it.

Non-renewable.

It also is dangerous.

Yes.

And when you think dangerous, in what sense? Explosion.

Fire and explosion.

The carbon monoxide.

So like a leak?

Yes, when it leaks or if you leave your stove on. There's just – like electricity, it's normally quite [INAUDIBLE] once in a while it becomes dangerous.

Cleaner than coal.

Cleaner than coal. Yes, by far.

Smells like rotten eggs.

Leading source. Isn't it a leading source of power now that they've shut down all the coal fire generators?

It is a source of – so a coal replacement?

Yes.

That is correct. OK, I think that's a – unless there's one more.

There's a lot of natural gas in Venezuela.

OK, so you're thinking Venezuela. All right, I think that's a great list. You guys are rocking and rolling. That's great. That's pretty encouraging. So, that will be good and get us going for this next topic which touches on some of the elements that you talked about and that is, as you think about your energy sources, either ones that you consciously went out and installed, or changed, or accepted, or have just maintained through the years. You haven't changed it but you've made a conscious decision to stay with that electricity or stay with that natural gas. What were the important factors that you considered that caused you to make that decision? What were the factors to make you choose what you've got now, the important ones?

Cost.

Cost, meaning, cost of what?

[00:17:57]

The cost of heating water or a range. Electricity versus gas.

So, the operating cost?

Yes, the actual cost.

Not the equipment cost?

Correct, the consumable energy source.

What else besides cost is a big factor?

Investment in the house, as in –

As in the infrastructure?

Yes.

So, whether you – so, tell me more.

So, we spend $4000 for the actual furnace and I did the installation and all, I'll never do that again, never. Laying all the pipes and all the airflow, but down the road, when the house gets sold, would it see better having all these little wires in the ceiling or would it sell with the furnace?

So, investment, it's really more, kind of, return on investment?

Yes.

Really? OK, return on investment. OK, what else? What are the other key factors that have made you decide to either choose something different or – for example, Jeff, when you made that decision to change, what was the important factor?

I'm from Colorado originally so it was all warm forced air heat, natural gas heat for the most part there. And heat pumps here, it just blew my mind that the air temperature coming out of your vent was pretty much half a degree warmer than the room temperature. So I wanted actually warm air which a natural gas furnace gives me actual warm air coming out of the vent that I can – heats up fast.

So, fast heat was a key issue?

And actual warmth coming out of your vent as opposed to just barely noticeable.

And that's why I chose to change my range from electric to gas was because it's instant heat and instant off. You turn it off, the heat's gone. With electric you turn it off and it gradually cools off over the next half an hour.

So that's very specific, the gas, the instant on and off.

And to range specifically, to cooking.

So, a gas range, OK.

I didn't choose mine because it was in the house when we got it but having had a wide range of ceiling heat, this heat, that, I definitely would go with what I have now which is the gas.

Forced air.

Yes, because it's instant, it's convenient.

How is it convenient? Tell me how it's convenient.

Because it's quicker and you don't have to wait for a burner. You can literally come home from work and turn it on, or wake up in the morning and turn it on and you get instant results. It's consistent so you're not going from zero to 60. Ceiling heat, that kind of thing is very, like I said, zero to 60. It's either freezing or smoldering.

You're saying that – and this is, you're describing, just so I'm clear, you're describing gas or –

I'm saying, yes, because I've had the other things I've had the feeling he and the floor vents, all of that, baseboard heaters, all of that electricity when insane. It's more reliable, predictable.

[00:21:12]

You said reliable. Tell me what that means? How is it more reliable?

Maybe that's not the right word, but I know – Like this morning, it was – We turn it off at night. We have the SECO feature, and it gets freezing by morning. I know that I can run downstairs, turn it on, and it's going to be warm. I don't have to [CROSSTALK]

That quick response again. It's an interesting word, and I just want to throw that out there. What about reliability? Is reliability a key factor in choosing your energy source?

I think so because of power outages. That's one thing when we had all those snow storms and we had power outages. I have a natural gas hot water heater and we have a fireplace. We had to never leave our home. We just cuddled around the fireplace and took hot showers. It was great. The fact that in our house, for some reason, it's on in other blocks. Our neighbors in front of us, all have power. That's happened a couple of times where I think we were the only ones on the block without power.

Even though the power is out, you've got some other things you can use and still get by.

I guess I'm thinking, I mean, it could be gas, or electric, but having forced air gives me much more of an even comfort in the house. Rather than having just one corner heating up and the rest of the room be cold. I'm enjoying being able to get up in the morning and just go downstairs and feel like it's going to be freezing down there even though we had the heater upstairs on. Which would happen if I had ceiling heat, or any kind of radiant heat.

Yes.

I'm sorry. What were you going to say?

I was just going to say I currently have ceiling heat in a couple of rooms, and I hate it. Because you can't figure out how hot it's going to be until it's too hot.

Let me switch, and just talk about – Let's pull apart natural gas and electricity, and zoom in on each one, and talk a little bit about the pros and cons as you see them. It sounds like most of you have both, so it will be really interesting to hear what you see as the pros and cons. Let's start with natural gas. What do you see as the key advantages of using natural gas?

When we moved into our house we changed out an older gas furnace, and I deliberated between getting a new electric one, or a gas one. Honestly, I believe, electric is better in the sense that the electricity is renewable. It can come from sources from the sun. It can come from all over. Where with the gas, once it's used, it's used. Basically, I was convinced, I guess, by the dealer that the gas would be that much cheaper to run, and that this furnace was going to be such high efficiency, that it really wasn't going to make a big difference. Because I wasn't going to be using tons of gas in order to [CROSSTALK]

[00:24:25]

It was going to be more efficient than the electric furnace?

Cost wise.

Yes, cost wise.

The efficiency of the furnace, if I got a brand new electric or a brand new gas, probably would be about the same. But I was able to be swayed that I was going to be getting something that really wasn't ideal. I think using electricity, in terms

of forced air, is better for the environment, but because I was getting such a high efficiency unit that I really wasn't damaging the environment, basically.

The first word that occurred to me was cost. In our area, we have very inexpensive electricity compared to national averages. But even then, running a gas furnace through the winter costs a lot less than running an electric furnace.

I realize that we did touch on some of the benefits just in our previous conversation. Anything else comes to mind in terms of advantages? We heard about fast, and instant [CROSSTALK]

We talked about, briefly, about reliability. The delivery systems, gas delivery systems, are generally more reliable than electrical because a storm won't knock out the gas line. I've only in my life experienced one time when the gas went out. I've experienced numerous times when the electricity went out. Not in my house, it didn't, my neighbor, or somebody else, though. Wires running through the air are just vulnerable compared to pipes in the ground.

That makes sense. How about disadvantages? What do you see as disadvantages of natural gas?

Carbon monoxide poisoning.

Yes, that was what I was going to say. It's scary.

Carbon monoxide poisoning.

I mean, that's what they do in the movies. It's almost like, "Well, I'm mad at you, so I'll turn the gas on."

Are you talking about explosions, or are you – When you say movies, I think about things blowing up like Jason Bourne.

In movies, it's explosions, but in real life it's if you forget to turn – If I put the fire out, but I didn't turn the thing and the pilot's not light, then it's slowly going to poison the family. Or you hear about people that are suffering carbon monoxide poisoning from a leak that they didn't know they had, and they start acting really weird, and doing strange things. They don't know that they're being [CROSSTALK]

It really is the carbon monoxide you're worried about not the potential [CROSSTALK]

I don't really think it's going to explode. I'm more concerned that there will be a leak and I won't smell it.

What about those rotten eggs? You're not going to smell the rotten eggs?

You'll get acclimated.

If you're a sound sleeper, you may not.

Other disadvantages [CROSSTALK]

One of the disadvantages when it comes to cost is when you have electricity and natural gas, you pay that delivery just having the gas. In the summertime, my hot water heater is natural gas, but just a hot water heater in the furnace. When you have both, you're paying that delivery fee. The natural gas itself is cheap, but having the service hooked up. That fee that you incur the month you don't have a heater [CROSSTALK]

[00:27:28]

Even if you're not using the gas?

Yes, whether you're using it, or not. It turns it into – I don't know if it would be better just to be on all electric. How that would balance out over the course of time because it doesn't get super cold here so you don't [CROSSTALK]

In theory, I think yes. Again, just to be sure that I'm following you. It would seem like if you're not using a lot of energy for one, wouldn't you not use a lot of energy for the other. You'd still – I guess I'm not understanding what you're paying for. If you're not using gas, during the summer months, [CROSSTALK]

You're paying the additional fee just to have it there.

It's a base cost.

Yes, base cost. It's not the cost per [CROSSTALK]

Your bill has some base [CROSSTALK]

Some delivery fees.

There's a delivery fee on your bill.

[INAUDIBLE] which is [CROSSTALK]

But you're still using it for hot water?

What I'm saying is, if I didn't have any natural gas whatsoever. You take away that delivery fee and apply it to your electric bill. How does that balance out? I haven't done the math. [CROSSTALK] if I put in to pipe the gas for a dryer, and stuff. It just doesn't work out to be cost effective.

Any other disadvantages with natural gas?

For me, I feel concerned when I'm driving my car and I have to buy gasoline that I support wars, basically, buying gasoline. For natural gas, since I'm aware of Venezuela, I feel concerned that it's a natural resource and by using that I could potentially be supporting resource wars, and stuff, that negatively affect others around the world. [CROSSTALK]

If you're using a natural resource that's coming from maybe some troubled parts of the world.

All though, US is a natural gas export.

Good to know. That's it all fracked.

For your comfort.

Is it all fracked? I didn't know [CROSSTALK]

Probably, a lot of it, I don't know how much of it.

It is unfortunate the damage that we're doing to the environment in obtaining the gas by fracking all over [CROSSTALK]

Fracking is awful.

Is that a disadvantage of the natural gas?

Yes, I guess so. It has an environmental impact, but interestingly enough most of the electricity is produced by burning gas. You're supporting the mining of gas whether you're burning it yourself, or using electricity from a gas fired power plant.

Is that something that you folks recognize? Do you realize how your electricity is getting generated?

No.

No. But you were trying – I know for a while they put up a certain amount towards green energy. It used to be that you could pay extra, and you'd know it was coming from green energy. They don't offer that anymore, and I think maybe because they have so many people contributing to that.

You're in a unique area where I think you do have more green sources coming. You've got hydro. You've got some other things going on in Eugene. But to Paul's point overall, when you look at the country as a whole, much of the electricity is being generated by natural gas.

[00:30:32]

Eugene water and electric board, and South both get most of their power from the Bonneville Power Authority which is all comes from hydro. It's all dams. The second largest source is from gas fired plants. The last is coal. I think there's still an operating coal plant at Boardman that we might get some power from that through the grid. They also have – EWEB has invested in solar plants and wind energy, so there's some of that. But it's a small part of the mix.

Let's switch gears. I'm sorry.

I want to say I think the fracking is something that's not, I don't know, advertised as much. But there's all sorts of reports of places that have never had earthquakes but they've had fracking, and were totally undermining the security of the area. People are suddenly experiencing earthquakes just because we've gone in there and fracked into the substructure.

Destroying the water tables too.

Let's switch gears. Let's now talk about electricity. What do you see as the advantages of electricity?

You can transport it quickly. It wouldn't [INAUDIBLE] your power plant and 500 miles away. We had an accident right outside our community last week. The transmission line went down. We had no power in the retirement community where I work. What they ended up doing is they ended up re-routing power from a different source, and we were up and running within 45 minutes. I guess everybody in the community was still out for quite a while. But they, because it's a vulnerable population, they were able to re-route really quickly. It's an advantage.

Other advantages that we're going to see?

I feel like it's safer. I feel [CROSSTALK]

Safer. Tell me how it's safer.

It's just I think the risks are less inside your home then the [CROSSTALK]

What kinds of risks are you thinking of?

We were talking about before the risk of the gas leaks and those things.

Do you worry about electrocution?

I don't actually. I never have.

Sue.

The infrastructure is already there. We're going to change, at some point, to a gas stove. I didn't have to make – I didn't have to be I hope we can get an electric stove, or I hope we can get electric outlets in our house. Every house I looked at had electricity. It's already [CROSSTALK]

It's plug and play.

Yes. It's ready to go.

Gas isn't universally available to send. Not every street has gas piping down.

How about electric disadvantages?

I want to add to the advantages. That it's more easily tractable than gas. I could look at my meter and say, "Woe. Something is spinning off-kilter. There must be a problem somewhere.", or, "Gee, I'm using up a whole lot. Let me see what happens if I try to – " It's something I can[CROSSTALK]

[00:33:33]

You can't look at a gas meter?

I don't think so. Actually, I don't even know, and I wouldn't know how to look at it. But [CROSSTALK]

If you look you can see it. You can see it.

But it's underground in most cases. No, it's not necessarily underground [CROSSTALK]

No, it's not. It's on the side of the house.

You're right. It's on the side of the house.

It just feels like the electric is easier to get a gage on it.

Because it's always moving. The gas, it only starts moving when you start using it. The natural gas starts flowing then.

An advantage of electricity is that it's [INAUDIBLE] AC to DC, DC to AC. It's so versatile. You can light your house with it as well as heat with it, so on and so forth. It's a really versatile energy.

I'm going force you to go into disadvantages though. What disadvantages are there?

Of electricity?

Yes.

I feel it's always been super expensive in the homes that I've had. I've always had EWEB, if I remember correctly. I feel that's always been my biggest expense with that.

Any other disadvantages besides cost?

Depends on your neighborhood, but if you have trees, and snow, or wind. You may be without power for an extended period.

You're susceptible to power outages. Any other disadvantages?

The landscaping, the trees have to get trimmed up around the power lines. I know my neighbor gets pretty upset every time they come hack up his Maple pretty good to keep from interfering with the power lines.

It's just unsightly with the power lines. It doesn't look very nice.

It's dangerous to children in terms of being accessible. Unless you're very careful, it could be harmful.

I'm curious. Several of you have electric ranges, or stoves. Correct? Would you ever consider changing from electric to natural gas for your cooking, or for heating actually for that matter. For either one, would you ever consider doing that, and why? Why would you consider doing it?

Me? I cook a lot. I'm really frustrated that I can't control the temperature on my stove accurately. I just think I'd have better control over what temperature my [CROSSTALK]

Better performance, that kind of thing, the control.

The instant heat factor. You don't have to wait for it to warm up. You don't have to wait for it to cool down very long. The cool, it's there.

I'm actually excited to convert my electric range to gas when the opportunity presents itself. When we bought the house, they put in a new, brand new, electric range.

Why are you excited about switching?

The heat source, we're very getting into cooking, and stuff. It's just a really better type of cooking.

[00:36:36]

How is it better? Help me understand.

Just heating up pans. Heating up water. Just more things faster. Heats up quicker. I find myself leaving the stove on quite frequently to when it's electric. I feel like the flame can [CROSSTALK]

You know it's [CROSSTALK]

You can see it a lot more readily.

It's more variable. You can turn it down a tinge and know that –

Those of you that have electric that wouldn't consider, or don't think you'd consider switching. Why wouldn't you? What would be the barrier?

It won't work in my house because I need a vent, and my kitchen is vaulted. It's got too many particles in it.

It's required to vent that to have a vent to remove it for a gas range?

From what I understand, if you're using gas in an enclosed area, you need to have something, some ventilation, you need to have.

There wasn't some aesthetically using way of doing the venting. Is that the issue?

No. It has to be one of those restaurant big vents that come down with the hood over the stove, and this big pipe going out. It wouldn't work.

How about the rest of you? Any other reasons that would –

We are setup for it. We can do it, and I'm very much in favor of it. Right now, my primary issue is putting money into retirement and that's not – As much as we use the stove, it's not a factor.

You've got other investments you'd like to make.

Something to add to what you said, Paul, about having a gas range and the heat goes off immediately. I've been told that you're best off with a gas range on top, but that the oven be electric. Then, if you're baking, you turn off the oven, and you're not using any power, but the heat stays on and continues keeping the food warm. Then a mix is supposed to be the most efficient way.

That makes sense.

I don't know.

If anybody is going to buy one, just take that into consideration.

Let me ask you about a couple of different things, and just get your sense of whether you think electricity, or natural gas, has the advantage. How about cost of appliances? Is it cheaper to get electric appliances, or gas appliances?

I'd buy an electric.

Electric are cheaper.

Electric appliances. Do people agree?

Yes.

It's like Darren said. If the electric stove craps out then –

I'd have to take a serious look at it then. Until it burns out, I mean, it was a new one not too long ago.

Interestingly, there was this mention earlier about efficiency. Which do you think is more energy efficient? Do you have any sense of that?

I'd say gas because you have more control over it. You're not making it super-hot, and then lowering it down, and super-hot.

[00:39:42]

One would have to compare the cost of producing electricity from gas, and delivery systems. It requires so much analysis and mathematics, I don't approach it. If you're using electricity, which is produced by burning gas. You're ultimately

creating a market in burning gas and creating the same amount of carbon dioxide, or emissions as if you were converting the gas directly. The efficiency of it is – I'm not mathematical enough, or don't have enough data, to analyze it. I'm always thinking about that because I burn gas and I like gas, but I don't know if I burn electricity [CROSSTALK]

You bring up an interesting point, and I guess my question to the group is, what is your sense of when electric utilities create electricity. Then they transmit it to your home. Does a 100% of that electricity reach your home?

No.

I feel like in the system [CROSSTALK]

There's a loss somewhere?

Sure.

There is a loss of efficiency just in the [CROSSTALK]

Transmission.

Sending of the electricity down the line?

Sure. I would agree with Paul. Is that your name? I'm sorry. I'm trying to see. I would agree that efficiency is more than just how much of it gets there. It's got to take into a fact where it came from, and how much it costs to produce it, and what the affect is. It would pretty – Just to say, "We might lose a little bit of the electricity somewhere along the line." I don't know what that loss is, but I can't imagine it's very much. We're pretty good. I would think our electric grid is pretty good.

It's pretty significant when you see the alternative [INAUDIBLE]

Is it?

Even running from your house, if you have an out building, or a little apartment in the back, and you run – It depends on the gage of the wire. You can lose 4 or 5% of voltage just in going, to say, 50 or a 100 feet depending on the gage of the wire. They're running on large wires, and they run high voltages, which has less loss than low voltages. They use transformers. They run high voltage all over the

place with minimum loss. Then they drop the voltage down through transformers near your house. So, there's less loss there. But there is loss in transmission, electricity and gas and barring leaks, gas, 100 percent of the energy that's put into there is delivered to the right points.

Let's keep on going here. I want to ask you, since you all have natural gas in one form or another, if your natural gas were to go away tomorrow, would that be a big deal?

Yes.

Why would it be a big deal?

Generally we haven't let our heat from about Halloween until about April and then we turn it off, and then we just turn AC. But I'm just thinking winter months. My wife? No heat. Hey, I don't have the wife. Well, I wouldn't be happy.

[00:42:50]

Give me your thoughts if it was to be shut off today.

If it was just shut off today, would that be like no big deal or would it be a huge deal?

Wouldn't have any heat.

I don't –

Would be a big deal.

Your heat would – I mean, you're depending on it for heat?

Mm-hmm.

I wouldn't have hot water, which I'm kind of used to.

It would be a big deal in short.

I might also ask the group at large, Darrin brought up an interesting point and I didn't have a chance to sort of ask everybody if they agree with it or not, which was this idea of the fact that you have both electricity and natural gas.

Do you see that as a benefit that you've got sort of, I don't know, the best way to describe it, a fallback in case one goes out, you still have some sort of energy source to kind of power –

When –

At least some of your stuff is that –? Do you see that as a benefit?

Yes.

As opposed to being single source and kind of reliant on a particular, one energy source and if it goes out, your kind of out of luck?

Very much so.

When we switched to the gas furnace and we replaced the air conditioning in and outside every HVAC guy, we had said if it was their money, they'd go the hybrid route so they'd have both fuels available. Obviously, you got to pay for it. But that's what they said.

I think the point is, is that my gas appliances are an alternative, but that there's electricity no matter what. The question, if the question was if electricity went away, what would I do? I'd be sunk. I wouldn't be able to light my house with the gas. I wouldn't be able to do all sorts of stuff. But having the electricity is the fallback. I could always get space heaters and I could always get, plug in water. Whatever so gas is an add-on in a way, but it's not the main, it's not what runs everything and I can use electricity to run everything.

It sounds like in your household though, natural gas plays a major role. If it were to go away, your heat would be gone.

My heat would be gone. Absolutely.

Except warming heaters.

But without the natural gas, I can get space heaters. I won't fall apart. It's just not good.

Which is another advantage of electricity as far as heat, is that electrical heat devices can be moved around, whereas gas devices are fixed.

It's true.

Let's switch gears a little bit now because I want to kind of focus now on the energy and the environment a little bit. Let's start first at kind of a high level and ask what do you see as being the greatest contributors to climate change today? And particularly in a carbon emission. What are the greatest sources, as you understand it of carbon emissions today?

[00:45:51]

Airplanes are huge.

Car transportation. [CROSSTALK]

I think transportation is the largest single source.

Cargo ships of course. Moving goods.

I think and I'm not –

Would you –? I'm sorry.

Cargo ships moving goods across the ocean. Correct.

Ships, cars, trucks.

Less of coal mines, and then power generation in China. That's their fuel of choice.

Coal, what else?

Cows.

The US military is one of the biggest polluters.

Military. And you said cows?

Yes. I was going to agree with that.

You've got sort of cows' slash agriculture. Anything else that you can think of?

Industrial.

An industry?

Industry.

First sitting in traffic for hours on end.

What energy sources do you feel like are playing a positive role when it comes to climate change?

Wind.

And solar.

Wind, solar.

Hydro.

Hydro. Anything else?

The wave as much as it's developed. When and if they develop systems that are truly efficient and profitable, economical, that'd be great. Ocean keeps going up and down.

They have some systems where they are pumping water up into lakes in the – At nighttime, nighttime the power is cheap and then during the day they let it down to the generators and it is being used. It is not an unused science.

My question though on these is – First of all, why do you feel like these are making a positive role? A positive contribution when it comes to climate change?

They're making less –

Because they're not making a negative contribution.

They're making less negative.

Like this we already have sunlight. We already have wind; we already have water or waves or what –

Now does that mean that these guys are all perfect?

No.

Do they all do they have any negative aspect –?

Yes.

Lots of them.

What are some of the negatives?

Solar in the nighttime.

Solar, can't do it at nighttime.

Cost of the infrastructure. Some of them are very expensive to get it all up and running.

I do know people that live their wind turbines, they're not happy about the –

Sound of the turbines.

And killing birds.

Or the appearance. Some people don't, are really disturbed by seeing them.

The appearance and the birds you said?

That's true.

Dams like changing the ecosystem of rivers.

What would you say that Germany has had now several days when the whole country was ran on alternate forms of energy? I think a year ago when that happened.

That's cool.

Where does natural gas fit into the equation when it comes to the environment? Do you feel like it's playing a positive role? Is it playing a negative role? Is it playing something in between? What's your sense about?

[00:49:03]

In the environment? I think it's negative.

Tell me why.

Basically fracking. I think that fracking is destructive and irreversible.

You're concerned about that sort of up front –?

The source.

Mining of it, if you will. And the impacts, the environmental impacts it does with that.

Yes. Irreversible.

And it's not renewable.

How about the rest of you? Positive, negative?

I agree with those. That those are the negatives. Those are the costs. I consider gas as an interim of a better source than coal and some of the other things we've used. But we're going to use it on the way to going into solar and wind and –

Why do you think of it as an interim? What? Tell explain your thinking on that a little bit. How was it better? He said it was better than –

Better than coal.

And how is it better than coal?

Less carbon emissions by far per kilowatt hour released.

How do the rest of you feel about that?

I agree with that. It's on a, it's what we have now, but it's not permanent.

It's – Go ahead.

Is there any chance that we'll ever use it all?

Yes.

Then what? There is that, maybe.

Do you feel like –? Was this discussion about an interim or sort of something to kind of fill the gap when you go to some of these other sources? Does that make sense to people or do you not buy that?

It makes sense.

Makes sense.

Or maybe that's how we should be using as an interim and not just using it till it's.

Till it's gone?

Yes.

Something I feel like you should use it as long as there's other sources that are worse than that. You want to get it, get rid of the bad players first. Like the coal and – If I was to convert [INAUDIBLE] versus natural gas stove, fireplace, the natural gas is better for the environment to burn it over the wood. Would buy that.

I don't think there's been any mention of nuclear power. Nuclear powers refuse to – Have we mentioned nuclear?

Nobody mentioned nuclear. Do you consider that clean or not?

Scary?

Depends on how it's done. I think there's a lot of fear but.

It's another one of these things that has the tradeoffs. No doubt.

Let's keep on going. I want to – On this issue of natural gas, I'm curious if you've known that there are certain West coast cities that are mulling over the idea of banning new construction using natural gas. And I guess I'm curious about how you feel about that. Do you feel like that makes sense and you're supportive of that? Or do you feel like it's local government kind of overreaching or do you feel conflicted? Where do you come out on something along those lines?

[00:52:18]

What are their reasons for it?

I think the thinking is generally along the lines of they're trying to do something positive in the way of climate change. That's – What that means then just to kind of finish the thought. What that means is then obviously those new construction would have to use electricity. And then we've talked a little bit about different sources of how electricity is generated so keep that in your thinking as well. What do you think about that? Do you think, does it make sense that they would be doing that or do you feel like that that's not, doesn't make a lot of sense?

I think that if their goal is to help mitigate climate change that's totally misguided. I don't think it makes any sense.

Especially if they saw the list that we have.

Explain to me why.

We would have to open up a discussion of what causes climate change. And so, I don't know. What I understand to be a really big influencer in terms of what's a carbon sink is forests that are intact, like forest ecosystems being intact. And I also understand that there is a weather modification, things that happen. And so for example, if the Amazon rain forest is in drought, then it's like 50% less efficient at sinking carbon, than it would be if it was not in drought. And so, for me, I'm concerned about weather modification and diversion of rainfall from forest ecosystems and so.

If I'm understanding you correctly, you're basically saying maybe the end goal is, admirable, but they're going about it wrong, that they're not going after the big ticket item in your view?

That's right.

How about the rest of you? You don't have to raise your hand. Just check. Just like go –

I actually, I like the idea because as I said, when I had the option of electric versus gas for my furnace it was a little easy to be swayed by, but you know a gas is going to be so much cheaper and you've got this really super-efficient system and electricity is just going to cost like above. And so, it was a dilemma and I think like I'd much rather be in a situation where like, we know that gas is a problem gas is non-renewable, the fracking is destroying the infrastructure of our country. And so, we're just not even offering you that option. And then if it's going to cost me more, that would've been my only option. So, there I go. It's like I kind of thinking when I first heard about it, I thought, good. That makes it easier for people.

How about the rest of you?

At some point we're going to have to get away from gas, right? For vehicles we're going to have to get away and everybody's going to drive electric vehicles.

Gasoline you mean.

Gasoline, yes. The brand-new vehicles are going to be the electric vehicle. The brand-new houses are going to be the ones without gas. Like you have to start converting. You don't want to like start taking people's natural and gas away like you take my natural gas away, I'm going to be upset, but if I don't have natural gas to begin with, you can't take it away. So, at some point there has to be a conversion process to get away from these, climate change, we try to prevent climate change. We're going to have to make the conversion and the conversion has to happen on the brand-new stuff.

[00:55:46]

I see that. And I guess my question for you guys is, in a lot of cases, in these municipalities where they're considering doing it, they're thinking about doing it on individuals and on businesses, but they're basically saying that the electric utilities can source their electricity from natural gas. They're basically creating electricity out of natural gas and forcing people then to get the electricity, which is sourced from natural gas, but not being able to get the natural gas directly.

But that's the current situation. And the hope is, is that the electricity is going to be more and more available through wind power and solar and all of that.

That's true.

With that in mind, looking towards the future, if they're building communities and saying everything is here is electric and we're working on trying to rid ourselves of the gas being the source of it, that's OK. Because electricity and the other sources is renewable. There's clearly a movement that way and it may not be going fast enough, but it's not [CROSSTALK]

How do the rest of you feel about that?

To be a fly in the ointment there, I think you see something along the lines of indemnity syndrome, not in my backyard because you don't see the power plant that's 400 miles away that's polluting like crazy, using coal, using gas, using whatever. But it's nice and clean in my house over here. But the thing is, is that aren't you still, until we get the solar, until we get the wind power, up to even par with those power generation plants, you're still going to be creating. Now the nice thing is you have filtration systems on a place that produces the power as opposed to you know –

My furnace.

My furnace. Yes, exactly. That's a good thing. But still, you're still aren't we not still producing a significant amount of pollution, even though I don't see it because it's over the hills.

I don't know if the point, I buy it, I don't see it but I think the goal is to break away from those places. At least there's an option, at least we're working towards freeing ourselves from being dependent on gas for it.

And that's great. I'm just saying in the short term –

In the short term yes.

We're still, it's over the horizon. You don't see it. I don't see the coal trains pulling in and blah-blah-blah. But either –

But even if we're looking at the future of building of the community, we have to look at it the best-case scenario.

Any other thoughts about this sort of the pros or cons of local governments doing these bans?

I think that local governments should be able to do whatever they can to try to attack, to try to address climate change. And I am kind of embarrassed that I didn't even connect fracking to the gas, but I should have, because I know fracking is, and it makes me rethink the using gas because I'm very much opposed to fracking and I think it's awful. And I think that, I think you're right. Like our local EWEB is trying to get a lot of their electric from other sources. And I think that maybe the first step would be no, not in new houses. And the second step is to the electric companies have to figure out a better way too. I feel like you have to start somewhere.

[00:59:19]

Fair enough. I want to switch gears now and run a concept by you called renewable natural gas. Anybody heard of that?

No.

No.

I'm going to pass this out. Please take one, pass it along and then we'll leave this and discuss it together. Renewable natural gas. Renewable natural gas is produced from local organic materials like food and agricultural and forestry wastewater or landfills. As these materials decompose, they produce methane that methane can be captured, conditioned pipeline quality and deliver it in the existing pipeline system to vehicles and homes and businesses where it can be used in existing appliances and equipment. This provides a renewable energy option for the natural gas system in the same way that wind and solar are used to generate renewable electricity. In closing the loop on what would otherwise be wasted gas, renewable natural gas can provide up to an 80% carbon reduction benefit. What do we think about that?

They do it here in Eugene.

Sounds awesome.

Short mountain. They what? Like in 800 homes? Something like that.

I don't know, there are pilot projects all over the place. I know a little tiny community that's doing has a little tiny gas generator. It's a great system. It'd be fantastic if we, like if when we put our trash out and our recycling, if we could also put all our compostable set up so that the city's collected compostable is on a massive scale and then put it all into a digestion system rather than short mountain where you're putting chairs in garbage and steel and all that other stuff.

What's that you're familiar with? It's called –?

The short mountain. It's a dump.

Short mountain.

It's a dump here in Eugene and on the –

Also known as a landfill. It's the dump.

It's the dump. And on the south side of that, they have, they laid plastic or rubber sheets over the top of the whole thing and plumbed it and they're sucking, for lack of a better word, the gasses out of there. Running in through there, cleaners and filters and whatever else.

So, what do the rest of you think as you read this?

My first thought is like looking at the cows and thinking, are they going to like put like 3000 cows into one, big industrial area and just like capture all the methane and the cows aren't able to move. Like chickens are kind of kept in a cage – [CROSSTALK]

They have to do that.

I don't know how – That, I have a question how they would [CROSSTALK] .

That's how –

Your question is how, how are they going to actually –?

Harness it.

I have experience with that, trust me on that. They will take it in, pull it in. They've got special machines and mechanical devices with which they can clean the stalls out. These were the long, 100-foot-long stalls, and then they'd get pulled right into tanks and then they get pumped open tanks and then they get pumped into closing –

[01:02:24]

What I'm saying is, are these cows going to be kept in closed stalls?

No. It won't change the way in which the cattle –

It's just the manure, it's all they're after.

It's from the manure?

Yes. Because I know that cows burp is one of like the contributors towards greenhouse.

Not at this point. [CROSSTALK]

Animals rights.

It's not a major contributor.

It's from the manure. That's fine.

And actually, I wonder if the CVD gene can do the same thing with this.

That's what this basically this – That's what this diagram is trying to show that it's animal waste.

Animal waste.

Agricultural waste, it's food waste, it's all a biological exercise where methane is sort of naturally produced.

But [INAUDIBLE]

So my questioning is, what do the rest of you folks think about this concept?

[CROSSTALK] I would be all for –

I'm sorry?

I would be all for it. I think –

You're not going to have much push-back for somebody not wanting a natural gas well on their landfill, so I'm –

I can't see any –

Do you, as consumers, do you think that this is a positive thing, do you?

Yes.

I think it's a positive thing for the environment. I think it's going to increase the cost of your natural gas. I don't think that –

Why would it necessarily increase your natural gas cost?

Just because to get natural gas this way is going to be, just off the top of my head, I don't – views on this isn't based on science or anything, is – it's going to be more expensive to get the gas this way than get it –

Now, let me –

If anything, it would –

Let me ask you this, because I don't know, I'm not an expert, and I don't – as I told you, I'm an independent market research guy, but we've been talking a lot about fracking, right? So this wouldn't involve fracking. You wouldn't be going off somewhere, you'd be going in your own local community, presumably, to get your waste products. Does that seem like it would be more expensive or not?

If anything, I think it would be less expensive because this is all things that are readily available.

Initial development of the infrastructure would be expensive, but that's –

Same with [INAUDIBLE]

A long term investment, and I think in the end, we don't have the data to do an analysis, but I think in the end, it kind of – it might be more economical to produce gas. The quantity producible is one question, I don't think all the compostibles that we produce in Eugene with a lot of forest waste from the surrounding logging operations and so on still probably wouldn't produce as much gas as we're burning from Northwest Natural. But it would definitely put a dent in it, I'd love to see it. I'd support that. If my gas bill were to go up, I'm assuming the gas company would be the ones developing it but maybe not, they might be opposed to it if they thought it was going to cut into their profits, but I – if my gas bill went up by $5 a month for an investment in this infrastructure, I'd say [CROSSTALK]

[01:05:27]

Would – how would you – does this change your impression of natural gas? Does it make you feel less negative?

Yes.

If we're doing new development, why are we going to ban natural gas if we're going to produce some of our own natural gas and then new development? Why don't we have the community designed so that this is how it functions as part of our energy source?

Better than –

We'll have to speak to those city planners, right?

If I'm hearing you right, you're basically saying go to these local governments and say "Rather than ban conventional natural gas, instead –"

Supply some of your own in a more environmentally friendly way.

Encourage the utilities to actually invest in this technology and allow renewable natural gas. Is that what I'm hearing you say?

Yes.

My question relates to what Paul said, it's like what's the quantity? How much would this produce in terms of –

It's a good question, I don't know, but the – but that is the question is regardless of the quantity, is it a positive thing? And my question for you is if a – if your utility, let's call it Northwest Natural, if they started to offer this, how would that affect how the – how you look at them as an organization? What – how would you characterize them as an organization if they were to offer something like this?

It's how, when EWEB started offering a chance to pay a little bit more but have X amount from renewable resources, I was happy to pay the extra whatever, five, $10 a month and feel like I'm doing my part, they're doing their part, and it feels better, so if Northwest Natural would do this, I'd be thrilled.

If they're making a serious investment in the infrastructure and not just window dressing or public relations, I would totally love it. It would change the image of the company.

How would you think about the company differently? What – and I guess that's what I'm trying to ask is how would you, if you were – if they were to go full force into something like this, how would you describe them as a company then?

Earth-friendly.

Forward-thinking.

Earth-friendly?

Forward-thinking.

Smart.

Forward-thinking?

Yes.

A positive player in environmental issues.

Positive player?

Solutions-oriented.

But as long as they don't – it's only if they really meant it, going back to that window dressing.

Of course. You got to put your money where your mouth is. Let's keep on going, I have another concept here I want to run by you. Take one, pass it along.

What [INAUDIBLE]

This one is called –

I know, right?

Renewable Hydrogen. Power to gas is a process that captures surplus wind and solar energy and converts it to renewable natural gas or hydrogen through electrolysis. This renewable energy can be stored and then blended into our pipeline system to one day serve homes, businesses and vehicles. Let me go a little bit further and try to explain this because I know there's chemistry on this page and it's not as clear. There's a couple things here that aren't explicitly stated. When it talks about surplus wind and solar energy, what they're trying to get at is that oftentimes, wind and solar, as we've indicated, solar's during the day, and that's not always when there's peak demand for the electricity, or wind that may be generating, they may be out of phase, I guess is what I'm trying to say, so there may be times where you're generating energy from wind or solar but you don't have the demand to take it up. So that's the context that they're talking about. What they're saying is what if you had that and instead of just having it go to waste, you could then use it to split apart what they're showing here in the middle of the page, splitting apart water molecules so that you've split them into hydrogen and you could do one of two things? You can either use the hydrogen along the lines of what somebody was using – talking about before, you can power an automobile but you can also use it as an energy source, you can burn it as a source and the output is basically water. Or the other alternative you can do is you can take – you can extract carbon dioxide, that's what that CO2 is, you can extract carbon dioxide from the atmosphere, combine it with the hydrogen, and that will create methane. Why would you want to do that? Because conceivably, you would be able to then store that gas for weeks or months until it was used as opposed to the wind or solar energy not being used and disappearing for good. Does that make sense?

[01:10:29]

Yes.

That's the concept. It's got – I'm sure it has its pros and cons, but I wanted to kind of explain it a little bit further so you got a little better sense of the concept. What do we think about that?

Takes a lot of energy to make that.

Tell me more about –

To do that splitting. It's not – it takes quite a bit of energy to split the atoms or the molecules, so that's a negative.

Electrolysis process.

Yes, thank you.

It's very, very energy inefficient. So you put –

Now –

Four BTUs of energy into it and get two out.

Here's – I'm playing devil's advocate.

That's not a scientific fact, but –

But it doesn't seem –

Let me play devil's advocate here, because let's just say that that's a fact, but let's say that you're using energy that would go away because you can't store it in –

In batteries.

In large batteries because those kind of large batteries do not exist today to store for more than a few hours. If you had the option of an inefficient process

but it still retains some of the energy or not being able to retain the energy, that's I guess sort of the question.

Would it eventually – what's that word?

The science –

Hold on.

Gets better.

Let me think about this. Make sense eventually because of you're using this much but you're saving this much?

There's no economy of scale if that's what you're thinking of, as you scale it up, you still have the energy inefficiency of electrolysis. But you're right, if – and I'm not saying you're right, but your hypothesis, if you're using energy that is available, just like EWEB has a project that Peter referred to earlier where you take surplus energy and put it into pumps and you pump water from one reservoir into a higher reservoir, then at peak demands, you drain that to turbines, so there are systems that – it's a – what you're – they're – you're looking at or hypothesizing is as a storage device, essentially, to store it.

I think that's maybe the easiest way to kind of think about it.

It's –

It's a – it's kind of a storing energy that would otherwise be lost.

If you have the power to burn, if it – then you can do the electrolysis.

It – the word surplus, this is renewable energy. You were talking about surplus hydro, I guess up here somewhere, surplus.

This –

The word – this all hinges on the word surplus, if there were to be surplus energy.

And you're absolutely right and that's the whole argument is if you have – and again, I'm not an expert, but apparently there are situations today where solar

and wind are generating electricity and they can't store it, that it's not being demanded at that time and they're not storing it, so it's –

And you're doing a lot of renewables a long ways away from any population centers, so you got a heck of a transmission barrier to overcome, and again –

[01:13:38]

So that's –

Offsite.

That's the issue, and I think you've also put your finger on an interesting question, which is thinking about this as potentially a way to store energy that might otherwise be lost. It's a storage thing, because the battery technology to store it for months and years isn't there to kind of store it at scale. So this is kind of converting it into a different type of energy. Now, there may be reasons why that doesn't seem attractive to people, but I just am curious, I just want to kind of explain what their concept it.

They're kind of doing it already. There are hydrogen vehicles and they are being used. Japan has a – they do quite a bit of that, and so they are doing electrolysis and they are storing the hydrogen in some manner. This is still an experimental situation, but they've got – in Japan they've got probably a thousand cars running around on hydrogen. I don't know the numbers, but –

What – tell me honestly how you – does this leave you confused, does it leave it feeling like there's something that just doesn't feel right, or do you –

Yes.

I feel like there's –

It's –

Something skipped. Sorry.

It's something that I don't understand at all, and when I look at it, I think "What's involved in – " we've got excess energy and we're going to invest how much to create a system that can convert that to gas versus investing in trying to find a way to use that excess energy in a way –

In a battery or something.

In a – in some sort of a battery or saying "We're going to send it to industrial use during the day that needs a lot and at night, we can – " some way of we're going to send it to LA because they need to light up more than we – whatever, but to use the excess efficiently or create something that might mean – I just don't know –

I understand.

How big a deal it is to create something that changes this.

I get it.

If –

Sarah?

I feel like there's this hydrogen and carbon, but that's going to be – it's going to be carbon dioxide and it's going to be hydrogen gas, both of those are fairly stable gases, just combine through methanation, but we don't know what methanation is and I don't remember what it is, and so –

It's basically –

I feel like that's where –

Bringing together this carbon dioxide –

No.

And hydrogen to make it into methane.

I under – I know that part, it's making methane gas and it's making oxygen, that part I get, but the process in there, because you don't just put carbon dioxide and hydrogen together and go "Good luck," so there's something that's happening, and that's the part where I don't know what are we doing there, and so –

I get it.

And so I'm wondering what are the side effects of that, what are the other reactants, what else is going into that? It's not a – not that simple, so I feel like this has been simplified and I can't – I don't feel like it's telling me the whole story, so that's where I feel –

[01:16:48]

Fair enough. I'm sorry, Katie, do you have something?

It just feels really expensive and really – this may sound dumb, but if you go to the store and you weren't planning on buying something but it's on sale, $250 off, you're not saving $250, you're spending, so it feels like, I don't know, just doesn't feel good like this one. This one felt good, this one made sense. And this one just –

This seems like a lot of work, it seems like it'd be more efficient to put your money into figuring out how just to store the energy straight up.

But the –

That's right.

But that's – that is a dilemma today in our production, our – most of our – most – our greenest energy doesn't come necessarily when we want it and that's not very storable. So this is somebody looking at one possible, or – and they're – people are doing this, this is being done, but I don't think it's commercially economical.

We've got one more exercise I'd like to –

I make my own hydrogen.

What's that?

I make my own hydrogen through electrolysis and I run it through the car, cleaner than gas, but my wife put a kibosh on that because it's kind of dangerous. But when I blow up balloons, people three miles away from us hear it.

I did that as a kid. That's why I know about electrolysis. I used to run electrodes in water and capture hydrogen and blow it up.

Sorry. Let's get you back on task here. So now what we're going to do in the last exercise is to evaluate these different messages. And what I want you to do is – whoops. Did I give you the long one?

Natural gas messaging.

I think I –

P, O, S, T, U?

Yes, but I've got the wrong version. Sorry.

P, Q, S –

So here's what I want you to do. Ignore the thing about the – if you've got the thing that says "rating" on it, you have that rating scale, or does that say "check and minus?"

Ten extremely compelling, one not at all compelling.

So here's what we're going to do. Just ignore the instructions at the top. We're going to read the five different messages. And then, I would like you to pick what you consider to be the most compelling statement and put a checkmark by it. And then I want you to decide which that you think is the absolute least compelling and put an X by it. So most compelling is a checkmark. Least compelling is an X by it. So we'll read it together. "Natural gas is a vital part of a reliable energy strategy because alternative energy sources like wind, solar, and hydro power are not able to meet all of the state's energy needs." "All forms of cleaner energy – hydro, wind, solar, and renewable natural gas – are needed in a balanced, low-carbon future." "Natural gas bans will allow utilities to continue using gas to generate electricity, but it will prevent individuals and businesses from choosing the energy source that best meets their needs." "The existing natural gas network can be used to deliver renewable natural gas and dramatically reduce greenhouse gas emissions as a result." "Natural gas is a uniquely attractive energy source because of its affordability, reliability, and cooking and heating performance." So take a moment. Choose the most compelling and least compelling. How are we doing? Has everyone chosen? Yes? What we're going to do is I'll just go down through the list, and if you've chosen that as most compelling, just raise your hand. That'd be great. So anyone choose P as most compelling? No? Q? Holy smokes. So we've got six of you.

[01:22:00]

Man.

Q wins.

How about S? Anyone choose S? T? So there are the other two. Well, that makes life easy. Let's start with the Qs. Why did Q do so well? What makes that so compelling?

It's broad-based. It's not just focused on natural gas.

And it seems the most true.

It's progressive.

Progressive.

How is it progressive?

The fact that we're moving towards more renewable energy sources.

"Balanced, low-carbon future." It acknowledges that's the direction. Carbon footprint.

So you like the fact – is it the verbiage "balanced" that is important or "balanced, low-carbon future," that whole phrase?

I'd go with the whole phrase. "Balanced, low-carbon."

The whole phrase?

Well, the first one sounds like an advertisement for natural gas. And the second one could be used as an advertisement for hydro, wind, solar, or renewable natural gas.

And it kind of touches on the point that not just one of those can meet all of our needs. We need them all.

And they're all renewable.

P needs – the sentence ends too soon because it should say "at present," "during the present time." Because it doesn't address the future, so it just cuts itself off right there.

Q sounds positive and encouraging. It's hopeful.

And "clean energy." Just the word there.

How about the two of you that chose T? Tell me why you like T.

I thought it sounded more honest. I felt like Q, which was the other one that I considered, put natural gas in the same category as hydro, wind, and solar, and I don't agree that it belongs in that same category. So I –

It says "renewable natural gas."

I know. But that's just what I'm – that's why I didn't choose that one. I chose the other one just because I felt like it had the goal "lower the gas emissions," but it also just felt a little bit more honest about it. That's why I picked it.

But to Paul's point and the part I'm not following when you brought up renewable natural gas, they both refer to renewable natural gas, right?

Right, but the other one puts it in the same category as hydro, wind, and solar, which –

I see. So you don't see them as being in the same category.

Exactly.

You don't think that renewable natural gas is a form of cleaner energy?

No, I don't think that it is in the same category of clean energy as hydro, wind, and solar. I think those are better.

That's fair.

The ad radar goes off when they give you nice, shiny things. Hydro, wind, and solar. Who's against that?

Nobody.

Then throw the natural gas in there at the end. Same exact idea as her.

[01:25:02]

So that was the reason why you chose T, or were there any positive reasons for choosing T?

Didn't feel like I was being shown a nice, shiny thing.

It felt honest. "The goal is to lower the gas emissions, but we know it's not perfect." It didn't feel like – it just felt more honest.

So it didn't try to go overboard. Let's go through the least-compellings, do the same little polling. [CROSSTALK] choose P as the least compelling? One, two, three. How about Q? No one. How about S? One, two, three, four. And T? And U? So talk to me about S. Why didn't you like S?

Sounds like we're choosing sides right off the bat there.

Feel like it's telling you how to vote.

So you don't – feels too – tell me more about that when you say it feels like it's choosing sides.

"It will prevent individuals and businesses." That's just pretty much a dog whistle there, isn't it? "Don't stand in my way. Don't tread on me. Don't stop me from doing something, and if we're killing the planet" –

You said it too when you introduced it, because you said, "Does it feel like local government overreach?" That's a phrase I've heard a lot.

In fairness, I said "do you agree with this or do you feel like it's government overreach?" So I was trying to give you both aspects.

Sure.

It's pretty clear when it just says it'll prevent individuals and businesses from choosing the energy source that best meets their needs. Why would somebody do that?

I don't know. People used to choose not to wear seatbelts. Some things you don't want to give people a choice when it's harmful for every – you want to save them from themselves.

So just the statement, it hasn't [CROSSTALK].

Yes. Fair enough.

You could say that same thing, that seatbelt laws prevent people from making the choice of going without a seatbelt. And it sounds – again, it's taking away freedom, but I don't mind it.

So three of you chose P. Tell me why P seemed not very compelling.

I think it would've been – let me reread this.

I think that there is potential for wind, solar, and hydro power and wave technology and stuff like that to provide all the energy that we would need. So I don't know if I agree with that statement. It seems like – I don't know if there's any truth in that statement and whose truth that is.

Is it the fact that Paul's bringing up, the fact that it's lacking the idea that it's not able to meet needs currently?

[01:28:06]

Yes.

Yes, right.

So if they had the language –

Finish the sentence.

– "it's not able to meet needs currently," would that change –

"In the short-term" or something like that. Then I would see it as – I could agree with it more if it had a temporal element.

Let me step in the back – or there isn't a back room – a side room, and see if any of my colleagues have any questions they'd like to ask you. And then I will let you be on your way. So hang in there.

Are your colleagues from a gas company?

I can't say.

I think we've figured out who's paying for this.

Calyan [ph] Middle School?

It was actually hard to choose which one was the worst one. There were a number that were – Q was clearly –

If it wasn't just one of those things where you have to choose one, and you have to choose over that –

So looks like you've answered every question that needs to be answered, so thank you so much for being a great group and giving all your candid feedback.

They don't want to know why I find U the least compelling? Wow.

Well –

I'm just kidding.

You don't find Rob compelling?

No.

"Don't say U."

Why do they miss R? P, Q –

Can you all do me a favor and hand me your handouts?

They probably deleted it. They're like, "Never mind."

Handing me your handouts, that would be great. And if you'd also do me a favor of when you leave to take your nametags, just because the next group is unlikely to have the same names as you.

Coming tonight?

What are the odds?

So thanks again. Safe travels home.

Thank you.

Yes. Outside, I think there might be a place to put it. Yes.

Thanks for making it an enjoyable experience.

Thank you. Appreciate all the inputs.

It's actually interesting.

So is this going into these too?

I didn't set this up, so I don't actually know.

Project Name: **5234-E190117 – NW Natural Safety Communications**
Location: **Eugene, OR**
Date: **10/30/19**
Segment: **Group 6**

We are going to get started. So everyone come with me. [INAUDIBLE] and come this way. If you people could stay back and I'll talk to you in just a minute [INAUDIBLE] OK? Everybody else come this way. Find a seat. The other side just go through there.

Welcome. How's everybody doing?

Pretty good.

Good. Hi.

[INAUDIBLE] my dinner.

Find a spot that feels comfortable. So is it still staying nice and chilly outside?

It's freaking cold.

What's the deal with that? I tell you, though, I'm from out of town, and I want to thank you all for doing the Chamber of Commerce Days. There's been beautiful days, sunny and gorgeous. Well, welcome, everybody. Delighted to have you here tonight. If you would be so kind as to put your name tags facing directly at me so I can see them that would be awesome. And you will see that my name is Rob and that you probably gathered that I'm going to be the moderator here this evening. We're going to be talking about the wonderful world of energy and different kinds of energy sources. That said, I want you to know I'm not actually an employee of the sponsor of this study. I'm an employee of an independent market research firm. And I'm telling you that just so that you know that I have no stake in the outcome of this research. If there's something positive you have to say about the topics of the day, that's great. If there's something negative you have to say about the topics of the day, that's great. Really, I'm looking for the benefit of just your honest, candid opinions. Now, this is a group setting. We do that for a purpose. We want people to hear each other, we want people to build off of each other's ideas or to contest each other's ideas as is appropriate. But in either case I am expecting you all to participate. Nobody gets to sit silently through the next 90 minutes. We didn't have you in just so you could be a silent participant. So, definitely

want to hear from everybody when the time is right. At the same time, I know that you all are going to be great at sharing the platform, so we also want to make sure that somebody doesn't just dominate and kind of take over the airwaves. We want to make sure everyone has an opportunity to contribute. So that's important as well. Now, not looking for consensus. It may be there are certain things that you all agree on, and that's certainly fine. But there may be other times when you're kind of sitting there by yourself and everybody's on the bandwagon, and all of a sudden you're thinking, God, what planet are those people on? I couldn't disagree more with what they have to say. If you find yourself in that situation please don't suffer in silence. I really want you to speak up, because if you feel that way I have no doubt there are other people in the population that feel exactly the same way, and it's important for you to voice that feeling. OK? A couple of miscellaneous other things. Sometimes we get going and people start getting excited and they start doing side conversations. That's a no-no. I can't understand what everything is going on when that happens, and usually that's when there's some really interesting tidbits being exchanged, and if multiple discussions are happening I just can't catch it all. So we'll try to do one conversation at a time. All right? Now we are recording, as you can tell, and I do have some colleagues in a side room just observing, taking notes, that kind of thing. I'm going to step out at the very end just to see if they have any final questions for you, but for the most part it's just going to be us having our chat. But I also want to assure you that all of this information is going to be held in confidence, it's all being used for internal analysis purposes only, so any dreams of making it big on YouTube tonight are dashed, unfortunately. So. But maybe next time. You never know. Maybe next time. So I think we've covered everything. And I think we can dive right in. So the first thing I'd love to do is kind of just get to know each one of you a little bit better. So I have a handy-dandy cheat sheet. I'd like to go around and have people give us your name, your occupation or former occupation or whatever it is you do when you're not coming to focus groups. And then, lastly, I'd love you to kind of talk to me about what energy sources you use. What I mean by that is do you have all electric? Do you have all gas? Do you have some mixture of the two? Do you rub two sticks together? What do you do for energy source? And then, secondly, has that changed at all since you moved into your home? Did you modify things to go from all one to another or what have you? OK? So, Christine, would you mind starting us off?

[00:05:39]

No. So my name is Christine, and I'm a teacher. I teach math and science, middle and high school level. And I currently use all electric in my house.

Has it always been all electric?

It's always been all electric. We were trying to get gas, but it was going to cost like $1,700 to run a gas line to our house so we stuck with electric.

Josh?

I'm Josh Fierstein. I am a human resources manager at a government agency called Lane Council Government in downtown Eugene. And our home energy source is all electric, and it has always been that way, ever since we moved in, anyway, which was 11 years ago.

Well, nice to have you here. Scott?

My name is Scott. I'm a software developer, and my home is electric and has always been electric.

Great. Nice to have you here. Eileen?

I'm Eileen, and I'm retired. I used to be a lymphedema specialist during the day.

A what specialist?

Lymphedema.

What is that?

And can you tell those of us who aren't as educated what that might be?

It's a condition of your lymphatic system that gets compromised. The best thing I can tell you is if you've ever seen anybody with an arm bigger than the other one, a leg bigger than the other one, it's probably because they've had either breast cancer or female cancer. They've had their breast removed along with their lymph nodes. And when your lymph nodes get removed it means that your lymphatic system is no longer cycling and your lymphatic fluid pools. It turns hard and woody and then breaks open your skin and comes out.

So you as a specialist were doing what? Just helping people?

Educating doctors and therapists on the best millimeter of mercury in a compression grade gradient stocking that's custom made in Germany.

Wow. I think you [INAUDIBLE]

And then at night my fun job was I was a music promoter.

And your energy sources?

I am actually living in a brand new build. It was built two years ago. We're all first-time tenants. It's electric but there's not even light bulbs. It's all new technology where the lights are permanent, there's not a light bulb.

Is it LEDs?

They're not even LEDs. They really won't tell us what they are, but there's no bulb, there's nothing to change.

You're just irradiated. You're glowing.

And the heat also is like radiant but it's electric. It's ductless but there's some other things going on.

Wow.

Fancy.

New type of moss?

Yeah, I know. Yeah.

Well, great to have you here. Brett?

Hello. My name is Brett Smith. I'm currently a student at Lane Community but I'm also a hospital corpsman with the United States Navy/United States Marine Corps. Moving in and currently I use electric. I live in an apartment. That's pretty much all about me. Oh, by the way, Mr. Josh, I used to work at Senior Disability Services.

[00:08:53]

We should talk later.

Yeah.

I'm curious, just as a follow onto that. So you're a renter, you said?

Yes.

Did you seek out your particular place because it was all electric or was that just a byproduct, it just happened to be all electric?

When me and my girlfriend picked it, it was a matter of location, to be honest.

That wasn't even a factor, really?

But growing up, all my life we used electric mostly other than a wood pellet stove, but other than that it was all electric, so I'm used to it.

Great. Well, nice to have you here. Andy?

I'm Andy, and I'm a violin teacher and wrangle three small children in my off time. And our house, we moved in two years ago, and it's all electric, but it's hooked up so that it could be gas. But all of our appliances are electric, and we see no reason to switch.

Great. Well, nice to have you here. Julia?

Hey, there. I'm Julia. I'm a part-time DoorDash driver. It's not amazing, but it's money. It's not bad. I like it.

That's good.

I like it enough. I currently live in a house my parents just bought this year. So they bought it from the original owner dude who was like 90 years old, and so it's kind of an old house, but it's all electric, and I don't know if they considered that. But I feel like most of the houses I lived in were electric so it's not a change. I'm used to it, and I think everything runs really nice. I definitely like electric stoves better than gas stoves. That's all I have to say.

Great. Well, nice to have you here, Julia.

Thank you.

William?

My name is William. I am an IT specialist for the US Courts of Bankruptcy, District of Oregon. I live in a geodesic dome. I specifically got it for energy efficiency. My house is fully electric. This year, however, probably against the fire marshal's wishes, I do have a propane tank with a heater in my house to supplement the heating to cut back on my electricity.

Oh, wow. Well, nice to have you here. We have a very interesting crowd tonight. It's a very dynamic group. So this will be fun. Well, what we're going to do first is a little exercise called word association. And it's pretty much just that. I'm going to put up a word or a phrase, and I just want you to kind of shout out whatever comes to mind. All right? So the first words, clean energy. What do you think of when you think of clean energy?

Wind power.

Wind.

Solar power.

Wind. Solar.

Renewable.

Renewable.

Hydroelectric.

Hydro.

Batteries.

Batteries.

Non-fossil fuels.

Non-fossil. What else?

[00:11:53]

Nuclear, question mark.

Nuclear.

Question mark?

With one really big asterisk.

I'll put down your question mark. What else?

Geothermal.

Geothermal. Anything else?

I'd say jobs and economy because it's not con energy but it's part of the discussion.

Jobs, meaning you think there are some jobs to be had or?

Yeah, the idea of more jobs being created for the growth in energy and fuel economy.

Anything else?

Saving the planet.

Saving the planet.

Eco-friendly. Reverse global warming.

Unknown risks.

So eco-friendly. What was the other one?

Unknown risks.

Unknown risks of?

Of clean energy. Just because it's so new. You know, that windmill cancer that Donald Trump talks about.

I think that's a good list to start with. Let's go to the next one. How about electricity? What do you think of when you think of electricity?

Elon Musk. Elon Musk. I like Tesla.

Yeah, I want a Tesla, that would be so cool.

Benjamin Franklin.

So is Tesla another one?

Yeah, Tesla, that's cool.

Tesla.

The company or Nikola.

Either or.

What else?

Shock. Shock.

Shock.

I was going to say electrocution.

I was going to say dams.

Dams.

I was going to say expensive. [INAUDIBLE].

Crisis.

Crisis?

Mm-hmm.

Tell me your thinking about that. Why crisis?

Our energy grid is falling apart. We don't have the money to repair it. Sooner or later it may fail. Just think of California.

I was going to say California.

Yeah. The fires.

What else?

Blackouts.

Blackouts?

I was going to say coal-fired power plants.

Coal-fired. Got you. Anything else?

Solar flare.

Solar flare. Tell me more about that.

Well, solar flares can knock out parts of the electrical grid if they're strong enough.

Oh, yeah.

It can energize the grid [INAUDIBLE].

Let's go to the next one. Natural gas. What do you think of natural gas?

Leaking.

Smell. The smell of gas.

Smell.

Pipeline.

Explosion.

Sorry?

Explosion.

Explosion?

Mm-hmm.

[00:14:58]

You got pipelines and stuff.

Unsafe.

Pipeline?

Yeah, pipelines.

Pipeline. What else?

Unsafe.

Unsafe. Where do you see the lack of safety? From what part of it?

So just in general, an undetected leak, a place where it collects.

So leaks, etc.

Native American rights. Native American rights.

Tell me more about that.

Yeah, the Dakota ASAS pipeline.

Tell me more about Native American rights, meaning what?

Their land was already taken away from them once, and now it's being taken away from them again so that people can build fancy pipelines amongst –

So they build the pipelines or to do the mining or just –

All of the above.

Anything else about natural gas?

Cleaner than coal.

Cleaner than coal.

Fracking.

Oh, yeah, fracking. Boo.

Fracking.

I just want to add, so it does burn, in terms of the energy output, like if you're trying to heat your home it's more energy efficient than electricity in terms of the heat output that it can burn.

Yeah, it's more positive than [INAUDIBLE].

More energy efficient.

Carbon monoxide.

Carbon monoxide?

Yeah.

It's more fun to cook on.

Yeah, if you are more of a foodie professional chef then a gas stove is a good way to go for them.

Great. Well, you guys came up with a healthy list which is great. So what I want to do now is kind of build on some of the things that kind of came up here. As you just described, most of you are – or all of you, I guess, are kind of all electric right now. So what are the key factors that helped you make the decision that you wanted to either purposely select electric or to stay with electric? What have been the key factors in your decision making?

There's no gas line to my house, and they said it would be $25,000 for me to put it in myself because it has to run from the street all the way down.

Cost is certainly prohibitive for a lot of that stuff.

If I could get everybody on my block to do it it would be less expensive.

Then you'd split the cost with the houses.

Right. But –

Which in my opinion is a little weird if you think about it because if you're spending the money to get it hooked up, ROI may be many, many years out but that house will always have it.

[00:18:00]

Right.

Right. You're a guaranteed customer.

Yeah. Whoever's living in that house is a guaranteed client.

We looked into, actually, to adding a gas line to our house and just to go like kitty corner – so the line comes down the street a little bit – to go kitty corner it was going to be $1,700 with Northwest Natural to hook it up. And so we debated whether to do it, because it increases the value of your home to have the option, so if we were to sell our home in the future, somebody who preferred gas, it makes your house more salable.

So your understanding was that having the option of electric or gas actually increases your home value?

Yes. And then we were going to have a gas fireplace put in, and so you would have an alternative if the power goes out. You can still have heat and light. But the cost of running the gas line and then having the fireplace put in, it was just over budget.

Good stuff. What else? What factors have caused you to stay with or proactively choose electric?

To the general public, it's arguably the cheapest source of energy. I know we definitely have a long ways to go before we can get wind or hydroelectric energy

into every single neighborhood in the US, but as of right now I would say that would probably be the most – or the least expensive one.

Most of our energy here is hydroelectric, though, because it's all dam generated.

Oh, really? Oh.

It turns into electricity.

Yeah, through the dam.

Eugene, Bonita, the area is all pretty [CROSSTALK]

All of Oregon and Washington and like all of our electricity comes from dams.

[CROSSTALK] wind energy then.

There's a small amount of wind and a small nuclear, too.

[INAUDIBLE] yeah, nuclear, and then some solar panels.

So other reasons why electric? Why electric? Why are you guys choosing electric?

We moved here 11 years ago. We had a rental house. We ended up buying it a year later. We stayed in – and it was just what was there. So it's almost inertia. And we never – I don't think we've ever thought of anything different, actually.

There's very few houses that have gas.

That have that availability, right? Yeah.

Yeah.

But I have a couple of friends – well, one in particular I know who has – he posts on Facebook all the time – that has solar power and will post a picture of his [INAUDIBLE] bill showing very little, if none. And in one month sometimes he made money, I don't know –

You can sell back?

Yeah. If you make enough energy off of your stuff you can sell back to –

Selling it back to the grid.

Awesome.

Interesting. And it's good citizenship or whatever, but it's nothing we've ever even thought about doing. I know that – what I hear anyway is the cost of putting solar panels on your roof and that kind of thing is high.

It's expensive, we looked into that.

But if you make it back down the road so you have to go [INAUDIBLE]

Let's dig into one of these in a little more detail and focus on one at a time. So let's start with natural gas and I'd like to have us talk about the pros and cons of natural gas. So let's start with what you see as potentially benefits of natural gas?

[00:21:15]

Faster heating. So, natural gas, propane, whatever your gas may be, can heat water faster than electricity can by far.

Either for cooking or for heating your home or you can have an on demand hot water heater rather than a tank.

For reference 1500 watts of energy per hours only. Just what 5250 BTUs and just a low setting on my little heater is 6000 BTUs, doing a triple gas on the 20 pound tank which will last 72 hours nonstop.

So faster heating big plus.

It's more efficient too, as far as hot, a gas on demand hot water heater versus an electric tank.

Yes less energy to heat the same volume.

It's a nice alternative to if there's no electricity to have that as an option.

Electricity required to do proper heating.

A place I lived in before, where I lived in now actually we lost power in the whole neighborhood for two and a half weeks and I had neighbors taking turns coming and staying in my place because I had a natural gas fireplace so my place was warm and they could put pots on top of the fireplace and actually boil water, cook food.

So basically I'm hearing a reliability issue where it can be up and running even if the power goes out.

Gas doesn't usually go out your electricity goes out.

Depending on the disaster that may be earthquakes may make it more deadly. [CROSSTALK]

I hear you. Any other major about electricity?

I was just going say just because your thing was cooking say I understand, because when I did live in a house with a gas it was you turn on just a flame which is, I understand that people really are into cooking over a flame that makes sense but also maybe my gas stove was just very gunky because I would turn it on and I felt like too much gas would come out of it and it would go and that was very scary and I also didn't feel like it was very prone to leaking out little bit, I walk by the stove and I be smelling gas.

So you're getting us into the disadvantages. So there's a flick you could have flare ups and some sense of danger and risk.

Just like if the thing isn't properly hooked up right or whatever that the gas is hook up to it slightly [INAUDIBLE] then I guess it could be dangerous.

[INAUDIBLE] is a very technical term. [CROSSTALK]

I have heightened awareness around my gas heater at all times. Whenever I turn it on or doing anything with it. I'll never leave it alone in the room by itself.

So there's more safety concern. This is what I'm hearing people say.

If you're sensitive to smell, you can actually even if you don't have a leak, you can smell it. [CROSSTALK]

[00:24:19]

Didn't flush it for a while. We're getting headaches for a little bit until we finally got the initial burnout.

Propane heater versus having if you had a natural gas line.

Gases are certainly different. But they both I'd use natural gas before there is a smell.

There's a little bit when you first turn on your stove because I let up some gas maybe right before the pilot light or something. But as long as you don't have a genky stove.

Here we go with the genky. But it does sound like on occasion there have been people that smell smells what about any other disadvantages? I need the rest of you.

It's not a sustainable fuel source. I mean, it's a fossil fuel. So just thinking about the environment and the way down the road the natural gas is coming from –

I do actually have a counterpoint to that because technically, we do have a landfill that's been talked over. And that's where we collect some of our natural gas.

Most of it comes from dinosaurs. [CROSSTALK]

Well, let's keep on going. And I want to be sure, we get everybody involved in this discussion too so about electric advantages. What kind of electric advantages?

It's what we're used to.

So you're just familiar with it.

More versatile. We do a lot more with electricity.

I can't run my TV and natural gas.

What else?

It seems like we're making advances and making the electricity more energy efficient. And so I don't know what's going on in natural gas, but it seems like we can light our house with really, really efficient bulbs or other things to make it better.

So it's a different technology associated with – what were you going say?

It is the future of automobiles.

Which is scooters. Tesla's coming out with electric semi-trucks. I think Boeing is in the process of creating an electric airplane, but it's innovative it's cleaner and in certain states like California you get a rebate a tax rebates if you buy electric car I believe it's like $7500 – [CROSSTALK]

On specific along with the federal.

They started that now. It's amazing.

What were you going to say?

To me it seems, and maybe this is me being naive. But I don't know as much about the other alternatives but it seems easier. So if I hear people on natural gas and it sounds like you have to do you have to be [INAUDIBLE] set up for it and then absolutely my friends with the solar power, which was a big effort and steps it to me and say, here you are everything you have in the house from the stove, I do like cooking on gas. I grew up in the East Coast with old gas stove. But it just seems easier and contract things better but you get the bill you can see month to month what you're doing, although maybe it's the same but other sources [INAUDIBLE].

[00:27:37]

So do you feel like it's an interesting question? You feel like you can you're tracking your electricity more so than your – Oh, you don't have any gas.

I don't have any [INAUDIBLE]

If you have gas in your home, [INAUDIBLE] electric bill because all of your TV, your lights. But if you have a gas home, you also have your gas bill.

And I remember I grew up in these coasts, and we had both my parents' house in the 70s I guess we had electricity but also a gas stove. And we did get both bills it [INAUDIBLE] what it was like but I don't know it just feels simplified.

Simplified, one bill.

So the new technology in my house that I was talking about this brand new whatever it is they're using. My electric bill for a three bedroom house is under $100 a month.

Let's talk about, let's switch gears and talk about disadvantages. What are electric electricity? [CROSSTALK]

When it goes out and it can destroy the very things that are powering, power surges lightning strikes.

The surges can knock out your electronics?

Yes, they can. I had a phone melt. I was a kid and my mom said she just moved me from the bedroom into the living room because there was a storm coming and lightning shout out to the telephone that had been in my living room straight towards the crib I had been in. Right on the phone, melted the phone.

That is amazing. What else are some disadvantages?

The power lines this was back to the storms you're talking about but [CROSSTALK] I was here talking with someone hits a tree or pole it knocks a tree out to a power line people out for four hours are obviously worse –

Because it's tied to the power outage. [CROSSTALK]

I was in New York when we had the big 2003 August of 2003, North East, Ohio and further to DC or something like that. The whole quarter of the country went out or something like that. So that's a once in a life. Like you said squirrels or something or someone hits a pole so and for four hours or whatever you can be out for no good reason.

I would worry about fires because I mean, that's why they're turning off the electricity in California because of the risk of fire hazard.

Any other disadvantages?

One a side note on power lines the street that I live on the power is underground, I guess there isn't poles. And that's cool. That's all I was just like, Oh, right. So you've noticed on the street that doesn't have the big poles versus the street next to mine that has a big poles, it's so nice to live on this street.

[00:30:39]

Well, let me ask you this. I'm curious about given that you all have electricity. Would you ever consider going from electricity and natural gas to for heating and cooking? I know for a couple of you –

I would if it was affordable. If they would give me a break. If you're going to be a customer we'll put this line in for a reduced price or something.

So basically if they could offset some of the infrastructure costs.

Yes, the initial –

Sounds like maybe Scott, you're in that same boat.

Yes. And for them to do the legwork too because I don't want to have to go knocking on my neighbor's door saying hey, do you want to get out on a $25,000 worth of work to put natural gas to your house? I might make some enemies out of my neighborhood.

Why would I mean assuming this is a big if of course, if you were able to get over that hump and you had the gas being delivered to your home? Why is it that the two of you are interested in potentially going to natural gas?

For me, it's even though most of our electricity is from natural gas. A lot of, some of it is from burning so you're turning heat to electricity back in the heat. That for heating, it's just silly, not efficient.

I would like to have a backup if my power did go out.

To have a redundant power source.

Yes. [CROSSTALK]

Increases the value of your house, you have the option to get gas appliances like a gas stove.

And why is that important?

Well, it's better for cooking you can, your water boils faster. The heating of the food. With your cooking, it's better to all professional chefs cook on gas.

Why do they do that?

Because it heats the food more evenly and you can heat your pan you can heat it up quickly and sear your food versus a slower heat up. And then having an on-demand hot water heater would be more efficient than the electric tank. Hot water heater. Having like she said, having an alternative heat source if I could put in a gas fireplace that I know that I have heat and light even though the power's out. You've got the nice beautiful fireplace and it's clean burning, you're not going to get, if you have we grew up with a wood burning fireplace. And now they have those restrictions because it puts out the particulate matter. So you can't really use a wood burning fireplace through the winter a lot of the time, but a gas fireplace you can.

Good stuff. How about anybody else? Anybody else? Would you consider switching over to natural gas for heating or cooking?

[00:33:42]

I'm just gonna jump on the bandwagon and say that, yes, I would use it for cooking and for a backup generator but that'd be it. I'm pretty content with all my other.

And why would you consider for those applications?

Cooking with gas is incredibly versatile, you can find to amount of heat and the amount of fire you produce [INAUDIBLE]will never grill with charcoal or anything else I would totally use just propane. But Christine said, it heats up faster heats more evenly. I just like enjoying cooking with more and in regards to generators, you can never give up on a gas burn generator as long as you got gas, your house is going to stay lit up even through a huge blackout.

Well, let me ask you, I want to ask on a couple different dimensions and get your sense of which has an advantage of electricity or natural gas. So how about a reliable uninterrupted supply which is more reliable?

Gas.

Gas or electricity?

Electricity. I'm looking at California, like you said it's so hot that they're trying to [CROSSTALK] Power shut-ups. It seems to me that there's –

A number of you think that maybe gas is more reliable. Is that right? And that's because you just have never seen it go out or what?

There's rarely gas out if there's something wrong with the line.

Why did you feel like electricity was a better reliable one?

Well, assuming you had lots of money, I could buy a battery pack for my whole house. It was smooth out all the electricity coming in.

I'm just talking about the standard operating situation. How about cost of appliances are electric appliances or gas appliances?

Gas appliances are cheaper.

Wait, really, because I would assume electric ones. I don't know.

Gas it's cheaper and cheaper to operate, heats faster, more efficiently. So if I had a choice I would go with gas.

But let's not get things confused. There's the operating costs but then there's the cost of the actual appliance. [CROSSTALK]

Well, so beams I recently shocked first. So we have an electric glass top stove. The gas operating stoves were comparable in price. But if you're shopping for a new hot water heater, and on demand gas hot water heater is cheaper than buying the most efficient electric one is where they use a compressed air to try to heat the water. Those are pretty expensive.

[00:36:50]

If we talk about a gas stove, what is your guess? Which is more expensive gas or electric stove?

Gas.

Electric.

Probably, wait the stove itself?

The stove itself, more expensive or less is electric more or less expensive than gas supply a gas stove?

I think it could be a little, more for electric, but –

It sounds like there's a lot of we're not quite sure. Is that fair? A lot of confusion.

If you get on Amazon or [CROSSTALK]

Let's keep on going. How about what do you think is in terms of monthly bills? What would what's who gets the advantage their electricity or natural gas in terms of monthly bills?

I would say natural gas unless you're keeping a pilot light lit all the time. So if you have a gas fireplace, and you run the pilot light then it's going cost.

What about the rest of you guys? What do you think?

More or less. [CROSSTALK]

Because it depends geographically really. I lived on the East Coast for 15 years in New Jersey. And the gas there compared to gas here –

You have a sense if you run gas here whether you would have your bill go down.

I don't.

I am sure it'll be cheaper.

My electricity bill would go down. I cannot say whether or not my gas bill would make it the same.

I think gas would be cheaper on the utility side bill, because it would see those as requirements for readiness heat how are included and it makes think it's cheaper to gas heating hot water than electric. I gave a completely off reason.

Well, I guess to be fair to fill the 20 pound propane tank that I have, it's only going to cost me a buck 70 a gallon to refill that thing. So I am using it to cut down on the amount electricity I'm using to heat my home. So I guess it is cheaper for me to operate that than to continuously operate my heaters.

There's also a lot of variables in that to it. It all depends on the certain individual how much gas and how much electricity that they use. For example, I live in a four bedroom apartment, student housing. And altogether we pay about 130 a month that's for all of us. And of course we split the bill I'm not going to pay all that to be honest. But again, it depends every month depends on how much electricity you use, if you're going to be running something all day, or if you're going to be out of the house all day and not use any electricity.

Let's do this. Go ahead did you have a final thought?

Yes, just a comparison between the house that my family was renting when we first lived in Eugene was really old and weird and had those little wall heater things which are electric but those things suck and the bill was very expensive. I just know because it's freezing in the house. We have to turn them on because the house is hardwood floors and not very insulated. Those suck. But now this other house has just the central vents. I don't know anything you guys know I'm talking about with the thermostat. And it's super, way cheaper now, that's all I know is that they were like, our electrical is gone down so much this house is so much more efficient in the way that it's set up because we don't have the stupid wall heaters. And the whole house stays warm, so that's nice.

[00:40:21]

So one more question before we go into a different direction. And this is actually directed to everybody except for Scott and Christina have already answered this question. What would it take you to consider adopting natural gas in your home?

I would want to know a lot more about it. I just don't know very much about natural gas. So even if it was coming from the company itself, some nice information about it, and I would do some of my own research too.

What would it take for the rest of you?

Cost of the installation would have to be equal to or less than the cost of me installing solar and power wall.

And power wall?

Yes, the place to buffer excess energy and produce.

Yes, I agree with that, it would just have to be cheaper and also I can prove that it's not terrible for the earth I guess. I guess there's going be really, really cost efficient more cost efficient and doing something like solar power or getting in newer energy because I know that all the stuff it's all about price up it's a lot newer so it's not affordable yet because we're still working on it and not everyone can afford a Tesla yet I hope that they're working on that because I really want one.

I agree with what Mandy said in terms of wanting more information. What I'd want to know is cost, of course, it's what everyone's talking about, but also safety and maybe that sounds because my house was built in 1929 in New York and this was in the '70s. It was 50 years later. And we had heat – gas heat and stove, and it must have been the original stove for the house probably. Because the pilot lights would always have to relight. And then you cook with it, which was great like you said. But the oven, we always had to – my parents would take a thing and light a match and throw it down into this thing. I don't even know what it was. And it would seem very unsafe to me. Maybe this is completely irrational, but my feeling about safety. And that's the information to the cost and the safety. And the other thing, it's just interesting you had clean energy as one of the word associations because, you know, if you think of clean energy you think not coal, that's dirty. But I don't think of gas as clean. And maybe that's just a different definition of the word. Because I think it was something that could poison you or it's something that's extreme. Something that when you smell it, the gas leak, that's dangerous. Or there's a gas leak and it's going to start a fire. You see the trains that have big fires that come from the gas pipelines. So I don't know if clean is the word I would use for it. To me, to market anything from a natural gas company.

I agree with you on that statement. I have monoxide sensors in my house because of the gas I use. So they chirp and go off if I have too much gas build up from carbon dioxide and carbon monoxide.

All right. Well this has been a great conversation. But now I want to start to steer it to a slightly different direction and start talking about energy and the environment. So the first question I have is just based on your own perceptions where do you feel like are the greatest contributors to climate change today. What are the greatest sources of carbon emissions?

[00:43:42]

Transportation.

Transportation.

Cow farts.

Some cow and agriculture.

Well, to be fair. Cows don't fart, they burp.

Just like, isn't it just like big corporations and when they –

So industry?

Yeah, just like the industry, what is that stuff that comes out of those tubes.

[CROSSTALK] It's coal fire [INAUDIBLE] in the rest United States. We're not as familiar with that here because that's not our energy. But if you go through the Midwest and the East Coast, all of their electricity is from – generated from burning coal.

Third World China specifically, I guess they do a lot of stuff with coal still. So they still have tons of it.

Developing countries?

Yes, developing countries.

And India. China and India are the biggest coal burners in the world.

But in regards to that, I would have to agree. I would have to say coal. That, in part because of the Industrial Revolution we had a couple hundred years ago.

So what are the energy sources that you feel are playing a positive role when it comes to climate change?

Solar and wind?

Solar.

Electricity.

Solar, wind.

And electricity. Yes.

I don't want to say Tesla again. Because you said that twice. But I worked out [INAUDIBLE] this new electric car that goes [INAUDIBLE]

But I'm talking about – That's –

That's not an energy source. That's something that runs.

That's not an energy source. So I'm looking for an energy source. Like solar and wind are two new. But what's generating – There's got to be something. You know, the electricity doesn't show up as electricity. [CROSSTALK] So what are – So is nuclear? Do you feel like it's contributing positively to climate change?

Yes. Definitely. It doesn't put out any air pollution. It's not polluting the air.

It doesn't produce carbon dioxide or carbon monoxide. So you're actually –

Do you all agree that that's – It's playing a positive role?

I've been stewing here about nuclear for a little bit. And I guess this can go for every single form of electricity or energy. But if not handled properly, it could be real bad. Like even if it's just one person or to a bunch of people.

But in regards to climate change, which is out atmosphere –

I'd say it has little to no effect on that. Unless something bad happens. Ergo Chernobyl, Fukushima.

To bounce off of that statement, I mean, the same thing's true for solar and wind. Wind kills a surprising number of birds. And in Arizona they use a special kind of solar collector where they direct a bunch of light to a centralized point. And for whatever reason, birds are horribly attracted to it. And then tuned into fried birds.

So the larger point I think that you're making is that –

Everything has a downside.

They have trade-offs.

But in terms of climate change – Because that's what the question is about.

[00:46:43]

No. That was my question. But my follow-up question was going to be "Are these perfect energy sources?"

No.

I worry about wind. I mean, I love wind because it really is clean. But I feel the acoustics. And so the lower frequencies of the wind, we've got to figure it out before it's going to be perfect.

You know, turbines create a lot of noise.

Yeah, that's true.

And then solar, depending on the climate and things, like, and the resources it takes to make the panels. It's just –

Its level of efficiency drops dramatically depending on –

Yeah. We hooked up a lot of panels to generate – Yeah. The efficiency of it is –

So it sounds like there's kind of [INAUDIBLE] Am I getting the sense that there's agreement that there are trade-offs with all of these energy sources?

Yes. But I hope that these newer things just get fine-tuned and get to a point where they'll be easier and more readily available and cheaper and run efficiently. And I just think that's going to take a little bit for that to happen.

Well, let's – I guess what I want to know now is where does natural gas fit into the equation when it comes to climate change? Is it positive? Is it negative? Is it somewhere in between? Is it mixed? What is your general impression of it?

It's responsible for a lot of the U.S's emissions. Because it's so much cheaper to burn natural gas for electricity that I'm shutting down coal fire power plants across the country.

So in that sense it's having a positive effect.

It's having a positive effect.

What do the rest of you think?

I would agree somewhere in between. Because –

It's certainly cleaner than coal. But it's still not clean as the others.

Right. It's not as clean in terms of air pollution as like solar or wind. But it is definitely, I guess, a lot cleaner than coal.

And the rest of you, how do you feel about it?

In the big picture, it's definitely a negative because it's still contributing to carbon emissions and the thinning of the ozone layer.

It's like the lesser of two evils. It's better than coal. But it's not saying that it's good. It's just better than something else that's bad.

That's a really good analogy.

Do you feel like – Does it have a role to play today? Or is it just – Does it –

I think it still has a role to play. There's a reason why I'm using it in my house.

Why does it have a role to play?

You need base load even with wind and solar. Something to provide when the wind's not blowing and the sun's not shining.

That is fair. Or your electricity goes out.

It minimum makes for a good back-up.

If you're talking about current [INAUDIBLE] Well, not currents. [INAUDIBLE] As part of the sort of solution and where we're going to be ten years from now or 20 years from now. I think that's behind the questions. And it's like we use the rest of our tools. And maybe something else will come next.

[00:49:50]

Let me ask the group as a whole. And I know we touched on this a little bit. And Christine had mentioned some things. But, just as a whole, I'm kind of curious, do you folks have any sense of – Maybe not just in this area. But if you think about the country as a whole, do you have any sense of where – how electricity is being generated today? And what are the primary source so generating electricity today? You have any sense?

Hydroelectric. It's in the [INAUDIBLE] list.

Do you know if there's hydroelectric?

It depends on your region. I know that there's still – Oregon itself does have some thermal. I know there's more thermal down in Nevada and some of the hotter places.

[INAUDIBLE] has geothermal.

Geothermal. So we' know we're clean over there. And I know the further east you go the dirtier – The dirtier it can get. And then you get nuclear over there.

Some nuclear in some other parts of the – Anything else that you think of creating interesting?

How about oil?

What's that?

Oil. I forgot about oil.

Oh, yeah, oil.

They're still burning coal in the states.

And they still have oil. You guys take Chicago. Get some of this too. We're going to shoot in the wild.

That is more annoying.

That's right. So coal is obviously still being burned in a lot of different place. But a lot of utilities are switching over to natural gas. So it's a big – natural gas is turning out to be a big chunk of that. So I just was curious whether you were aware that natural gas is actually behind some of this electric generation that's going on. So my nest question really has to do with, you know, given the concerns that different communities have with climate change, there are some, particularly on the West Coast there are some cities that have been considering potentially banning new construction from using natural gas in the residential or business settings. And I'm curious how you feel about that. Is that a good thing? Or is that a bad thing?

Completely unaware that that was going to touch on banning new construction.

I would personally probably be against it just from a cooking standpoint. It is heavily used in restaurant businesses. It would destroy a lot of places. Domino's, in general, their whole oven is powered by gas. You can't achieve 600 degrees in –

I wanted to know what their reasoning was for banning it. Because then you're limiting customers. And you're limiting people on their options.

And I think the answer is that there's an honest effort to try to figure out how do we combat climate change over time? And so some people feel like, "Well, maybe this is a step."

[00:52:51]

Backwards to confuse [INAUDIBLE]

A step to kind of start finding alternatives that, you know, wouldn't affect climate change. I think that's the thinking. Now, whether that's right or not, I'm sort of throwing that out for you guys.

There's, like, a ban on single-use plastic items in Eugene.

[INAUDIBLE]

So what do we think? Do you think that that – Is that a good idea? Is that getting us in the right direction?

I think it's a good intention. But not necessarily –

Court execution.

I don't know. And yes, 300 and – How many people in the U.S? 350 million in the U.S. all using gas. I still wonder if you using gas to heat your home and cook your food with even come close to what industry uses for around the world electricity.

From all the other potential sources that could be turned down.

So you are doing that, the focusing on the wrong area.

They should be focusing on business rather than residential.

Makes me want to run home and google their reasoning.

I agree with that. But it's like there's always little things that are like happening to people not business. Like the things with straws, [INAUDIBLE] Which still, those things are valid. Yes. But it's like the main contributors to all this bad shit that's going on is these big mega businesses that just burn through all this shit and put all this I'm not a scientist. And it sounds like I don't know what I'm talking about. Because I really don't. But I do know big businesses suck.

You said the ban was on residential only?

I think it depends on the municipality. And I think, you know, as to what they're considering. But I think it's more – The idea is to try to control new

development. So it wouldn't be, you know, taking away gas from people that already have it.

So it could be mixed use?

And it would be – And if somebody – Like if they were building a new – It could be a new business. But it could also be a new residential – The [INAUDIBLE] would be to anything that was new in these municipalities that said, "Sorry, can't go there."

I was going to say the Pacific Northwest is arguably one of the cleanest parts of the U.S. And I think they should continue doing that with, you know, with finding different means of electricity, of energy, of finding different ways to reuse materials. But I always – I do think that we should use natural gas as a plan B, a back-up just in case anything happens. I feel like that we should always have natural gas in the back of the head when looking forward.

So you're saying natural gas should be a fallback?

Yes.

Or are you saying that natural gas is sort of something that fills the gap right now while they're going toward other cleaner sources of energy? What are you saying, exactly? When you say back-up, I guess I don't really know what that means.

I would say as of right now fill in the gaps. But I think we should always have it as a back-up in case. I mean, let's say there's just this giant [INAUDIBLE] that goes off. I mean, I'm just spit balling here. And it sounds like crazy talk.

[00:56:03]

If we got to fully solar wind and geothermal. You'd want this as something in the back?

Or if like half of Eugene and Springfield goes through a blackout, you know.

Not to mention just from that chef stance. I mean, I doubt we'll ever stop [CROSSTALK]

I don't have the idea of being told what your energy source could be. You should be allowed to have options. And if they force people to only have electric, then here in the Northwest that forces us to continue to have dams or to build more dams, which is affecting salmon populations. And it affects our beaches. Our beaches will shrink if we don't let the sediment travel down the river. So dams have really negative effects too. Like, we aren't producing as much air pollution with the coal fire power plant. But we've done a lot of damage to the environment in other ways with dams. So it'd be good if we could, you know, not rely on electricity or force people to do that.

So overall – I was kind of hearing a little give and take. But overall one more time. How many people kind of feel, just by a quick show of hands, how many people feel like a ban is at least a reasonable thing to consider?

Not how they're – I just don't like how they're doing it. And I don't think they're targeting the right people. I don't know if that makes sense.

It seems like bans on anything get sometimes quickly implemented before there's enough research.

So the rest of you are kind of leery. Am I hearing the rest of you are kind of leery about the ban idea?

Yes.

Yes.

I don't like it.

I mean, the best analogy to think of that ban is the ban is the ban that we had on the single use items. Good intentions but completely doesn't change anything.

Why doesn't it change anything?

So in this particular case, [INAUDIBLE] But it doesn't change the amount of consumption that still has to happen. People are going to want it in the end.

You're banning a plastic straw. But you're handing me a paper straw in a plastic cup.

Well, what we're going to do now is discuss a concept here called renewable natural gas. Anybody heard of that?

Yes.

I haven't.

Maybe.

I've heard of it.

Well, we're going to read this together. So take one. Pass it along. And then you could read along silently while I read it out loud. And we'll go through this together. Renewable natural gas. Renewable natural gas is produced from local organic materials like food, agricultural, and forestry waste, wastewater or landfills. As these materials decompose, they produce methane. That methane can be captured, conditioned to pipeline quality and delivered in the existing pipeline system and vehicles and homes and businesses where it can be used in existing appliances and equipment. This provides renewable energy options for the natural gas system in the same way the wind and solar are used to generate renewable electricity. In closing the loop on what would otherwise be wasted gas, renewable natural gas can provide up to an 80% carbon reduction benefit.

[00:59:34]

Is that including all the energy it takes to get it to that stage?

So basically what they're describing here is something that is happening on its own today just through basic biology. So as things decompose they give off methane gas. And so what they're basically suggesting here is that by collecting that methane gas and then reusing it you're actually benefiting the environment. Because otherwise that waste, that gas from the waste is going up into the atmosphere.

Like the kept landfill?

Yeah.

They're using that.

Methane's a lot more potent of a greenhouse gas.

So what do we think about this concept?

I like it.

I think it's good.

I like it. But –

I think the question's a little loaded. The renewable part is a little loaded. But you're still producing a greenhouse gas, regardless. You are lessening the greenhouse gas. Because –

But let me stop you there. Producing it. You're not necessarily producing it. Nature is producing it.

So we're saying nature is producing it. But we're still burning it. We're not removing carbon that's being created.

So you're using it and having a positive impact versus letting it just go up into the atmosphere. So that's what they're saying about the 80%.

They were kind of saying that it already had been produced.

So they're having a – Even though it's being burned, it's still having a lesser impact than just it all going up.

Correct. To call it renewable is a bit of a stretch. I would say it's just repurposing.

That makes sense.

Well, I would say – I mean, it's renewable because if you think of the carbon cycle. So, you know, you're going to have dead organic matter breaking down, producing the gas. And that will go in to power other things, which, I mean, you just – It's renewable because your source is organic matter versus if your natural gas source was from underneath the ground from the dinosaurs. You're pulling up carbon stores. So that carbon was not in our atmosphere. It was not part of our existing carbon cycle. And you're pumping it back into the atmosphere. So this is using carbon that's already out in the system.

So ideally what we need to do – And they're working on a technology that'll hopefully capture carbon to make it so we start it off negative.

That would make this renewable.

That's not renewable.

But let me take a step back. And I'm not trying to discount the importance of how we think about it or reference it. But I want to just kind of go up to the 50,000 foot level and talk about just the overall concept. And whether you think the concept has merit or not. Does it?

[01:02:38]

Yes.

Is it positive? Is it negative?

Depends.

Tell me why you think it depends.

I believe Oregon won't use renewable natural diesel fuel. You can get some bio-diesel. But there's – And I don't think it applies to natural gas because [INAUDIBLE] has their own bio-digesters. The source of the agricultural waste – for some of that oil for the diesel, for instance, was palm trees. The palm oil fields that they slashed the rain forest to plant the palm trees. So that's why Governor Brown signed something to ban that. So it's renewable, but the source of the materials – if you're just burning more fuel to produce the agricultural waste – because, at some point, it becomes profitable to just grow it.

That wasn't agricultural waste, that was being grown – there's crop that's grown specifically to make biodiesel. Which is different than agricultural waste.

The problem is, the waste is no longer waste, it's profitable to grow it.

If I'm hearing you, I just want to be sure I'm kind of getting your concern. The concern is that you don't try to create a problem by somehow going beyond waste product, but in fact, start introducing additional materials into the stream – growing things, for example – only for this purpose. That noted, if it was focused primarily just on absolute waste, animal waste –

So, we're not growing crops specifically for this system, we are taking what is waste product and putting it into the system. So we're not making anything additional.

That's correct.

Taking the manure from the Tillamook cows, conceivably taking food waste from restaurants and residential homes and that kind of thing, any of that kind of stuff. That's the idea. Again, let me just ask the question, does this have merit?

It does. But, this should only be considered renewable as much as it is a refinement. Because this isn't a full loop, technically.

It is, though, if you know what carbon cycling –

I know we've been really focused on the labeling, let me throw out another thing, and I just want to see if you guys like it or not – what do you think about this being called recycling? In a different form, it's recycling material to produce –

That makes sense, because there's a carbon cycle. People are hung up on this renewable part. Renewable just means that you're growing, it's an organic source, so you're not going to –

[01:05:45]

If you thought about this as recycling waste product into something that could actually be used in a positive way, would that resonate?

Yeah that seems like recycling.

We're talking from a marketing standpoint, in fuel now? I kind of like the way the conversation went from the term 'Renewable', and you talk about repurposing and you use the word 'Refinement,' and now we've kind of gone further, to a different term, 'Recycling.' It's all kind of trying to say the same kind of thing. I think of it as marketing, because, even this phrase in the paragraph where it talks about where it can be used in existing appliances and equipment – so wouldn't you start off with asking why would you [INAUDIBLE] the cost of getting a new gas stove, versus – and then the other piece I think was very smart

– for whoever wrote this was – in the same way that wind and solar are used to generate renewable electricity, and that's kind of like, if you've heard of the term "Halo Effect" – Subway advertises you eat healthy sandwiches, you can go and you'll be eating healthy even if you get the worst stuff. Same thing, wind and solar are two terms that people like out there. Recycling, same thing – halo effect, it's a term people like out there. Whether it's overused, or whether it's inaccurate if it's used for this, just goes to what you were saying, "Is it really renewable or not?" But I think, from a marketing standpoint, that may play better.

What would play better?

Recycling.

I wasn't necessarily throwing it out there as a marketing term, I just wanted to throw it out there as a term that I think everyone's familiar with. And I wondered if it applied, because it was basically taking something and then turning it into something else and reusing it, which at some level, seems like recycling to me anyway. I just was curious whether anybody else thought that or not.

I agree.

I'm just wondering what is happening to the leftovers – so you're getting the gas, but what is happening to the other sludge? Is it compost? Is there anything toxic? What are going to do with – in this anaerobic digester, what is coming out of it besides the gas that we want? And what do we do with it?

For me, the recycling and renewable doesn't necessarily fit. There is still something left behind.

There's going to be something, and it's a big question mark.

I think that's a legitimate question. Although, I think if you think about this – in today's world, if you put out garbage, and you just let it sit in your compost pile, it lets off methane, and it decomposes. What's left is organic material, and that would be kind of where you're at, only on a much grander scale. But, I think your point is well taken, which is – there are lots of questions about the entirety of the system, and what are the implications of implementing it? For example, it sounds like it you knew that that sludge could be used as fertilizer, would that be something that would be useful to know, and would that make the concept more appealing?

[01:08:46]

I'd be like, "You take all this away, you put it in the thing, you get gas, and you get fertilizer," and if it's good, and it can prove that everything that's coming out of it is good, then I'll be like, "Oh, great. There's no – "

There's not going to be anything left to deal with.

Again, I'm not an expert at this, but that's the principle behind this, they're trying to use the basic biological decomposition idea.

This 80 percent carbon reduction, to me, doesn't make sense about this, just because you're taking existing carbon and it's just going through the carbon cycle. You're not actually taking, you're not really actually removing it out of the system. It's just going through the methane and the carbon cycle. It's not actually being removed. It's not a carbon sink. [CROSSTALK] You're using it for something, it's not making it worse, but it's not going to – if you were doing this as an alternative to coal-fire power plant, then yes, it would be a reduction.

Again, I'm not an expert, but my understanding was they were comparing the impact of methane, untreated, going in the atmosphere versus this being sort of the –

That I could see.

Burning it versus letting it release.

Because methane is certainly more hazardous.

The cost issue that's not being addressed in this paragraph, too though – which is, how much does this all cost and who's paying for it?

The customers who are using [CROSSTALK]

Whose pockets is it lining?

Who's paying for getting conventional natural gas? Basically, they're looking at different way to produce what they're hoping is a more environmentally friendly –

Certainly more friendly than fracking.

If I knew this is what was coming out of the pipeline at my house, we would switch.

Why is that?

Because right now, I don't think of natural gas as being necessarily a positive change. But, this would most certainly be a positive change, if I knew that that's what was already at my house.

They're harvesting all the cow poop and reusing that.

Let me build off of that. Does this concept change your perception of natural gas?

Yes.

In what way?

In a positive way, it's seeing it as being renewable versus coming from dinosaur – pumping it out of the ground.

[01:11:50]

If a utility were offering this product, how would you feel about that utility?

I'd switch.

I would feel positive about the utility.

How would you characterize them? If you were talking to somebody else, and referring to them, what would you consider them – how would you describe them?

A progressive sort of energy.

I hate the phrase, but "Thinking outside the box."

Outside the box, progressive. Any other terms?

Trying to make a difference in the environment, maybe.

Friendly to the earth. Trying to make a difference.

It seems so unreliable, I don't know why.

There's a lot of flaws with this concept, and I feel like a lot more research needs to be done with this, but if this were to get onto the general level, to the public, I feel like I'd be happy with my tax dollars going to that.

So, you said there's a lot of flaws. Where do you see as the flaws?

I just feel like – a lot of you are right about the effect that the equipment that is used to make this – that's going to be a lot of money, a lot of time, a lot of energy going into that. We don't know what kind of products they're going to be using with – an anaerobic digester, I'm no scientist, I don't know what's going to be into that. I'm just wondering where the –

It's just microbes.

It's definitely – there'd be some sort of infrastructure. Here's the other thing I should let you know – this isn't just a hypothetical, this actually is happening today. There would be investment in terms of the actual equipment necessary, and all of that, just as there's investment if you're going to go mine something or build something, or whatever – you're going to have some infrastructure.

I've heard about this, and I've only heard about it with – if you have a dump, and they're capturing the methane and burning it to use to power their facilities. But I have not heard of this, using it to power residential homes.

Are you saying it's already being used now somewhere?

It is used, this does exist. It's just, I don't know of it in any kind of large scale, in terms of – it's new.

It is new, but it's not a theoretical.

It is happening.

Here? In the United States?

Yes. Outside of Eugene, actually. There's a landfill outside of Eugene on I-5 that they do this already.

In Portland, wastewater treatment plant actually [CROSSTALK] using this.

This has been a great conversation, but we're going to go to the next concept. Renewable hydrogen power to gas is a process that captures surplus wind and solar energy, and converts it to renewable natural gas or hydrogen through electrolysis. This renewable energy can be stored and then blended into our pipeline system to one day serve homes, businesses, and vehicles. So this is a little more complicated than the last diagram, but in essence, what they're trying to argue here, or describe here, is – there are times, as was sort of alluded to earlier, that wind and solar generates electricity, but maybe it's a low-demand time, and there aren't always good ways to store that electricity. Sometimes it's generating electricity, and it's not needed. It then, therefore, goes to waste. The concept here is, rather than have this wind or solar energy during non-peak times go to waste, why not use it to actually split water molecules to produce hydrogen, and then either use the hydrogen as power, or combine it with carbon dioxide from the atmosphere to create methane and therefore, be able to store and then use that sort of gas, if and when it is needed. That's the concept. What do we think about that?

[01:16:10]

Water's already a precious resource.

I'm wondering where are they getting the water from? And then, hydrogen's really explosive, so that's a safety concern. And then, I don't like the idea of taking – I guess, it's still part of the carbon cycle, it's not adding any more carbon to the system. So as far as that goes – but, the water use. But, it is a good solution to store – it's a form of stored energy.

It's a battery.

It's a form of a battery, it's true. So, what do the rest of you guys think?

I feel like there's something dangerous about working on the molecular level on such a grand level. I immediately think of splitting atoms, and I know that sounds incredibly crazy, I know.

You could do this with a battery, like a AA battery. Electrolysis is not – I've done that, it's not –

But it's fair, if you're not a science teacher, it doesn't necessarily sound intuitive. You're saying it sounds mysterious, kind of maybe dangerous, at a large scale?

There's a difference between pulling two atoms apart, and actually splitting an individual atom. There's a big difference.

It doesn't sound cost effective.

Just looking at this diagram and seeing all the steps and all the verbs that say "Do this, do that, do this, do that, do this, do that, and then you have this."

The first sentence makes me wonder what happens now with this surplus one in solar energy so.

So the argument is that there are times when it generates that energy and it just can't be used. And then if there's.

It goes to waste if we don't store it.

It goes to waste.

So the point is so the [CROSSTALK].

And so you might say well why not have huge batteries? Well they don't have enough, the battery technologies aren't –

Our batteries aren't there yet.

There yet to store at all. So and what they could store would be more of matter of hours as opposed to days or weeks or whatever. So not saying this is the only solution but what they're saying is well what you could do conceivably is take it during those periods and convert it from one energy source into a different energy source.

And this would be stored long term that when you don't have enough sun or something else, you could harness the hydrogen or the methane and burn that as in.

Well you just have to burn that hydrogen and it would just break back down into oxygen and water or a different combo.

So that burns clean.

So anyway that's the concept. Now I'm not saying if it's good or bad I'm just trying to explain what the concept is. So what do we think?

[01:19:14]

It is a just a concept or is it being used already?

It must be yeah.

It's already being produced and there are vehicles that do leverage it. I personally think this is a fantastic idea because it's an incredible way to store a bunch of energy. A more simplistic concept is basically taking a body of water and pumping it up a hill. You're storing the energy long term and then when you need the energy you could run it up back down the hill power generator.

Or spin.

This is just doing the same concept, except you can produce a lot of it during off times and then just burn it when you need it because electricity is all on demand.

So what's the downside? Is it the cost or the?

The biggest downside may be cost and the fact that hydrogen is very volatile.

Volatile.

And very expensive.

Well then I'm wondering the water.

And it's expensive.

So the water could be recycled. It produces so much water and then you could re-harvest and reuse the water to create your hydrogen again. Because all you're doing is separating and forming the same bonds.

I think the problems comes when you combine it with, you're capturing CO2. If you're turning the hydrogen into the methane.

Correct. I am not.

The perfect thing is as in you had the perfect connection [CROSSTALK].

Correct. I would be against the methane portion of it.

So you see the methane is [CROSSTALK]?

Now would not.

The methane is still coming from the atmosphere, it's not coming from a carbon sequestered place.

But there's a net, my concern is there's a net loss of water. When you burn the methane you get carbon dioxide and water.

Well you won't lose water it can't disappear.

Well you don't technically lose anything in this.

You don't.

So let me ask you this. Just overall between the two different concepts which one seems more appealing to the group?

Hydrogen for me.

The first one or the second one?

I don't think that there is a one size fits all solution to energy problems. I think that maybe like in the mid-west, maybe where there's a lot of agricultural waste, to have a system like this might be more efficient because you don't have to travel the agricultural waste very far. But in.

But I guess I'm just wondering, as a whole I'm kind of just trying to get a sense of whether you guys find one more appealing here in your home area.

I lean towards hydrogen.

What about the rest of you?

I would lean towards the anaerobic digester.

There're a little bit.

[CROSSTALK] for gas.

First one I like better.

The first one?

It feels easier –

Yeah.

For the public to understand.

The first one is easier to understand and.

I'm not [CROSSTALK] but I feel it's more.

Just it's less, there's no explosive gas. You don't have a plant that's holding so much hydrogen that.

Well that's great. So let us now, our final little exercise is going to be around messaging. So take one pass it around. And this is where we're gonna review a few different statements and then gauge from you which ones you think are most compelling and which ones we think are least compelling. Now I'd like you to ignore the instructions at the top. We have an outdated form here unfortunately.

[01:22:32]

[INAUDIBLE]

So here's the new instruction. We're gonna read these together and then at the end I'd like you to put a check mark by the one you find the most compelling. And I want you to put an X by the one you find least compelling. So check

mark by the one you find most compelling, X by the one you find least compelling. So now let's read it together. Natural gas is a vital part of a reliable energy strategy because alternative energy sources like wind, solar, and hydropower and are not able to meet all of the state's energy needs. All forms of cleaner energy, hydro, wind, solar and renewable natural gas, are needed in a balanced low carbon future. Natural gas spans will allow utilities to continue using gas to generate electricity, but it will prevent individuals and businesses from choosing the energy source that best meets their needs. The existing natural gas network can be used to deliver renewable natural gas and dramatically reduce greenhouse gas emissions as a result. And then lastly, natural gas is a uniquely attractive energy source because of its affordability for liability in cooking and heating performance. So choose the most compelling and the least compelling statement. We're good? So let's start with the most compelling. And I'm just gonna go down the list and if you've chosen it just raise your hand. So anyone choose P as the most compelling? One, two, three. How about Q? One, two, three, four, five. Well that pretty much does it. So let's talk about both of them. Start with Q, why was Q so popular?

There's not a perfect solution so having all of those as part of the solution makes more sense.

I just feel like it's pretty realistic and easy straight forward statement that I can be like I agree with this.

[01:25:37]

The fact that it's for.

Use of the word needed.

What's that?

Use of the word needed.

Needed?

Yeah.

If the word would have been something else, I might not have been inclined to choose it. Even with the fact that all those possibilities right there.

What else? Anything else?

I just think choosing between Q and T as the most compelling and definitely was strong. And the reason I chose Q over T, it goes back to the Hall Effect when I described it you're lumping in renewable natural gas with hydro and solar which again a positive fills, fillings. The other thing is it uses the term renewable. Both Q and T use renewable natural gas. And I like if you're trying to get, and I like that better than the second one you [INAUDIBLE]. So I think that would be a term you wanna put in there, because then it also makes people think, what is that? If I don't know what it is. And by having it tied to the more positive things in Q as opposed to the stand alone in T, that's why I put Q just ahead of T.

Well let's talk about P, for those of you who choose P why did you like P?

I liked it because I don't think that any one energy source is going to provide enough energy. And so we need to have a variety of sources.

What else? Who else chose that one and what was some of your thinking?

Having it there as the backup provides some resiliency to the electrical grid.

And they use the word reliable so that's that.

That's the word that really got it for me is that you run out of, if the sun clouds covered, you know you can fire up your plan real quick if you needed on demand energy assuming you had a way to store it.

So reliable is sort of the key phrase key term?

Yeah, the reliable.

Yeah. The wind is not blowing the solar is not going, we can't rely on hydropower because we're ruining our salmon. So we need, our population is growing we need something else and it would be.

At that point it would be supplemental energy. We need something to backup; something takes out one of the renewables because its footprint is a lot smaller.

Well let's go to least compelling, I'll do the same exercise. Anyone put down P? One. Q? One. S? One, two, three. T? One. U? Two. We're spread all out a little bit here. But S and T. So those of you who chose S why S?

I'm thinking at an economic standpoint. I feel that a lot of companies that do benefit off of natural gas if they were to be banned completely from that, then a lot of businesses would fall under and then just for the sake of capitalism will not be so good for the economy. I'm thinking about this as a business man's standpoint not an environmentalist standpoint because I'm all for different forms of energy. But as of right now, I feel like that a ban would probably not be the best idea.

[01:29:05]

How about anybody else who chose that one?

So for me it's counterintuitive to just specifically use it for utility. Not when there's so many people's lives that do rely on natural gas to produce food and stuff like that. Because it does propound more energy would burn perfect for high temp cooking.

How about U? Why did folks find U to be less than compelling?

Well first I didn't find any of these in particular to be not compelling if that makes sense, but you just told me I had to choose one. So I just picked U just because it's well the one thing that we heard is if you wanted to put in a gas line then it's not affordable. So it said that it's attractive because of its affordability that's so the affordable. But so the thing that we talked about is just that it's not reliable. But it's not something where you could just be like I think I want gas in my house and you just call up and then get some gas because.

It just sounded like a cutesy statement to me.

It sounded cutesy.

It didn't really address anything going on as far as reliability or renewable energy the environment. It was just kinda cutesy.

So it didn't address some of these larger issues that we've been talking about?

Uh-uh.

I'm gonna step in the back just to see if there're any final questions for you before I let you go.

Frankly I think it will just all go back to the [INAUDIBLE].

I personally really like having plumbing in my house so I really don't go for it [CROSSTALK] we're doing.

Well you guys apparently you answered every question that needed to be answered.

Woohoo.

Yay.

So what a dynamite group. So thank you so much for all your insights and contributions. And if you would be so kind as to pass your handouts back to me. And then you can take, at no extra charge you can take your name tags with you and keep them as a special souvenir. And safe travel home tonight. Thanks again for everything.

Thank you.

Thank you.

Do you want everything or no?

Do you want me to put this somewhere or?

You can put it there that's fine. Thanks.

Thank you.

I want another one. I can't [INAUDIBLE].

I will meet you at the front desk.

[01:32:09]

They're recording.

Do you want me to answer this?

Sure. I just had both my hips replaced 39 days ago.

Oh my god.

At the same time.

Oh wow.

So the fact that I'm even.

Just maybe do one and then the other.

Project Name: **5234-E190117 - NW Natural Safety Communications**
Date: **10/28/2019**
Time: **6:00 PM**
Segment: **Day 1 Group 1**

Eddie, hello. Welcome.

Thank you.

Hi, there. Come on in. Find a spot. How's everybody doing tonight?

Good.

Good.

Excellent. You staying warm? Is it getting chilly outside?

It's heating up. [CROSSTALK]

I got in earlier today and it's beautiful. It was a beautiful day. Well, thank you for organizing that for me.

Where are you coming from?

California. Land of power outages and wildfires. Oh my goodness, it's a nice little break, let me say that. Welcome, everybody. Do you all have name tags? Do you have a name tag?

I do.

If you could do me a favor and make sure it's focused towards me, that would help – Be very helpful, so I can see all of that. My name is Rob. As you probably figured out, I'm going to be the moderator here today. Welcome to all of you. Really glad to see you all. I am here to have a discussion with you about energy and energy sources. But, I want to tell you that I am not actually an employee of the sponsoring organization. I'm an employee of an independent market research firm and I go through the trouble of telling you that just so that you know I have no stake in the outcome of this research. If you have something really positive to say about something, that's great. If you have something that's really negative to say about it, that's great too. Really just looking for your honest, candid opinions. Now, this is a group discussion.

One of the things that I will hope I'll see from each one of you is that you will all participate. Nobody gets to be a silent partner sitting here through the whole group. That said, I don't want you to feel like I want you to necessarily be forced into any sort of consensus opinion. Like if - it's certainly OK to have different opinions, particularly if you're listening to everybody else talk about something and it seems like everybody's coming out on one side – And, you're thinking, "I don't know what planet these guys are from, but I couldn't disagree more." By all means, please speak up. Because if you feel that way, more than likely other people in the population feel that way as well and it's important they hear that view expressed. A couple other things I just want to let you know, because we do have a conversation, sometimes people do get excited and we start having side conversations and that doesn't work so well, because I want to be sure I'm hearing everybody's comments. If we can keep it at one conversation at a time, that would be awesome. Also, I want to let you know we are recording this session. I do have colleagues in the back just to observe, take notes, that kind of thing. But we are – I want to assure you that all this information is going to be held in confidence. We're all – Only using this for internal analysis purposes only. If any of you were hoping that this was going to be a breakout moment on YouTube, you'll have to go to a different group. That's not going to happen tonight. But oh well, I think we'll have a good time, nonetheless. What I'd like to have us do is just to have a chance to get to know each one of you briefly and kind of your energy situation. I put a little cheat sheet on the back. What I'd love to do is just kind of go around, if you could tell us your name, what occupation or what it is you do when you're not coming to focus groups like this one, and then your home energy sources and what – I've got now versus when you moved into your place. Some of you may have started off with a particular energy source and then switched over time. I'm kind of curious if that ever is the case for any of you. OK? So Will, why don't we have you start off?

[00:03:51]

My name's Will Wiley. I'm a retired mail carrier, 37 years, and the home that I live in has natural gas through Northwest Natural, as well as electricity through PGE. And very little's changed since I moved in. I did add some solar collectors for my swimming pool to heat the water through that instead of the natural gas that was – It has a heater that's not plugged in right now, because I'm using the sun.

Great to have you here.

Thank you.

Bryan.

My name's Bryan. I'm a concert promoter and my house has a natural gas, as well. And it has since I've been there, just a couple years.

So electricity and natural gas?

Yeah.

Great to have you here. Kelsi.

I'm Kelsi. I'm a media distributor for [INAUDIBLE] the organ symphony, children's theater, stuff like that. I hang the 11 by 17 posters in restaurants and whatnot. And my house has natural gas and - through Northwest Natural and also PGE. It's just kind of been the same with every rental I've had.

And for both you and Bryan, your natural gas is for what? Heating and water or what – how do you use natural gas?

Just heating the house.

Home heating?

Yeah.

I believe it's the same. Yes, home heating.

Great to have you here. Mary.

I'm Mary and my occupation is HR. I'm under the HR umbrella. My energy sources are Northwest Natural Gas as well, for my fireplace and my stove. And electricity is through – I think it's through Clark County. I live in - across the river.

And, that's been the same –?

Mm–hmm.

You've kept it and been consistent since you moved in?

Yes.

Well, nice to have you here. Stanley.

I am Stanley. I'm a product manager, I work on healthcare software, and I have had natural gas and electricity since I moved in.

And what do you use your natural gas – What is that for?

It's for the stove, heating, and I believe the water heat as well.

Nice to have you here. Gwen.

My name is Gwen and I'm retired. I've been retired, I think, seven or eight years. You lose track after the first year. And I have Northwest Natural Gas for heating and my stove is gas and electric, and then I have electric for my lighting.

Perfect.

It's been the same since I moved in.

Well, nice to have you here.

Thank you.

Jodi.

My name's Jodi and actually I'm self–employed. I have a floral, wedding and event business of my own.

[00:06:58]

Can you be sure to speak up so –

Sure.

– we can hear you? You're - I heard the self–employed, but then I couldn't –

Self–employed wedding and events floral. And our home is heated with electricity and Northwest Natural Gas. PGE, fireplace, stovetop, of course, and

then heating electric.

Great. Nice to have you here. Eric.

I'm Eric. I'm a – I work in nutrition services in a high school, which basically means our school district's lone lunch lady. And our house has – currently has a natural gas heater. We put it in about ten years ago. Prior to that we had – Basically, one of those giant oil tanks in the front yard. Which, it was – Yes. We replaced that about ten years ago and then we also – Primarily electric, but we actually go through Arcadia Power, which means that we basically use a solar and wind power, basically offset the electrical. But - so they kind of go through PG. It's a process thing.

And have you changed any of these sources since you moved in?

As I said, about ten years ago, yes. I changed the oil to natural gas. Well, actually, I guess we were going straight electric with PG and two years ago we went – Started going through Arcadia, so we get to use the solar and wind power.

We've got a great, dynamic group here today. That's awesome. We're going to start off with a little exercise that is basically called word association. This is where I'm going to go over to the chart. I'm going to have a word or a phrase and then I want you to just to kind of shout out whatever comes to mind when you see this word or phrase. The first is clean energy. What do we think of clean energy? What comes to mind?

Solar.

Solar?

Environment.

Environment.

Wind.

What else?

I consider gas clean.

Gas.

Natural gas.

Natural gas. What else?

Green.

Green.

Propane, since we're differentiating.

Important, survivability.

Important and –

Important and survivability.

Important and survivability?

Correct.

Sustainability.

That's – Yes.

That one, too.

Close enough.

Sorry, lost my – And then sustainability.

Maybe little to no negative effects?

Small footprint. Or small carbon footprint.

[00:10:05]

Small carbon footprint. Well, this is good. Let me – Let's go to the next one. Electricity.

Expensive.

I was going to [LAUGHTER] that, actually.

Expensive?

Yes.

Sometimes dirty.

Dirty?

With coal fired, anyway.

That's assuming it's generated by coal?

Yes.

What else?

Edison.

Edison. Anything else?

Pervasive. It's everywhere.

Pervasive. Anything else?

Indispensable, I would say. Look at my phone, to charge it.

Good list so far. Natural gas.

Cheap.

Cheap?

Cheaper.

Cheaper, yes.

Cheaper.

Yes, cheaper.

Cheaper than what?

Electricity.

Electricity.

What else?

Maybe clean burning.

Clean burning.

Efficient.

Efficient?

Yes.

What else?

Deceptively dangerous, actually. It is not as clean as it should be or could be, because of the way it's processed and gotten.

Dangerous in the processing part? Not in the using part?

To basically survivability. That's –

You're talking about the gathering of -

The gathering. Yes, the gathering of it from [CROSSTALK].

The processing of it.

Correct.

Fracking.

Most definitely.

Anything else? That's a good list. Awesome. I guess I want to start off by asking you a little bit more about when you're thinking about home energy sources, what are the factors – And, you may have touched on some of those that we just went through that exercise. What are some of the most important factors to consider when you're trying to think about what home energy sources you should use?

Availability.

What's that?

Availability.

And what do you mean by that? Can you elaborate?

I mean like whether or not there's a provider that services where I live.

Is that a question? When would there be a problem with availability?

[00:13:10]

I mean, like if I had to choose one natural gas provider over another, I really don't have a choice where I am. And then costs factor into it as well, as I go down that road.

You're talking about having multiple choices between utilities or whatever, but what about just choosing between different kinds of energy sources, like electricity versus solar, versus natural gas, versus – How do you make those kinds of decisions?

Payback. The length of time to pay for the upgrade. How long will it take to pay it for itself?

For the investment?

For the investment, yeah.

Just the cost to maintain it, the usage.

What are you thinking of when you think of cost to maintain?

Well, certain times like now, I feel like burning gas is cheaper than turning my electricity on when – in the Winter.

Just the operating cost, basically?

Yes.

And I was going to say options. I don't have the option to look into solar because of where I live and it's been so long since I moved in there, like 12 years, but I know that they – We couldn't have solar panels in the area.

And that's because why?

Probably maybe even design or the way that the houses look at it.

Are you in some kind of a housing –

In a subdivision.

Subdivision that has rules? And you're part of a – have an HOA or something that has rules?

I'm not in HOA, so maybe I better keep my mouth shut. But yeah, it's something like that.

But there's something in the neighborhood that prohibits you from doing solar?

I just think when I moved in that that was one of the things that they talked about. No solar panels.

Interesting.

What else?

The - I mean, carbon footprint. That's a huge thing. The – Keeping our planet available for our kids and grandkids and – I mean -

That plays into –

It plays a major role as well. The reason I started looking at solar and wind to try

to offset a bunch of the other stuff.

And then – how – was is the life expectancy of something that I might want to change? Will it be – I know, for example some solar panels, they have a life expectancy of 20, 25 years or something like that. And you're looking to have to reinvest. Some offerings have that kind of factor that comes into play.

How about – let's think a little bit about – specifically about heating your home. I'm curious about advantages of using natural gas for heating your home. What do you see as the potential advantages of natural gas for heating your home?

[00:16:25]

I think, just for me, it's the price and convenience versus using electrical.

How is it more convenient?

I mean, just for me, personally. I am renting out a home, so it's just there. [CROSSTALK].

Convenient. It's already there.

The hassle of doing anything different.

You don't want to make the change and it's also cheaper. What else? Any other advantages?

To piggyback on that, I have a similar situation. I'm renting my home and it turns out that I'm in the bathroom sort of where there isn't really a vent for this natural heating. So I've had to weigh the possibility of getting a space heater for the winter months and thinking about, "Is there a way to keep the – My room warm enough right now so that I can survive this winter in this rental?"

That's more of a – Is that a disadvantage that you're describing?

I'm not sure. I think it's more just a circumstance.

You just –

Is the thing. So I –

There's nothing about the - inherently about the energy source. It's just that your particular layout is a problem. Anybody else can think of any advantages of natural gas heating?

Well, the fact that it seems to just – It doesn't seem to need any maintenance that the system that I've had has probably been in the house 25 years and thing just keeps running. Very little to do to it and the gas just keeps flowing, easy peasy.

How about disadvantages? What are disadvantages of heating your home with gas?

It's not as clean as it should be. I mean, it's –

Not as clean as it should be, but what does that mean?

Well, I mean, it's not as clean as other sources. It's –

And what sources are you thinking of?

I'm thinking, again, like solar and wind power, and the other - I mean, if it was possible to do geothermal as a cleaner source, but that's not really an area where we can do that conveniently. I mean, there's a lot of downsides to natural gas and a lot of downsides that are kind of less off the table, generally speaking, in discussions. It's what I have. It's what I've had to use and I'm still looking for a better way.

Are we still talking about the source of it being what's primarily you're talking about or the burning of it?

Both.

Really there's no exhaust.

Like the smell, you mean or –

No. It is a cleaner energy source than, say, like coal, but not by much. And the way to actually get it is actually has detrimental or – Has detrimental [INAUDIBLE].

You see –

From what I've read and I've studied. I'm not an expert, so I don't know.

Just to be sure that I'm clear on what – Your perception is that it's cleaner than coal, but –

[00:19:27]

But not by much.

And not as clean or solar or wind?

Yes. They have their issues, also. [INAUDIBLE] set up for and things like that, but they're -

Anybody else? Any other disadvantages to gas for heating your home?

There's a possibility of a leak. You do -

That's what I was going to say.

Now, it's not real high pressure, but it's pressure. And if you do get a leak – Well, you're looking at [CROSSTALK].

It's going to be detrimental.

So kind of the danger?

The explosion on 23rd a few years ago. I worked two blocks from it and it just –

There was an explosion?

Yes.

Yes. They broke a line.

I was thinking along those same lines if there was a leak or a -

Danger.

Some type of – I don't know.

Well, how about let's talk about electricity. Let's talk about the advantages of electricity. What do you see as the advantages?

Depending on what it's sourced from, much better. If it's – if you're getting electricity, again, from wind or solar, good. If you're getting it from coal, not so good. I mean, it's -

How do you balance that all out? How do you figure that out, given that you can't really discern that when you turn on the light switch?

You - I mean, what I've been doing is I basically find companies that source it out through that and basically go through them. So I'm giving them money so that they're sourcing it out, hopefully, shipped in. So basically, they're shifting more toward those sources rather the coal source.

So in some cases, cleaner.

Yeah.

So that's one of the advantages. How about other advantages?

More popular, I guess.

More popular.

Convenient. Plug in and go. Are you talking about primarily for heating?

Yeah for heating.

Yeah.

Advantages for heating.

Yeah.

Convenient.

Multiple ways of applying it, whether it's a forced air thing or if it's an oil, plug-in heater radiant thing. You have multiple options for what is comfortable for you.

All right. Anything else? How about disadvantages? Electric disadvantages when it comes to heating your home.

Expensive.

Yes.

Expensive.

Often times slower to radiate through the house. Depending on the type you have, it can be very slow going.

Slow to get the heat dispersed?

Distributed. Yeah, dispersed.

OK.

Unless its fan forced.

And then I'm assuming I can take the flip side of what you said before, which is in some cases you are going to get it from a dirty source.

Exactly, yeah.

OK. Anything else in terms of disadvantages you can think of heating your home with electricity?

Power outage possibilities.

All right. So how about the concept of switching – for those of you who have electricity to heat your home today, would you consider switching to natural gas or not? Do any of you have electricity heating your home today? Is anybody having their home heated by electricity today?

No.

No?

We have electricity to run the furnace but I mean that's not [INAUDIBLE].

Well yes, so you do have an electric furnace, it sounds like.

Well, no, I have a gas. I have a natural gas furnace but I mean you still – it still runs off of power that's not natural gas it just [INAUDIBLE] plugs in.

All right. So you are all kind of on natural gas on heating right now?

Yeah.

Well I guess – I think the – I don't know. I don't think I am.

You think you've got electric heating?

Yeah.

Everything is electric, your furnace is electric?

Yeah.

[00:24:00]

So how about for you, would you ever consider switching from electric furnace to a natural gas furnace?

Potentially. I mean I think it would depend. I mean I guess we have a new bill so I am assuming most of the new bills are more – I'm trying to think if we've done this.

Efficient more for sure.

Yeah, more efficient. So yeah I think – I guess it would just depend on all of these factors that we brought up; cost and-.

What do you see as potentially barriers that might prevent you?

Well the biggest would be cost, I think.

The cost in terms of the monthly cost or cost in terms of replacing your furnace with a –

Both. First of all replacing and then to maintain, so monthly.

But didn't we just get through saying that we thought that electricity was more expensive than natural gas? So if you switch from electric to natural gas wouldn't the operating be cheaper?

It would, I would assume so.

So then the barrier of cost is?

Yes then I guess that would – yeah.

So the barrier more the upfront expenditure for the -?

I think so, yeah. Sorry, I'm just thinking – I am just –

A lot of processing that's going on right now. That's all right. That's great. Well let's switch gears and talk about cooking appliances. I want to do the same kind of exercise with cooking appliances. So let's talk about what the advantages of natural gas are for cooking appliances.

Fast.

Fast yeah. Definitely instant.

And why is that important?

The food just cooks more evenly.

And if you want to make s'mores inside. [LAUGHTER]

Yeah it's just much better.

The s'mores factor. He's underlining that.

[LAUGHTER]

It's definitely better. I didn't know – this is my first gas stove.

So fast and you feel like you get a more even distribution of heat as well?

Yeah.

What else? Any other benefits of gas cooking appliances?

I think it's again less costly on the fuel expense. And I think electricity for cooking I'm assuming I don't know for sure but that's my belief, is that electric elements are just going to cook you right out of your wallet.

So I've heard some arguments for performance and I've heard some arguments for cost. Anything else? OK. Disadvantages, any disadvantages of gas appliances?

[00:27:00]

My wife was – when we switched we actually did put in a gas line to the stove and put in a gas kitchen stove, and my wife was terrified.

So you did switch?

I did switch out something. I take it back, edit the film. [LAUGHTER] I'm a liar.

So you switched from an electric stove to a gas stove.

Yeah.

OK tell me about that process. Why did you do that?

Because of the convenience factor and –

Convenience in what sense?

Convenience of- you are able to cook right away, you don't have to wait for things to get up to temp. And I think that's primarily- the primary reason.

Again, just that performance, that fast.

Performance, yeah. And I wasn't thinking about the cost of- any savings, because that's I think negligible compared to heating your house.

So does your wife – I mean I don't know if you both cook, but who was the one who decided that you wanted to go to this gas stove?

I decided that she would be better off cooking with gas. [LAUGHTER] She was concerned about it, but we'd used it for a while in like a little travel trailer, and that kind of thing. So we saw the convenience and I assured her that it's you know-

Was she interested in the potential benefits of the performance?

Yeah, absolutely.

But was nervous about it.

She was nervous about –

What was she nervous of?

Potential explosion from the burner going out and the valve still being open. So that was her primary concern.

That's what I was worried about it before- when the house came with the gas. I used to use electric all the time. But once I started using it I wouldn't switch.

Because you've used gas and you wouldn't switch because?

Because of the way that food cooks and – it's just more convenient.

So you got over that nervousness.

Oh yeah.

What did it take to get over the – in both of your cases. What did it take to get over the nervousness about using gas?

I think for her was just my reassurance that we are not sloppy about turning things on and off. I think when she saw the way that you turn the knob and it's igniting instantly as you turn the knob. How do you miss that it's burning?

Actually some of the settings are super low. Like on ours, to warm, there's still a flame but you can't see it.

Really?

So we've forgotten to turn it off several times just like there's the knob- someone is in the kitchen like, "I feel heat," and you can see that the knob wasn't turned off but you can't see the flame.

[00:30:02]

There still is a flame, it's not just emitting gas. [CROSSTALK] But the nervousness about the gas and exploding isn't different than this, it's just you didn't know that the flame was on is what you're saying.

Right.

And I was worried about the smell that our house might smell like gas a little bit. I mean the house that we bought had the gas stove before and we didn't have one.

And did that turn out to be a concern?

Yeah I think I smelled it at first but maybe just because the house was brand new but –

So as you got used to as you started cooking you didn't seem to have a problem with it?

Yeah. No.

All right. Any other disadvantages – I guess we got onto this in terms of disadvantages. Any disadvantages?

Just simply catching something on fire very easily; your hair, your clothing.

More so than electric?

Electric you could get burned, but it's not going to necessarily catch on fire.

All right.

And for me, see disadvantages of furnace just replace the –

The same concerns about it.

Yeah. The fracking issue.

OK. All right well let's go back to – now let's talk about electric cooking appliances. What are the advantages of electric, cooking advantages?

Not going to burn anything down.

Sorry?

They are not going to burn anything down.

[CROSSTALK]

So less likely to burn things down.

The appliances are generally cheaper. And again if you are getting your energy from a clean source, it's better that way.

Yeah.

For me, like I have a roommate who is in charge of the gas bill and doesn't really pay all the time. So that can shut off, you can still cook.

Are you the one responsible for electric and he's responsible for gas?

Yes.

So if it were reversed you'd be telling me just the opposite?

Probably.

So there is nothing inherent [CROSSTALK]. OK I got you.

Any situation yes.

All right. OK. Any other advantages? So we've got clean, not as likely to burn things down, cheaper appliances overall. Anything else? How about disadvantages what are disadvantages of cooking appliances that are electric?

If the power goes out, you can't cook.

You never seem to have – we have power outages, but we rarely have "sorry your natural gas isn't coming through, it's been shut off". That's just – well I guess we don't pay.

But you don't have as much disruption – well I guess you are saying there is not as much disruption on the natural gas front as electric?

[00:33:02]

Yes.

So that's almost a –

That's a positive.

Yeah so it's a positive for natural gas, negative for electric. More susceptible.

And I think a negative with I think about the electric stoves that I have had most of my life, there is always an element going out or just not sitting right. I've never had one with a glass top or like that because we went to gas instead. But I don't know how those hold up if you were going to replace the glass stove and that sort of things. But it seems like in the past in my younger days.

So the coil [CROSSTALK].

The coil yeah. So that's always something going.

Maintenance.

Yeah. Replacing and all that stuff.

All right. So who here has electric appliances today? Anybody? All right.

Yeah I have a couple.

So would you folks ever consider switching to natural gas appliance? Well let's go with the – you say yes and I want to know why now.

[CROSSTALK] other people are saying about just cooking food more evenly but I'd switch – it would be something I would look for in a new place, but it

wouldn't be something that would be like a deal breaker where I'd go out of my way to try to get my landlord to switch it.

So you'd consider it just because of the performance kinds of things we were talking about?

Right.

OK. Anybody else that would consider it?

I'd have to know more about it like how does that work versus electric a bit.

But you currently have – I thought you said you already had natural gas.

I have natural gas stove top but not –

Not for the oven. You have a separate oven.

Yeah. I have a separate oven and then I have a secondary oven and microwave.

So if you were going to go to some sort of natural gas version of that, you'd want to know more about what?

How does that work, is it open flame when cooking like a stove is, is the heating element on top [INAUDIBLE]. I haven't heard that.

So is it more just – do you have certain concerns that you're worried about?

No, just is there going to be benefits to it like is it going to cook the food more evenly versus burning your pizza on top or bottom.

So what are the benefits really?

Yeah.

OK. All right, and then you said no.

No.

You wouldn't do that. Tell me why.

Because that's something I don't – natural gas isn't as good as it says it is in terms of the environment and I'm trying to be as cautious so I can't have any more of that because it's tough times and everything. And so at least with the electric appliances, I have more control over who is providing me that energy as opposed to natural gas I know it's coming from fracking and I can't – I still have the furnaces but I don't have the means to replace them this time.

[00:36:18]

Right.

So we've just got to be more and more cautious about what we are doing to the environment.

So curious; how many of you folks have electric water heaters? Anybody?

Yeah.

Just one? OK. And I'm guessing you are happy with electric for the same reasons?

As happy as I can be.

But again it's nothing you would be considering switching to natural gas or whatever?

Yeah, I wouldn't.

OK. And for the same reasons we've been talking about.

Yeah.

OK. I'm curious about is natural gas used in any other ways in your homes, whether its grills or fireplaces or other things.

Yeah.

What? What kinds of things?

Fireplace.

So fireplace. OK. What other ways is gas used in your home? Any other ways? Grills?

I have a line to outdoors to my grill outside.

OK. Anything else? And any particular reason? Did the fireplace come that way?

Yes.

And how about your outside line it was already -?

-Fireplace [INAUDIBLE].

It came that way, OK. All right, so what I want to do now is go through and get your sense of whether electricity or natural gas has an advantage. Which has the greatest advantage in some of these different elements. So reliable uninterrupted supply; electricity or natural gas which has the advantage, do you think?

Natural gas.

OK. And that's based on what, just your own experience where you've had electricity gone out?

For me yeah. Whether taking out tree lamps or power lines or freezing rain that's something.

But nobody has had any problems with their natural gas everything interrupted? OK. How about cost of appliances electric or natural gas, which has the advantage?

It seems like when I was pricing before the electric ones were the cheaper than the gas ones but I can't say I'm 100% on that one. Or at least that was what I was doing years ago.

[00:39:08]

I think electric would be cheaper. I feel like more people are moving towards gas, so the demand might be higher for those appliances.

Your sense is they are moving to gas because of – is it cheaper because the gas is cheaper or that the appliance itself is cheaper? Because there is the operating expense and then there is the –

No, the gas would be cheaper.

But the appliance itself, it sounds like a couple of you think maybe electric is cheaper.

Yeah.

How about the rest of you?

[INAUDIBLE].

I haven't been shopping in a while.

Not really sure?

Yeah. I would think the electric would be cheaper.

Monthly bills, what are cheaper or has the advantage; electric or natural gas?

We are talking about appliances specifically or are we talking about -?

Overall.

In terms of bills, gas is cheaper.

[CROSSTALK]. It's gone up some. It's kind of fluctuated a little bit in the last year or two.

[INAUDIBLE].

How about safe usage. Does one have an advantage over the other or are they the same or?

I think they are the same, myself.

I don't know what the disadvantages of electric for safety-wise is.

Appliances of wire codes that are frayed or winding up in the tub with a blow-dryer.

[CROSSTALK]

So any thoughts about safe usage, are they equally safe, one safer than the other? What are we thinking?

I think they both have their advantages and disadvantages.

Do you feel like one has an advantage over the other or no?

I think it's a wash.

It's a wash?

I think it's a wash too.

And then how about energy efficiency?

There is some high efficiency in electric appliances like the water heaters and things that are – and some of the instant on demand type of stuff. I think that's just come a long way with electric as far as improving efficiency over –

You're thinking specifically about water heaters?

Water heaters yeah. I don't know about space heat kind of things. I don't know.

Anybody else have any thoughts about efficiency whether there is a benefit of one over the other?

I have no idea on that one.

OK. So I'm curious given that you've all had some natural gas I'm wondering if the gas were to go away tomorrow. If you didn't have natural gas, how big of a deal would that be for you in terms of impacting your life, your day to day life? Would that be an issue?

A little colder [INAUDIBLE]

What would be the major impact if gas were to go away tomorrow?

My furnace wouldn't heat the air in the house.

Cooking for me.

Cooking would be a problem.

And you couldn't do your s'mores anymore.

Back to the toaster.

Your bill would be higher.

And my water heater. I wouldn't have hot water either so I'd have to be converting stuff.

So a big deal?

Yes.

Sure. [INAUDIBLE]

How about the lack of a redundant power supply? Would that be a factor? Would be thinking about that at all? I mean right now, most of you have electricity and gas, is it important that you have multiple sources of energy or does that not really matter to you?

It matters to me. It's nice to have options available.

Yes.

Yes. Like if I'm -

Not being locked in to juts electric or locked in to -

Why is important to have options available?

In case the other one goes down. In case we have that ice storm that takes down the power, it's nice to have - you know, I can still cook on my stove for example. I won't have to get the electric read out but I will have the - the valve is manual.

You can still cook?

I can still cook and maybe warm my wife toasty side, rotate her around a little bit [INAUDIBLE]

And if we just only had gas as an option, would our cost stay low knowing that we had have to it?

Because there would be no other option.

No competition.

So having some different options kind of keeps everybody honest? Is that what I'm hearing you say? So the competition - Let's switch gears and talk a little bit about - I mean we've touched on this but I want to go a little deeper now in terms of the environment and some of the environmental issues that all of these affect. What do you believe are the greatest contributors to climate change today when it comes to carbon emissions? What are the biggest contributors in your mind's eye?

Fossil fuels.

OK. Specifically coming from where? Where do you think where do the -

Well obviously [CROSSTALK] probably the dirtiest of all of them historically. Industrial.

[00:45:04]

[INAUDIBLE] manufacturing.

So fossil fuels specifically from autos, manufacturing.

Coal I'm sure factors in there big time historically, yes, around the world.

Any other thoughts about contributors, major contributors to climate change? Carbon?

Well methane.

Methane from the animals. Leaf.

Yes. Well I mean that's -

It's real.

And from the waste sites, the methane that's produced there and -

So methane from garbage, from dumps, and -

As the air heats up, the methane is basically trapped in the ice which is basically being released which speeds the - I mean the methane, the carbon, the - it's all that.

[INAUDIBLE] the moderation potentially but now not so much -

Right. How about what are the energy sources that you think are playing a positive role when it comes to climate change?

That be solar and wind. Aside from [INAUDIBLE] solar panels but I mean [INAUDIBLE] you have to get them somehow. So I mean there's an initial -

What is it about solar and wind that makes it feel like they're making a positive contribution?

Well they're there without actually destroying things.

They're not depleting resources that are - I mean the solar radiation is sustainable so far as the next couple of million years goes anyway.

So there's a sustainability aspect?

As well as with the wind, same kind of thing, the wind's going to be there either way.

Any other energy sources playing a positive role?

Wave. Wave energy generation is interesting.

Geothermal when you get it.

Geothermal. I love geothermal. Wave energy, they're designing power

generation from waves in the oceans and it's kind of an interesting thing. They're proven. They've got some working models of that stuff.

OK. Cool. I'm curious, where does natural gas fit in to all of this? Where does it fit in when it comes to the role it plays in climate change? Is it a positive or is it a negative role?

It's not positive.

I think the fracking, the thing just turn the whole perception upside down and for good reason in my opinion.

Is the negative, just to be clear, from your perspective, it's the fracking, it's the kind of - it's the actual getting the natural gas and what -

[00:48:07]

And what's the effects on the substrata I guess of the Earth and what it's doing to the -

Explain what fracking because I'm not familiar with how they actually process the gas.

The create explosions below the surface of the soil in certain areas that can release the natural gas where it's not freely coming up fast enough. It breaks up the rocks so that it releases the natural gas to be collected.

The biggest problem is not just there. It goes all over the place. The waterways -

It spreads out.

Winds up in the water sometimes.

Not sometimes, all the time.

Yeah. I didn't want to be - [CROSSTALK]

Freaking me out.

You should be.

So again, any other thoughts about this? So we've got the processing that is a concern at least for some folks. Is that a general concern or is that - not sure, not paid a lot of attention to it.

Not sure. Haven't paid enough attention or just don't know enough about the process to -

What about - I guess the other argument sometimes made is that, to your point about coal, coal is the source for a lot of years for various different - for electricity as well as, you know, other -

And oil.

Where does natural gas fit relative to that?

Step up.

Do you consider it a cleaner version, a cleaner resource than some of the other fossil fuels that are out there?

For me, the problems with coal has largely to do with the particulates that the emissions wind up in the air. Gas, natural gas, burns off very cleanly from what I - as far I know. That's my perception.

I'm not 100% on that. I've heard mixed things on that on how clean it is. I don't know in terms of the burning -

Relative to coal, I would say it's probably far less particulates than what coal puts out.

I think I'm hearing kind of a mixed message. So it might be a cleaner alternative certainly than some fuels like coal.

At least on the output after it's being burned for example but coal has to be more [INAUDIBLE] so I don't know what goes on there ecologically but the fracking that goes on with natural gas, that's really detrimental to -

Right. So I'm hearing the concerns about the processing of fracking.

But the exhaust I think brings that down a notch because my perception is anyway that it's cleaner burning.

[00:51:14]

And this is a complicated situation because were talking about different kinds of effects. In terms of the climate change aspect of it when we think about carbon emissions, where does natural gas fit relative to the - you've got coal, you've got solar, you've got natural gas, where does it all kind of fit?

Somewhere in the middle between those two.

So cleaner than coal.

Not as clean as solar.

Not as clean than solar? How do you feel about the idea of sort of natural gas being kind of a bridge or a pathway from say dirtier energies or dirty energy sources to a pathway to eventually wind and solar, other kinds of energy sources?

My opinion is, and this is just opinion obviously, I guess that's why we're here, is that the capacity for solar and wind generation is advancing so fast and is becoming so much more commonplace and within somewhat of a reach of the average guy if he really invest in it for his family, that I don't know that there needs to be much of a bridge. I don't know the gas provides a bridge when I think about the damage of fracking. I'd just soon make the jump direct.

And I'm not an expert at this either but let's just assume for a moment that there wasn't enough resources to provide all of the energy needs through wind and solar which I believe is actually the case today then the question would be, how do you make up the difference from people's energy needs and how do you - if wind and solar isn't there in sufficient quantity to be able to meet everybody's energy needs -

[INAUDIBLE]

Then how do you feel about sort of natural gas kind of filling the gap until the wind and energy needs are sufficient?

I have a hard time with that one because of what I believe about the fracking. I have a hard time ascribing to that. I also neglected to think of another option is the geothermal is so readily available. It's all around us and there are very low

tech ways of implementing some of that just by digging a hole and burying some pipe and a little bit of electricity to pump water, air.

[00:54:18]

Fair enough. Some of you may have heard that on - in some of the West Coast cities that they're either passing or considering bans on natural gas hook-ups, for new natural gas hook-ups in some of the new buildings that are being constructed. So it's done in a kind of a locality, sort of a more local government kind of area. I'm curious what you think about that? Do you think that that's -

Are they banning -

In new construction.

But in terms of their banning natural gas, what are they allowing to be OK in its place? Do you know that?

Yes, I was going to ask -

That's a huge thing. If they're banning just that, that's not great but if they're banning that and say like coal power so they're going alternate greener routes, I'm all for it.

When you say buildings, do you mean just like an office building or a home or a -

Talking more about like residential type of situations so that people like you in certain cities would - if you were going into a new building, what they're talking about or considering, saying can't do that. Maybe all electric to answer your question. Maybe an all-electric as opposed to a natural gas kind of thing. What do you think about that? Is that appropriate? Do you feel like it's appropriate for government to step in and do that? Do you feel like you -

I feel like if there's a need, a people's need or their wanting to have that as a choice but I don't like it should eventually be pushed into where you don't have a choice and -

So you feel like having a choice would be a positive thing?

Right.

Let me turn around for you and make it kind of maybe more real, like if they basically said no more natural gas in this community. You guys can't do natural gas anymore, how would you feel about your city government telling you that?

I generally don't like that. In view of what science seems to be saying about the tipping point that we may be over in our environment and that climate change may be at that point, we're at the brink, I don't know that I object as much to government saying please, somebody's got to help us get past - get pulled back from that tipping point. So I've got real strong mixed feelings on that. I don't have an absolute, they better not restrict my choice.

Right.

I can't say -

It sounds like one of the issues that you bring up Eric is you'd want to have some sense that they weren't replacing it with something that was -

[00:57:24]

Correct.

As detrimental whatever which - and I guess that would depend on the community.

Right.

[INAUDIBLE]

And cost is a factor too. So if you [INAUDIBLE] gas which is the cheaper alternative and you're forced into something that's super expensive then [INAUDIBLE] be even more expensive than it is.

And then you're [INAUDIBLE] people out of the neighborhood also.

Yes.

Like is there any subsidy, subsidization of this, if you're going to remove any of the choice -

[INAUDIBLE]

Right. And then you're talking about eliminating competition from providers of different -

So there's a real -

[CROSSTALK] competition of providers right now. I mean you have one or -

Yes. There's not very many -

Usually have one choice depending on what you're doing.

I'm hearing a real tension. On the one hand there's a real concern about the environment wanting to do right by that and yet at the same time, some practical challenges with cost and with -

Choice.

Choice and the like. Fair enough. What I'd like to do now is discuss something that's called renewable natural gas. Has anyone ever heard of renewable natural gas?

No. [CROSSTALK]

Well I'm going to do is pass these things along and if you take one and pass it along, that would be great. Actually, if there are any extras, I haven't counted these out so if there are any extras, send them back my way. And what we'll do -

[INAUDIBLE]

Yes.

[CROSSTALK] **Any extras or what, you managed to do this on the dot, man, that's great. I'm going to read this out loud while we read it together, OK? Renewable natural gas. Renewable natural gas is produced from local organic materials like food, agriculture and forestry waste, waste water, or landfills. As these materials decompose, they produce methane. That methane can be captured, conditioned to pipeline quality and delivered in the existing**

pipeline system to vehicles and homes and businesses where it can be used in existing appliances and equipment. This provides a renewable energy option for the natural gas system in the same way that wind and solar are used to generate renewable electricity. In closing the loop on what would otherwise be wasted gas, renewable natural gas up to an 80% carbon reduction benefit. And so you can see here -

Move entirely away from fracking and do this, that would be incredible.

Yes.

So, let's talk about that. What are your impressions? What do you think about this concept?

Absolutely fantastic because you get rid of - I mean we have so much waste that's basically killing us. I mean we could turn it into something useful, that would help us and stop other things that are killing us. I'm all for that.

[01:00:29]

How about the rest of you? What do you think?

I love it.

Yes.

Yes.

Yes? Why do you love it?

Renewable and eliminating the fracking from the equation if that's, you know, I would imagine that it might become close to eliminating the need for fracking if it were adopted.

It should. We have enough stuff.

We do.

Any other thoughts about it?

Just the fact of waste. At some point, where is waste going to go especially if we

keep growing? It makes sense to me.

So being able to do kind of do something with all this waste.

[INAUDIBLE]

Any negatives that you can think of or no?

Not based on this little bit right here, no.

But nothing immediately jumps out at you where you're kind of saying, I can't see the benefit?

I can't see myself processing that. [INAUDIBLE] That would be a negative.

What was that? You can't see yourself [CROSSTALK] **I got you. How does it affect your perception of natural gas when you think about natural gas in this sense?**

That boost my opinion of it much higher because this layout here is not entirely environmentally destructive. This here, if this is a feasible and it can be done, that is something that is cleaner, beneficial -

Close to a home run.

Yes.

Well it definitely gives natural gas - when you think of natural, this is definitely - agricultural waste, animal waste, that's natural.

And all that methane is just leaking everywhere anyway so you take it and use it.

Put it somewhere.

Yes, put it somewhere.

How would you feel about a utility that was offering renewable natural gas? What would be your impressions?

I would seriously look into it.

What would your perception be of a utility that was pursuing that? What would be your characterization, or your impression, of how they are as an organization?

Responsible. I see them as being responsible. Obviously, they would be needing to assess the cost and making that something that wouldn't be a huge sticker shock to the average person. It's hard to know what the cost for doing this is.

[01:03:31]

That's what I was going to say just to piggyback. I probably wouldn't jump ship right away. I would want to see - I don't know how long six months, a year, as far as what the cost would be.

It should be free because we're taking the waste and doing something good with it.

We are, but, I mean, there's always [CROSSTALK]

That would be nice if [CROSSTALK]

There's some cost for them to do all this.

Somebody has got to be doing it.

I would probably do some research and then also [CROSSTALK]

But again, I guess my question really is, how would you perceive a utility that was offering natural gas, the conventional natural gas, versus a utility that was offering this renewable natural gas? How would you perceive them differently?

Superior versus inferior.

Yes, like you said, responsible, doing the right thing. They're trying to [CROSSTALK]

Somebody who doesn't want to kill our children.

Trying to [CROSSTALK]

[INAUDIBLE]

Do things, I don't know, the natural way, or at least, provide a service that is giving us a better option, I guess. I don't know. [CROSSTALK] I don't even know if natural is the right word.

I probably would reserve judgment until they were actually delivering other than just pursuing. [CROSSTALK]

Pursuing is a step in the right direction.

Sure, but what does that mean though.

Talking to people that actually - Once it is up and going that have actually used some services from the company and have seen the results, and lower cost, or whatever.

Because if it's going to be pursuing this 20 years from now, you're not going to make a difference.

I'm sure if you caught this, but basically, what they're saying is, that they would be able to deliver it to you in the same sort of way that you're getting your natural gas today. Does that make a difference? Does that [CROSSTALK]

Absolutely.

Yes.

It's appealing.

Is that appealing?

If they change the cost and change [CROSSTALK]

It's an option.

Changing something also.

Basically, if you're already getting natural gas, **you could still get natural gas delivered in the same way only a different source.**

It would be cleaner, and natural. It would be a cleaner, natural source.

It would be a good option.

That's a positive?

Yes.

Something that should be emphasized [CROSSTALK]

Absolutely.

Definitely.

I would applaud a company that's trying. When they implement it, then it's big cheers.

I want to throw another concept here by you.

Do you know anything? Are you just a neutral [CROSSTALK]

I'm a neutral guy, remember. I'm the guy. I just told you I was a neutral guy [CROSSTALK] **I do like to think I know something, but I don't know if I know what you want to know. This next one is called renewable hydrogen, or power-to-gas. Let's read this together. "Power-to-gas is a process that captures surplus wind and solar energy and converts it to renewable natural gas, or hydrogen, through electrolysis. This renewable energy can be stored and then blended into our pipeline system till one day serve homes, businesses, and vehicles." What are your thoughts about that? It's basically taking wind and solar energy. Then applying it and converting it into converting** [CROSSTALK]

[01:07:03]

It depends on how the conversion is done. If it's done through huge machines that are [INAUDIBLE] up to do it. Then it's dicey. I'm not sure how this works. The electrolysis, that's interesting.

They're basically saying is - What they're saying is, they're using this energy that's coming from wind and solar. Then it's through electrolysis splitting the water molecules to produce hydrogen.

It's another home run. It's another absolute home run because electrolysis is basically splitting water into hydrogen and oxygen. It's separating it. It's strictly done with electricity. Then I don't know the process of converting the hydrogen into a natural gas.

Apparently it mixes with carbon, which then that concerns me a bit there. Where is that carbon coming from? [CROSSTALK]

Hydrogen and carbon combined through [CROSSTALK]

You see a nice big factory there with hydrogen and carbon [INAUDIBLE] That's where it gets a little [CROSSTALK]

Tell me more about what you're [CROSSTALK]

I don't know. That's the thing.

Even though the original source is solar and wind, there's some concern that down the line [CROSSTALK]

It's what you're doing with it to - That's where I don't - Again, I'd have to look, and research, and know what this means. Where like the renewable natural gas makes more sense because they already have methane release. It's just basically channeling the methane. It's already there. This is taking something, combining it, with something else, and readjusting it with - But how was that - How was that implementation? What implementation? What are the pieces going there and how clean is that? The pieces that are actually making this, which I don't know.

Other thoughts? Thoughts that are negative?

I'm also curious because earlier you had that wind and solar energy they were a little bit behind, and we're waiting for them to be extended to everyone. That's why natural gas certainly has this bridge. If we also diverting wind and solar energy to try to make a cleaner, natural gas, then are we still waiting for that equation.

Part of that equation is a lot of times you have so much solar that it's higher than the demand that they can take it right out. It's either finding a way to store it by using batteries, or some other. There's some really cool things that are being done to store the energy to use it later, like after the sun goes down. This sounds like

one way of taking it, some of that, and applying it to the natural gas that's doing it. What the carbon is doing is a clean deal, then it's another whole other [INAUDIBLE]

Any other thoughts on this one? How does this affect your perceptions of natural gas if this were available?

[01:10:05]

Versatile. Versatile.

I guess what I'm asking is, would you feel this is a step up from where you are today with natural gas? Would it be the same? How would you perceive this type of product versus conventional natural gas?

I think it would be a step up, but again, it's an option that I think we would all consider.

It sounds like there's a lot of - There's interest, but there's some degree of uncertainty. You want to know a little bit more about what's behind it.

Yes, like he said, you want to know how it's being processed, and what's actually happening.

If the process is going to worse in processing it then what we already have, or will it be better in the process.

The trees are better. A little bit, this much. Yes, OK.

Maybe this next question will be hard to answer given what you just said. How would your perception of a utility offering this product be compared to a standard - Utilities offering standard conventional natural gas?

Tell us how it's being implemented. Where the carbon is coming from, or how it's affecting the - Is there a net benefit, or is it just a slight benefit? With that information, education being provided, it could be a great deal. I'd feel great about a company doing it if they've got these answers for me.

What about the rest of you? Do you feel the same way?

Yes.

If it was a little clearer about what was really going on?

It really comes down to positioning. Where the renewable natural gas, the first one, this is reusing all of these waste products that we have that are just leaking, and we are wasting, and doing something with them. The renewable hydrogen, power-to-gas, we are taking these very clean energy sources, and then doing some process to them to manipulate to them to turn them into another power source. I don't know that it's - I don't know enough about this process to combine through methanation in order to make a judgement call. This first one is going to be wasting into converting into something that we can use. This other one is taking a very clean source of energy that we have and doing something to it.

There's questions about what's really going on with converting this very clean [CROSSTALK] **Now that we've talked about a couple of different new concepts here. Does that affect your thoughts about any of gas ban ideas that we were talking about before? If utilities were offering these as options, would that change your opinion about whether localities should be** [CROSSTALK]

[01:13:12]

It would be standing a potential better way of using it.

In my opinion, you're on a short leash. I'm not going to say don't have our government step-in just because there might be something down the road. I don't know. It seems to me in our society we've seen a lot of empty promises in the past. I don't want to stop one solution [CROSSTALK]

If you can see a company that is totally going with this renewable natural gas route, and completely banning their use of fracking. Yes, no, they should be banned from providing that. If they're still fracking, I can still see the point because how do you know how much is coming from which. One needs to be stopped entirely.

Let me more specific in terms of the question to. If these concepts were available, would you want localities to have the ability to ban those particular capabilities, or would you [CROSSTALK]

I'm OK with the banning until these are the full accessible [CROSSTALK]

A reality?

Yes.

But if these were a reality, then [CROSSTALK]

Again, I'd be [CROSSTALK] banning this, especially a renewable, would be ridiculous. Banning what we have now, I'm OK with.

What I'd like you to do now is, I'm going to send you one more handout around the horn. There are no pictures. No pictures on this one.

Do we get to keep these?

No. I'm going to read these things out loud with you. Then I'm going to step in the back room and see if they have any questions for you while we're looking at it. What I'd like you to do is, we're going to read all of these. Then I'd like you to take a few minutes, while I'm in the back room, just to rate them as to how compelling you feel each message is on a ten point scale. Ten is extremely compelling. One is not at all compelling. Then you can rate anywhere in-between. Starting off, first one, "Natural gas is a vital part of a reliable energy strategy because alternative energy sources like wind, solar, and hydro-power are not able to meet all of the State's energy needs." Second statement, "All forms of cleaner energy, hydro, wind, solar, and renewable natural gas, are needed in a balanced low-carbon future. Natural gas bans will allow utilities to continue using gas to generate electricity, but it will prevent [INAUDIBLE] **and businesses from choosing the energy source that best meets their needs. The existing natural gas network can be used to deliver renewable natural gas and dramatically reduce greenhouse gas emissions as a result. Natural gas is a uniquely attractive energy resource because of it's affordability, reliability in cooking and heating performance." Take a moment and rate those, and I'll be back in a jiffy.**

[01:17:01]

[PAUSE]

[INAUDIBLE] in my gas furnace.

Do you have to switch back over? Do you have to switch back over?

No, I still have a gas furnace..

One of the coolest things I ever saw with regard to using solar power. They used it- They had these two lakes, and they were manmade lakes. One is at a higher elevation than the other. All day long, they used solar power to spin a pump that would pump the water uphill into the upper lake. Then, at night, they would have the water come through and just spin the turbine, and generate electricity at night, so they had power at night time from the access from during the day.

Cool. Let us see what we've got here. Let's go down the list. Everybody has done their thing, I would assume. Let's start off, and what I want to do is do a quick poll, and find out from people. How many people gave it - Let's just go down one at a time. The first statement P, how many gave it between a nine or a ten? Anybody? One. No, two. Don't be shy. Raise those hands so I can see. Two. How about anywhere between a six and an eight? How many? One, two, three. Then, the rest of you came in at something that was five, or lower? That was three of you, correct? If I did my math right. How about Q? How many gave it between a nine or a ten? One, two, three. How about six to eight? One, two, three. Less than five? That was one, two. About S? Anybody give it between a nine and a ten? One. How about a six to an eight? One, two, three. Then less than five? One, two, three, four. Letter T, nine to ten? One, two, three, four, five. Six to eight? One, two. Then lower than five, or five or lower? One. Lastly, U, "Natural gas has uniquely attracted." Anyone give it a nine or ten? Two of you. How about six to eight? One, two, three. Less than five? One, two, three. Let's now take you - I'd like you now choose your - Circle the letter of the statement that you feel is the most compelling overall. Has everybody done it? Everybody all good? Have you all chosen? I'm just going to do a quick poll. How many gave P their most favorite? How about Q? Two, three. How about S, most compelling? How about T? One, two, three. And you, two of you. Quickly, let's talk about, those of you who chose Q, why did you feel like Q was the most compelling?

[01:23:24]

It may have been just it's the cleaner energy source that I know about, or at least to my knowledge, the hydro, wind, and solar. Then it's renewable. It sounds like a good idea. At least what I know about it, renewable natural gas.

What was it about that message though - Obviously, it sounds like you liked the renewable aspect of it, but what in particular stood out for you about that statement?

Just that the whole group, all the sources that they're naming, all seem like positive steps.

How about, Kelsey, were you one who chose this one, or no? I'm sorry. Who else chose this one?

In case you lose one of, or two of them, then you have something to fall back on. You have an option.

That's why I chose it too.

How about P? That was another one that got a fair number of votes. What was the reason for choosing that one as the most compelling?

It's the whole recycle-ability of it. If the existing gas networks were to use this renewable natural gas, which is also effectively the recycled stuff and will drastically reduce greenhouse gas admission. Which is the main core that I like but it's not a whole aspect of taking the stuff that we already have that's destroying us and using that to benefit us, and save us.

I think there's a piece of it to that speaks to potential feasibility, and thus actually being able to achieve it. For me, there also sounds like, within that, if we're going to use all existing networks, and all existing materials. Then it doesn't sound like the type of thing that I'm going to have to incur a bunch of upfront costs, as well as ongoing costs in order to actually get it up and running, and then maintain it.

How about the last one, U? A couple of you liked that one. What did you like about that one?

It wasn't necessarily that I liked it the best, but I realize that I had rated it the highest on that scale before deciding that it was the one that I sat with. It's just something that generally we can do a consensus on. That it was an attractive because of all these qualities, at least right now. As an idea, T is something that I would stand behind. As a statement, U is a strong reason why we're sticking with this source.

It just works for me now.

Versus future kind of thing.

I did have a question from the back that I wanted to get your feelings on. It

turns out that electricity, a lot of the electric utilities today. One of the things that they're doing is they're basically moving away from coal to natural gas.

[01:26:25]

Are they? I didn't know that.

Does that change your impressions of electricity and natural gas knowing that?

I still have the options for solar and wind with it at this point? Hopefully the other aspects that we know of these actually coming through. At this point, it stays the same for me.

How about the rest of you? Knowing that a lot of the electricity that you're getting is actually natural gas powered.

I don't know if that's true in this area because of the Bonneville Hydro Power. I assume that we are - The last I heard, within the last couple of years, is that we're still selling some to California from excess that we have. Assuming that's true in this area that may not flow nationwide because who has hydro power like we do here. There aren't that many places. It does change the equation a little bit maybe nationwide when you're thinking about coal generation with all the pollutants that come from that, and the damage to all the - The other consequences of digging for coal. It's a cleaner alternative to coal, but then, what Eric was saying. They're still better alternatives that we'd like to see. How it comes into play with the point that's brought in here about having neighborhoods, or towns, banning locals from using it. Whereas, they're electricity is being generated from it. That's a tough call. That's getting into the weeds a little bit, that we need to get into. We need to get into those weeds, but it's an important message.

Where are you coming out on that then?

I say it's a step up from coal, but again, of which aspect. The aspect of our electricity coming from [CROSSTALK] from having it from natural gas directly in our homes.

Another way of looking at this is knowing now that you know. At least, I can't speak for [INAUDIBLE] **Knowing that over the nation, that a big chunk of the electric utilities are now moving to natural gas. Does that A, make you feel any better about natural gas, or B, does it make you feel any less good about**

electric, or does that not affect anything at all?

If we've established that natural gas is less expensive than electric, then why is electric so expensive?

If it's being generated from natural gas?

Obviously, there's some processing going on to turn it into electricity. Then distributing it, and you've got a whole network, et cetera. I don't see that it's moved the needle a whole lot in terms of knowing that. It doesn't change your opinions drastically, one way or the other.

[01:29:35]

Not dramatically, but it does level, bring things down to a similar level. It brings things closer.

Just let me pop in the back one last time, and then we'll let you be on your way. Let me see if we've got one, or any final questions.

That question was a little bit - Maybe it was just my answer wandering all over the place. It's like there's multiple issues in that question, I thought.

There's a positive and a negative in that.

If utilities are allowed to burn with natural gas, then why are they making them [CROSSTALK]

They just beat each other out. [CROSSTALK]

That's why I say it didn't really change my opinion at all. I pretty much stayed with one there.

We're starting the fracking thing. We're fracturing the rock and it's down a couple of miles to release the natural gas. There's been 60 Minutes and 20/20 episodes for the people politically to open their files [CROSSTALK]

Gang, you've been great. Thank you so much. That will do it. If you would be so kind to pass in all your materials.

Do want these and all the pictures?

Do you want these notepads and [CROSSTALK]

Notepads can stay. Then if could take your name tags with you though since the next people will not likely have your name. [CROSSTALK] **Thank you all. It was great having this session with you.**

Yes, thank you.

Appreciate the discussion. [CROSSTALK]

Project Name: **5234-E190117 - NW Natural Safety Communications**
Date: **10/28/2019**
Time: **8:00 PM**
Segment: **Day 1 Group 2**

Welcome. Howdy. How's everybody doing?

OK, how are you?

All right.

So far so good.

So far so good? Excellent. Come on in, make yourself comfortable. How's everybody doing tonight?

Good.

Pretty good.

Found your way here OK? Didn't freeze on the way? It's getting chilly outside.

Misread the confirmation letter, and was here at 8:00 this morning.

Oh, well -

I was a little early.

You got here on time. Well, welcome, everybody. If you could do me a favor and make sure your name tags are facing me, that would be awesome. My name is Rob. I'm going to be the moderator here today, as you probably figured out. And we are going to be talking about the wonderful world of energy and energy sources. Now having said that, I want you to know I'm not actually an employee of the sponsor of this organization - of this particular study. I am an employee of an independent market research firm. And I go to the trouble of telling you that just so that you know that I have no stake in the outcome of this research. So if there's something we talk about here today that you really love, that's great. If there's something that we talk about that you really hate, that's great, too. I'm just really looking for the benefit of your honest, candid opinions. Now along those lines, this is a group. So I am hoping that everyone will chime in - no silent partners here tonight. We have

to - everybody has to earn their keep and weigh in on the various different topics. That said, I want you to know I don't necessarily - I'm not trying to strive for consensus on all of the different topics. You may all agree on certain things, you may disagree on other things. It's particularly important for you to speak up if you hear a bunch of people going down one path and you're thinking, boy, I couldn't disagree more. That just doesn't - that seems crazy to me. Please don't suffer in silence. I really want you to be able to speak out in those circumstances because if you feel that way, more than likely there are other people in the population that feel that way as well. A couple of other things - because we're a group, sometimes we get going and things get exciting, and people start having side conversations. That's a no-no - I can't allow you to do that only because everything that you say is really important to me, and I want to be sure that I capture everything that's being said. So if you're having side conversations, I can't listen to everything all simultaneously. I'm not that talented. So we'll do one conversation at a time. A couple of miscellaneous things. I want to let you know that we are going to be recording this session. I also have colleagues in the back listening, taking notes, that kind of thing. But I want to assure you that we're going to be keeping all this information confidential. It's all being used for internal analysis purposes only, so you don't have to worry about this showing up in the public domain. And you thought this was your breakout moment on YouTube, but unfortunately that's not going to happen tonight. So that's kind of all the preliminaries. Now what we'd like to do is just have a chance to get to know each one of you just a little bit better. And so what I'd love to do is kind of go round-robin. And if you wouldn't mind, we've got a little cheat sheet on the back here that's - love to have you give us your name, your occupation or whatever it is that you do when you're not coming to focus groups like this one today. And then I'd like you to tell me what kind of energy sources you have where you live today, and whether that's different than when you first moved in to your place - whether you've changed anything from gas to electric or electric to gas, or you name it - oil to - or burning bush to something else - whatever it might be. So why don't we start with you, Echo.

[00:04:14]

Perfect. My name is Echo. I am an administrator for a [INAUDIBLE] company. And I have an electric house.

Be sure - everyone be sure to project today here as well so they can be sure to hear you. So you have an all-electric house?

Yes.

And it's always been that way?

Mm-hmm.

Well, very nice to have you here.

Thank you.

Doria.

I'm Doria. I'm a full-time mother of a toddler. We have electricity, or electric, and a fireplace. [CROSSTALK]

And so you stay at home?

Yeah.

And it's always been all electric.

Mm-hmm.

Great. Well, nice to have you here. David?

Let's see, I teach at a local university and -

What do you teach?

I teach anthropology.

Great.

As an adjunct. And I also teach English online as a side gig.

Nice.

I'm living in the house for about two years - electric furnace. And that's - [CROSSTALK]

All electric?

Yeah.

And I assume appliances and all when we're talking about this - all of your appliances are electric as well.

Yeah.

All your stoves and everything. Great, David. Well, great to have you here. Tamara.

My name is Tamara. I'm an in-home care aide for my mother. And at home, my house is all electric, but at my parents' house, which is where I am 90% of my day, they use electric, but they also have solar panels on the roof, so -

Great. Nice to have you here. Kelly?

I have one, two, three - three businesses. I do two more, so that's five. Three of them are from home, so anyway - florist and handyman, carpentry work, Air B&B - anyway, wood stove insert is what I do a lot of heating in the winter with, and then I have electricity, and that's it.

So wood stove and then electricity. And it's always been that way?

It does have the pipings to do gas, we just have never done it. We've lived there 20 years, so -

But you've never used gas yourself?

No, not at this house.

Well, nice to have you here. Wayne?

I'm retired, kite flyer -

Kite flyer?

Kite flyer - that's what my - I had a stroke several years ago, and that is one of the things that motivated me to get off my couch and interact with other people.

Wow.

And therapy for my body. I had lost my balance, had problems with my vision. So kite flying kind of coordinated everything back together for me.

Nice.

I've lived here in Oregon for 36 years. We've lived in the same home for 32. It's all electric - all appliances, everything. The gas company came after I had lived in the home for two years, and I said, what am I supposed to do with these - all these brand new appliances that are only two years old? You may leave now. So they did.

[00:07:30]

You had all electric appliances?

All electric. All electric.

So you've basically been all electric the whole time.

32 years.

Great. Well, nice to have you here as well. Kinley?

Yeah, I'm Kinley. I'm a PhD student and teaching assistant. And I have all electric in an apartment. It's always been all electric.

What are you studying?

Where or what?

What are you studying?

Philosophy.

Philosophy. Nice. Well, nice to have you here. [INAUDIBLE] ?

My name is Liam. I do laboratory logistics at Providence Health Services. My house is all electric. I just got it a month ago, so I plan on getting solar panels and a battery pack for it at some point. But -

But basically it's all electric at this point.

Yeah, all electric, yeah.

Great. Well, we've got a great group here today. So thanks all for being here once again. Well, what we're going do first is a little exercise called Word Association. And what I'm going to do is come out over here, show you a word or phrase, and then what I'd like you to do is just shout out whatever comes to mind. So let's start with clean energy. What do you think of when you think of clean energy?

Windmills.

Windmills?

Solar.

Solar. LFTR.

Let's see, solar - sorry, what was the last one?

LFTR - liquid fuel thorium reactor - LFTR.

LFTR?

L-F-T-R.

L-F-T-R.

Renewable.

Renewable.

Investment.

Gosh, it's not clean anymore though.

Nuclear is very dirty.

Was there something after investment?

I was thinking about nuclear, but it's -

No, it's really - [CROSSTALK]

It's waste of it - that is so much.

So nuclear.

It's clean energy, but it's got terrible side-effects.

Water.

Hydro.

Water. [CROSSTALK] **What else?**

Geothermal.

That was a good list. Let's keep going. Electricity - what comes to mind when you think electricity?

Appliances.

Outlets.

Appliances.

Power lines.

Outlets. [CROSSTALK] **Sorry, power lines? Is that what I heard?**

Yeah. [CROSSTALK]

Cars made of [INAUDIBLE].

Electric cars? So EV.

[00:10:33]

But as a side note, the lack of infrastructure to keep those things powered up.

Lack of infrastructure.

That's quickly expanding.

Dams.

Yes, it is, but still. And range is another issue -

That's also expanding.

Again -

Dams? Meaning for hydro?

No, I was just angry at something - sorry.

Are you talking about hydro - [CROSSTALK]

Yeah, dams.

Hydro. Anything else?

Lightning, getting shocked.

Lightning.

Coal, gas -

Meaning things that create sources? So coal -

Coal fire plants, gas plants -

[INAUDIBLE] plants.

Cool. So let's keep going. Natural gas.

Rotten eggs.

Rotten eggs? Meaning smell, I take it?

Yeah.

Rotten eggs.

Good stoves to cook on.

Better than coal.

So better than coal, but I also wanted to capture - the other one was good to cook on?

Yeah.

Good to cook with.

Immediately came to mind - the flames that you cook with.

Anything else?

Gas.

Furnace.

Big canisters.

Big canisters. What are you thinking of when you're thinking about canisters?

Well, I lived in Thailand for a while, and we had to replace that - with a - big canister would come every - when you run out, you have to order a new -

To heat something?

No, for cooking.

Oh, for cooking.

Repeat - what was your original question is as to needing answers for our own [INAUDIBLE] ?

The point is what comes to mind when we - when you think of - what comes to mind.

Just what comes to - OK. Propane?

Just what do you associate with natural gas.

Propane.

Good or bad.

Propane.

Propane.

Explosions - like the neighbor's house.

Explosions.

Well, yeah, you get a good earthquake and the guy next door might blow. He's got gas.

Is that something that you've -

Concerned about.

Is it something that you've actually seen happen or is it just a worry?

It's a concern.

Because back east, there's that whole freaking town where the land got over pressurized and that maybe caught fire.

[00:13:38]

So there's this - there could be an element of danger in terms - on the [INAUDIBLE] **in certain circumstances. Cool, well, let's keep on talking here. A couple of - and touch on some of the stuff that maybe we've already touched on a little bit through some of those associations. I guess I'm wondering when you're thinking about what kind of energy source you want to have for your home - and right now most of you, or all of you, I guess, really have electricity as your energy source - what are the factors that you - the important factors that you consider in choosing electricity as the way to go?**

Cost.

I second that.

Impact of the [INAUDIBLE].

So cost - before I let you go, what's the thinking in terms of cost? Are you feeling like electric is -

Long-term, what's going to be better for my pockets, for sure.

It's going to be less expensive.

And it can transition to solar and have my own backup, whereas with natural gas, if there's - something goes wrong, the gas lines get cut - oh, look, I have no heat, I have no stove, I - [CROSSTALK]

Let me understand something though. I guess the question - when you're talking about wanting a backup, everybody here has just electric right now. So you don't really have a backup today.

No, not today, but I plan on getting solar panels and one of those - like the Tesla battery pack things or maybe not - it doesn't have to be Tesla, but some - one of those [INAUDIBLE] so I can basically charge it up. And if there's a power outage or whatnot, I can run off the batteries to -

So are you saying that maybe a factor is reliability or is a factor having redundancy, or factor having - [CROSSTALK]

With electric, I have the - I don't currently have a way to go off-grid, but I can get that capability. With natural gas, I can't go off-grid at any point in time.

So flexibility?

Yeah.

If I was able to pick and choose the type of energy source I had, I would definitely pick something that had the least environmental impact.

Is your sense that electricity is that today?

I mean, compared to other energy sources, there's energy sources that use less

environmental impact. But I don't get - I don't have the option to choose right now, so it's not something I researched and looked into. But if I were to do that, one of the things that would be important to me is environmental impact.

[00:16:40]

So if someone could make a compelling case for one of these energy sources that was - one was more environmentally sensitive than another, then that would be something that would be compelling for you?

Mm-hmm.

I would probably prefer gas to electricity. Electricity - they charge you way too much for. You're actually getting - you look at your bills, two-thirds of it's not even really correlating to your house. They just - that's the infrastructure you're paying for.

So if you feel that way, why is it that you have an electric house as opposed to gas?

Affordability - changing it over - to change it over. I personally don't have even duct work in my house. My house is a very old house and it's - it came with ceiling heat, which is insane. California guy built it, so I don't have any duct work. So to put that all in the house would be very costly for me.

So basically even though you see some benefit of gas, all the sort of up-front investment is too much.

I had been considering - I have a flat cooktop that I need to change out. and I'm actually considering going towards the route of how other countries do it, which is the big propane tank that you refill outside the home, and pipe that into that, and have a gas burner cooktop only. There's a lot of places - India, and all the different countries that do that.

I'm looking at getting a - when I replace mine, getting an induction cooktop because it gives you the ability to quickly adjust how much you have with gas. You've got a lot more - [CROSSTALK]

Is this like the glass - you're talking like those glass tops?

The induction ones are basically where - by [INAUDIBLE], you need to use

specific cookware with it. It heats up the cookware without heating up the actual element. So you don't have to worry about burning yourself and -

Cost - [CROSSTALK]

If you leave it on - if you take out the - take the pan away, there's no current flowing. So it -

Right.

As an ex-cook, gas is an awesome thing to cook with. You can regulate it. Electricity's always got that sine wave going on. And so you've always got a hot and a cold, and a hot and a cold, and it goes up and down and around. Gas is just - once you set a temperature and find what you like, boom, it's right there and it's not going anywhere.

Well, let's get - we'll come to that in a second. I want to maybe kill this part a little bit in terms of different elements. So when it comes to heating your home, what do you see as sort of, if any, advantages of going with natural gas?

Natural gas is cheaper than an electric furnace, but I believe a heat pump is cheaper still, if -

[00:19:44]

So the furnace itself is cheaper?

So an electric furnace is expensive to run. A gas furnace is cheaper, and a heat pump is cheapest, is where I understand it.

So one benefit - it's a mix, I understand, but one benefit of the home heating with natural gas is the actual furnace itself could be cheaper than an electric furnace.

I have no idea what the up-front costs of them are, but I'm talking about just - as far as running them.

So are you saying that you see that running a gas furnace is cheaper than electric? Is that what you're saying?

Yeah.

Any other advantages you could see potentially of a gas for heating?

I think the danger would more higher with gas versus electricity.

Yeah, carbon monoxide -

Yeah.

I think you maintain your temperature easier - [CROSSTALK]

I don't know if that's something - an advantage, but -

Well, that's a disadvantage. We're going to get to disadvantages. I just want to be sure we haven't covered - so you were saying maintaining -

I think it's easier to maintain general temperature in the house. You don't have that like, right now I changed from the ceiling heat to just in the wall heat. Electricity heats it so they're either on all the time or they're off or they're back on. They fluctuate too much so if you can just have that even - that's like you said with cooking you get the same with.

Does a gas furnace work when electricity is out? I'm not sure.

If the igniter needs electricity to jump because I know you've got a pilot light going -

But if it's got the pilot light then it shouldn't need an igniter, right, as long as the pilot light stays lit.

Even if you don't know it, that's an electronic [CROSSTALK] sensitive -

So any other advantages before we go to the disadvantage? Any other advantages you can think of gas for heating?

I remember when I was a kid we had a gas furnace that we always used to sit on the vents and it would push the air out and then since I've had electric it's just those baseboard heaters that I've had it and they make forced with electric.

I've got the forced air electric.

Disadvantages? So you started to say your concern was potentially -

The danger of the gas.

Carbon monoxide.

Carbon monoxide.

Fire.

Yes, fires. Definitely.

Line breaking gas leak.

The danger I feel like it would be higher with gas versus electric. Although there is that danger with electric but the risk factor I feel it would be higher with gas.

Any other disadvantages of gas as a heating source?

I remember when I was younger we used to have to light the pilot light on our gas furnace [INAUDIBLE] I don't think with an electric one you have to manually light it because there isn't one [INAUDIBLE] lights it if it goes out.

[00:22:52]

Pretty sure the pilot light shouldn't be - that's only if something goes wrong that the pilot light's going out.

So I feel a disadvantage because of the gas you have to light it yourself. It's kind of scary.

OK, let's talk about electricity in heating. What are some of the advantages of electricity for heating your home?

[INAUDIBLE] at least although California [INAUDIBLE] their issues at the moment.

So tell me more about reliable. How do you perceive it at being reliable versus other sources?

As long as they [INAUDIBLE] intact it seems like that it's a pretty constant

source of -

I guess what I was wondering, I mean I don't know what kind of outages you guys have, but don't you have electric outages during storms and things at different points?

Not usually.

A squirrel chewed on ours and we lost power for four hours. There was a squirrel went up in their transformer.

So I'm not trying to contest it, I just want to understand when you say reliable, it doesn't mean that it never goes out it sounds like.

With progress, more and more of the wires are being buried underground so they're not affected by things like accidents and winter storms and things like that where before it was - I saw a picture in India where one pole's got three hundred thousand wires coming into it. And I had to say, whoa.

I guess it's an interesting question because I'm curious. So reliability, this is a question for the group. Is electricity as reliable as natural gas or vice versa? Which do you see as being more reliable?

As far as I understand your gas you can keep working even if the power goes out which is nice but any sort of line break is more dangerous than the electricity going out. Out of electric you have the option of basically installing a backup battery that you can keep running things for a while even if the grid goes out.

But again, if we just grade those two on reliability, which would you say is more reliable?

Electricity. It's always there, we take it for granted so much now.

I've never heard of the gas going out. I wouldn't say one is more reliable than the other.

You feel like natural gas and your electric are equally reliable?

I can't speak toward natural gas because I never had it but the electric it's just like we completely take it for granted. A couple of years ago when we were out for three days it's like -

If feel like, also, an advantage for electric would be different types of electricity that you can get. There are so many options and I don't know - I've never had gas and so I can't speak to natural gas but I feel like there's so many different ways and different types of electricity that you can get.

[00:26:04]

What do you mean by types of electricity?

I mean then you can get electricity from hydro-power, you can get electricity from wind power, you can get electricity from solar power. There are so many options of ways to get it.

You can pay a bit extra per kilowatt hour to go fully green.

And were you pointing those out as being green?

Advantages.

Advantages. Because they're green?

I just think - you were talking about good thing about electric, I'm just saying there's options to it versus - and I don't know if there's that many options with -

But I guess what I'm curious about is why do you care as long as the electricity's coming out the other end? When you flip on your switch, why do you care? You care because?

Because of the environmental impact.

Because the environmental impact.

And also, options are always nice. Who doesn't like options?

But do you get - do you have options?

I've never - I currently, no, I do not. But if I was able to, having that options having the ability to choose like if I was building a house from ground up if I had the ability to choose from the different options that would be nice. That would advantages for electricity. [CROSSTALK]

But particularly, environmental kind of options?

Yes.

As for source options, though, you can wire in a generator and bring electricity for your own home and then whether the power goes in or out, as long as you've got gasoline or whatever heat source goes into your generator you can provide for at least a minimum amount, keep a refrigerator going, keep a couple of lights going, something along those lines. Where if the gas goes out, you are SOL.

And, again, it sounds like nobody really has gas so I'm just curious whether -

I've had it in the past.

You've had it in the past?

So I lived back East for a while and there's a lot more gas in the structure it seems out there like Pittsburgh. And in Pittsburgh is seemed like gas was totally reliable. But it was a thing that everybody had there so I think I would feel more comfortable switching to gas in Pittsburgh if I didn't already have it. But here, because I'm just not as familiar with the infrastructure here, I don't know as much about the reliability of the gas infrastructure out West.

Is it reasonably that the infrastructure would somehow be different between the West and the East?

I have no idea and it's because I don't know but I'm leery about it.

The other thing is if your gas isn't going to - power your house. That's just heat and possibly like your dryer and your oven whereas you still need. I was just saying that's an additional bill. Yes, both, you're going to have a lower electric bill because some of that stuff is taken up by gas but that's just for convenience. It's like having one bill for all the things a bit more convenient.

So you'd like to have the convenience of one bill? What else?

My neighbor has both, electricity and gas. And so he has a kitchen and whatever, I don't know exactly, but he's got both of them. And that's what I would do if I had the opportunity or financial means to do it I would trade it.

[00:29:16]

And why would you want to do both?

I don't really like the bill that I get sometimes in the winter time. With electricity it's too high. And I do know he pays less overall with two bills than my one bill sometimes during winter. So if I get offset it that way, but I also use wood insert so I actually can get my house up to 72 with just my wood.

So let me just stop on that one question because that I felt like we had a mixed opinion and I just want to poll the group here about whether you felt that electricity was more or less expensive than natural gas.

It's more.

It depends on like if you're using an electric furnace it's more expensive. If you're using a heat pump it's less expensive. The heat pumps are a lot more efficient than electric furnace.

I never had gas but I hear that it's cheaper than electricity. But I have never, nothing to compare it to.

Any other perceptions?

I have no idea.

Complete ignorance.

I think the only thing I can compare it to - I lived in Road Island and we got oil heat actually. Everything else was electric and you had oil just for your heating.

Let me go back to the original question which was the heating the home and the advantages of using electricity for heating your home. So I had reliability, different sources that could be environmentally sound, convenience of a single bill if you all have just electricity anyway. Were there any other advantages that you wanted to bring up on electricity for heating your home? If not, let's talk about what you see as potential disadvantages if heating your home?

With electricity?

With electricity.

If the power goes out you can lose your [INAUDIBLE]

The bill in the wintertime. In Texas it was the bill in the summertime.

And we're not just paying for our electricity, we're paying for the infrastructure of the electricity companies down twenty years from now they're looking ahead. They're tacking it on to all of us now so that we could pay for it in future and that is a given. That's why we're paying, that's how it works. And so if I move away after I put in all the money to my town and I move away then it's like - well, I've got to start all over in this town. Because that's what they're doing, they have to pay for -

So do you feel like the electric utilities are making you pay for infrastructure but you're not? You wouldn't have to pay for infrastructure with any other energy source?

I just think it's less. I just think gas overall is less. We had in Tiger, we had an oil community, the family had a very big oil tank and that's how we did it in the house there and we have electricity and stuff and so Union, that one oil tank filled would get you through the winter and that was it. Two hundred bucks, you're done. It was much easier, efficient, and it worked. We all stood with [INAUDIBLE]

[00:32:30]

So let's switch gears now and talk about the advantages of electric cooking appliances. What do you see as being the advantages of electric cooking appliances?

They're more efficient than gas in terms of there's an energy transfer.

I think it would be safer I feel [CROSSTALK]

Once again you don't have the -

Safer in what sense? Tell me what you're thinking.

Mostly what she was saying I was thinking about my child, I think it'd be safer because you don't have an open flame.

So it's the no open flame.

Also you don't have to worry about the spark or going out. You've just got gas coming out being lit.

I think I'd rather have my kid get burnt a little than electrocuted.

So you don't necessarily see that as being -

No.

That might be actually an advantage to gas.

It might burn your finger a little bit or get your whole body shocked.

I don't agree with that. I've dropped my hand on a gas stove before and burnt myself much less then what I did on an electric stove. I bumped the electric stove. [CROSSTALK]

The burner that they have but that's it - there's no outlet or the plug thing.

It's a trade-off. Basically what you're saying is that for you that might be an advantage of gas appliances is that the worst you could do is maybe get a burn as opposed to being electrocuted? Back on the electric advantages. So more efficient, safer because there's no open flame at least for some of you. Any other advantage?

More options of appliances.

Are there?

I don't know for sure but I've never seen a whole bunch of gas appliances.

You can get a cook top for three or four hundred dollars for a plain cook top. But then gas tops, those run seven, eight hundred dollars.

So cheaper appliance overall. The electric are cheaper, electric appliance.

Aren't we just talking about the stove and not like all the appliances?

Cooking appliances.

Cooking appliances, so there's microwaves, toaster ovens. [CROSSTALK]

I like electric just because it's what I'm used to, it's what seems to be most common here. Grew up with it and there's times when I have had to use a gas burner I end up burning the salmon. [LAUGHTER]

How about disadvantages? What do you see as disadvantages of electric cooking appliances?

With a traditional coil cook top you don't have as fine of control is you do with gas and if you go with induction you do have the fine control but the cookware you use is rather limited because you have to use cookware that's specifically designed for use with an induction cook top.

But you're limited with cookware with a coil. There's certain types of cookware that you can't really use with electric. For instance I wanted a Donabe, which is a Japanese clay cooking pot, you need an open flame. You can't do it on an electric stove. Things like that. Cooking properly with wok, hard to do it on an electric stove.

[00:35:51]

Yes.

Any other disadvantages for electric cooking appliances? Then, and again, just based on what you do know, what advantages can you perceive that gas appliances might have, cooking appliances?

More fine control for - for basic cooking it's not really an issue but if you're doing more involved stuff than that, having gas is beneficial.

You can actually cook the vegetable on the flame, you don't have to have a pan. You can just get it over there and if you're roasting peppers or something like that which I do a lot.

Or the tortilla.

That's right.

A**nd I noted the fact that I'm assuming that the same, the flip side of what you**

just talked about is true for the gas side. So that's the benefit, is you're able to use special cookware with gas like a [CROSSTALK]

On that note with the electric, one thing that I don't think - when I'm cooking I like to have a nice place where I can have turns, one with an electric, one of my burners on to really low heat and set the plate down to warm up the plate that it's not so hot that it is going to do anything to it. I don't think I could do that, wouldn't feel comfortable putting my plate over open flame.

It's pretty much any - go to any restaurant and you're going to find gas. You won't find electric stoves.

What does that tell you?

And that tells me that it's got benefits to it that's why they do it.

What do you perceive as being the benefit?

It's precise, you can dial it in, you can hold the temperature [CROSSTALK] piece of cast iron and once you find a temperature once you set, forget it, it's going to be there for the rest of your life basically. Or until the gas runs out.

Any disadvantages for gas cooking appliance?

You go to light a flat top and it doesn't light, you leave the gas on and you stick your head down there and you don't have an eye brows.

So potential danger if you got the gas turned on the igniter doesn't ignite.

Hit it with a match. Kaboom.

Any other potential disadvantages?

I was thinking about what David said about unfamiliarity earlier so when I moved to back East for several years it's the first time I ever cooked on a gas stove and I think there are advantages of it but it was a learning curve at first. I wasn't familiar with getting it lit. I wasn't familiar with using the heat like that. I was used to cooking it on a worse surface.

[00:38:59]

The familiarity thing that applies either which when you're transitioning from one to the other, that same thing as well.

Any other disadvantages come to mind?

Worried about gas leaks.

Yes. I think it's the rotten eggs smell.

It's not so much a disadvantage purely in terms of cooking itself but it's less efficient than in terms of energy transfer from.

Let me ask you this. Everybody here has basically electric appliances, would you ever consider migrating to a gas cooking appliance?

Yes.

I have used gas, I was a cook in the Marine Corps for eight years. I definitely like cooking with gas. And I keep mentioning induction. I discovered that's like - oh, OK, I don't need to go back to gas because this has all the advantages of both.

How about the rest of you? Anyone else consider?

I would.

You would, and why would you consider?

For all the advantages.

Is there any one that looms larger than the others?

The control over the heat. And greater flexibility in cooking devices.

Discussed appliances are more expensive than electric, though, so I don't do it.

So that would be a barrier, the gas appliances.

The upfront cost.

Anybody else say they were thinking about it and what would be the reason why you would think about it?

I do like the idea of the induction. That's one of the things I'm going with but I do have to change something. My cook top is cracked so I personally have to think about in the next six months or so changing. So it would actually be cheaper for me probably to do the route of the gas but have a portable-ish tank so a tank outside of the home, not have the whole house done but just the kitchen area. If you look on any information about other countries that's what they do often. [CROSSTALK]

Are you thinking about this primarily from a cost perspective? Or what's the reason that you're thinking potentially going to kind of a gas approach?

Because we prefer to cook that way, I did when I was younger cook that way. And restaurant work and things of that nature so I'm used to that. But 20 years in this household with electricity I'm over the electric cook top.

I like cooking with gas but I don't want to wire up my house for gas so it's just like the benefit isn't enough to be worth the hassle and the cost.

Right. Because you don't have to do that.

How about the rest of you?

I would do it just because of the quality of the food that you get with it. Like the way it cooks and the different opportunities that you have to be able to cook with it. I've never cooked on gas, but I would be just from what I hear from people here as well as friends and family that have gas, I would.

What's kept you from kind of considering it up until now?

I've never had the opportunity to be able to switch. It's never been something I've been able to do.

Meaning? What does that mean, you haven't been able to do it? Meaning?

Because I just rent my home.

Oh, you rent.

So what my thing is I do have two huge propane tanks with a huge flat open grill that I use in the summer when I can my foods. I can't get my water up hot

enough on my cook top, so I put my big pots of water with the jars in it out on the propane.

For canning?

Yeah. So, I put it outside and that's what I do. So, I'm used to that. But I'd like to have that option and just do it in the house. Because occasionally even in the fall or the winter, like I can something now, it's available, this food source or whatever. And I can just can it in the house and not go out in the cold and put a hat or gloves on and stuff. But, I enjoy being able to can that way and it gets the heat up properly.

So, I just want to tick through a couple of these things, I know we touched on it briefly, but I think I got some mixed feelings on a couple of these things so I just want to bring it up one more time. So, in terms of a reliable, uninterrupted supply. Natural gas versus electric, which do you feel like is more reliable so that you could count on it always being there?

In this part of the world, electric, just because that's more familiar, there's simply just more of it.

My parents have gas, I know people that who have gas, I've never seen it go out. Electric does go out every once in a while, gas never does.

Never does.

Right.

How do the rest of you feel about it

I've never experienced gas,, but over the last 20 years I can count maybe two or three times we've lost electricity more than a few hours, so I would say it's pretty reliable.

You feel like it's about the same reliability?

Probably.

And some of the rest of you think that maybe gas is a little more reliable?

You see a light edge, but it's got an edge.

Did we decide on monthly bills? What do you think? Who has advantage there in terms of just the cost of energy, electric versus gas?

It depends on what kind of electrical appliances you're running versus like older stuff.

I have no experience with gas so I don't know.

Older stuff and gas stuff that they have an advantage.

Does anybody else have any thought about it in terms of?

Well I'm actually from Nebraska before I moved out here and all of our appliances and everything, houses, everyone that I lived in back home was natural gas. It's a different market so there's different prices, but it definitely was a lot cheaper and my bills were always a lot cheaper than my electric bill has been out here. Always.

[00:45:17]

What would it take for you to consider adopting natural gas as part of your energy source? Anything?

Free appliances.

But what if there wasn't free appliances, but what if there was some sort of discount on appliances?

I don't know.

Or a trade in.

Yeah, a trade in would be nice.

I kind of ran into that when I first got the house. It's like you're late. Here we had a developing area and I had a choice of, I could have gotten my house with any appliances I wanted. And here was two years later they're walking in the door, we're ready to put in gas. No, not in my house you're not.

So for you there isn't any real way that you would consider natural gas?

No. I mean, not unless.

Is there anybody here that what it would take for you to consider natural gas?

If I moved into a house that was already hooked up to it.

How about the rest of you, Any other situations where you consider it?

Not renting.

Not renting anymore.

It would have to be a huge discount or something really big because I would not

Or renting that already has gas.

It would take a lot to convince me to go through the hassle.

If some way.

Go away from what I'm used to, so it would have to be something big.

If the condition was like tied into my bills somehow maybe I would.

Those of you who have all electric, which I think everybody. Do you see that having a redundant energy supply, would that be of any be**nefit? So, in other words, you're not just relying on electricity, you have more than one energy source so in case one goes out you always have another one?**

I'd prefer that.

It would make life easier for when the electricity goes out, for sure.

Except it's not really redundant, it's a different. So it's like if the electricity goes out, the natural gas isn't going to keep my fridge running.

Sorry. Well, I guess Yeah, maybe the terminology isn't right, but what I really mean is if your electricity goes out then everything goes out, right? As opposed to maybe you still have hot water if you have gas or you have a stove that can cook as opposed to a stove that you can't, that kind of thing. So, my question is

does that kind of thing have any merit, do you care about that? Does the whole idea of having it?

It's not really having an advantage of having both.

But it does have that advantage in that during a power outage, you can still cook, especially since power outage happen most often during inclement weather. Still having heat is really nice. There's that whole cost of getting everything set up.

[00:48:18]

So, there's a tradeoff, but I guess I just wanted to kind of get a sense of do you see that as a major benefit or not?

Does natural gas power your entire home like if electricity goes out and your house is a natural gas home, does that mean that your refrigerator is going to keep running?

Well, I think you'd be choosing one or the other, it's not like they would switch over necessarily.

But I'm saying if your home was powered with natural gas -

Only.

And the electricity went out in your neighborhood, but you're only run on natural gas, will your appliances - Will your refrigerator still run?

Anything that was running on natural gas would continue to run on natural gas, yeah, if the power went out and stuff.

The diversity is pretty nice. It would be nice, but again, the outlay.

So, I think what I'm hearing everybody say is there might be a benefit, but it doesn't seem like it there's a big enough benefit for any of you to go down that path and actually doing it.

You're going to be paying to convert to natural gas, the cost of that may as well just get a battery backup and then you can power all the things instead of just some of the things.

I would rather put money into solar panels. The battery thing we're talking about then right.

Well, let's keep going.

My parents made that investment on their home. My parents when they invested in their solar panels was my father says is the best investment he's ever made.

Well, let's keep on moving. This time I want to kind of talk a little bit more about and get into some of the environmental issues that we've touched on a little bit. So, I guess my first question for you is what do you perceive as being some of the greatest contributors to climate change today? What is your sense of What is contributing the most?

Vehicles.

To climate change. And in particular, carbon emissions.

Vehicles.

Vehicles.

Vehicles and coal powered plants.

And cows.

Yeah, agriculture.

They're not very much.

So vehicles, agriculture, what else do we hear?

Coal.

Coal. What else?

I said cows.

I'm going to put sort of agriculture as that.

Not just car but transportation in general, basically shipping stuff internationally

on the big tanker ships because they're - The bunker fuel they use is - it puts a lot of carbon in the air.

And what kind of energy sources do you feel like are playing the positive role when it comes to the whole issue of climate change?

Windmills and -

Wind.

Solar.

Electric, geothermal, hydro.

Wind power.

Tidal.

So what are the rest of you saying? What were some of the other thoughts?

I said wind and solar.

Wind, solar.

Definitely solar.

Any others?

Geothermal. Tidal. Nuclear.

[00:51:22]

What is tidal? You keep saying that. I don't know what that is.

So it's instead of a dam that - It's as the tide goes in and out, it's basically a generator underwater that -

So its hydro powered?

It's hydro-powered but out at sea.

But it's the tide not the downfalls, force of the river.

Where does natural gas fit into climate change.

Is natural gas renewable? Like is it.

No.

A renewable source?

No, it's a hydrocarbon. But it's more efficient than coal, puts out a lot less pollution, its still-

Well, we're going to get to some topics there first, but I guess what my question first is what are - Talk to me a little bit about the different kinds of energy sources that you feel like are playing a positive role and why you feel like some of those are a positive role? So, you mentioned a bunch. We had wind, we had geothermal, solar, hydro, tidal, and nuclear. What makes all of those positive?

The energy sources -

They're all renewable.

Themselves are clean. The problem is the infrastructure that puts all of that together is just as dirty as any other source, that's the problem.

[CROSSTALK] coal-fired plant making electricity, but then you got some coal-fired plant creating the metal that goes into building the nuclear power plant, which yes is a clean source of energy, but to get there you're making a mess of the whole world.

[CROSSTALK] So your bringing more green power online than the creation of further power gets greener and greener.

So basically though you bring up an interesting point which is your saying that there are different sources that create things like electricity. That electricity doesn't just happen. It doesn't all just come from wind. It can also come from coal.

Or whatever the source may be. Some of them are cleaner than others but all of

them somewhere along the line have some sort of infrastructure to start them, to get them built, whatever what is just as dirty as could be.

So the issue is one has to be careful about what the ultimate source is of some of these energy sources.

What's the lifetime of carbon emissions?

Where does natural gas fit into the whole role it plays with climate change. How do you feel about natural gas and how it's contributing? Does it have a positive or a negative impact?

I feel like that because it's depletable that it's probably not a good thing.

So it's not renewable?

[00:54:23]

So what happens when its all gone?

Go ahead.

I was just saying if I agree with her. But it's not a renewable source of energy, what is the benefit of using it. If it's eventually going to run out. Where's the benefit of it?

It's transition fuel. It puts out a lot less carbon in the air during it both when it's being run and during extraction than coal fire plants. So while we transition to like will it be renewable stuff. It's better than a lot of what we're using now. So that it's a step in the right direction. It's less bad.

So like he was saying, if we we're using natural gas to work those plants versus coal energy. To build the metal for the windmills or to build that need to be better.

Yeah, it's still putting carbon in the air but it's putting less carbon than coal.

Oh okay.

Still a vision of natural gas as a transition energy to not something of the positive side to get to the question.

So you see it as a transition from what to what?

Worse today. You mentioned climate change so that's greenhouse gas emissions.

Give me an example of what source you think could be dirty and it's a transition to. And what it would transition to.

So say coal since you were talking about to something more renewable with less greenhouse gas emissions like wind.

It could be a bridge than between the dirtiest fuels out there today to something that was even more renewable. How do the rest of you feel about that?

Yeah.

Does that make sense?

Yeah**.**

Now some west coast cities. I don't know if you've been hearing this or not. But some of them are considering passing or considering bans on new natural gas hookups for residential kinds of. With the goal of potentially even banning it all together. How do you feel about that? How do you feel about the idea of local municipalities kind of restricting natural gas.

That's a big government over reach.

So you feel like that would be an over reach?

I think so. That's almost like how do you determine that you could not use this source of energy anymore.

I don't think we can't use it. I think we're going to stop you from making more.

Yeah because building codes get updated. You can't build a house with asbestos insulation and lead paint. It's not going into the places that already exist. So as far as moving forward working towards greener. I think that's a good idea.

I agree with [CROSSTALK]

Gas could be the bridge between [CROSSTALK]

As electrical generation might.

[CROSSTALK] How do we go from A to C if we don't have B?

[00:57:24]

That's relying on something like coal out here [CROSSTALK].

Let me throw another factor in, which is that at the same time that municipalities are thinking about doing these kinds of bands on the residential. The electric utilities are going from coal to natural gas. So, they're creating electricity by using a lot of these utilities are actually using natural gas to create the electricity. I guess my question is, how does that than sit with you in terms of the utilities would be able to use natural gas but new buildings wouldn't be able to use natural gas.

Using it in a large scale plant for electrical generation is more efficient than an in-home use for heat where a lot of energy ends up being wasted. Just like what the internal combustion engines, it's more efficient to run an electric vehicle entirely off of coal plants than running gas cars normally because the economy having that large generator working at peak efficiency versus turning stuff on and off-

I don't know if that's right or not. I'm curious what do other people think?

I think that putting the counties or municipalities, is that what you said, applying saying OK you can't build with this type of energy source going forward. They're not saying that you can't use these where it's already in place. I think it's going in the right direction for the use of renewable energies. And for the use of cleaner energies. I think that would be the point of putting a ban on something like that.

My question though is getting back to Kinley's point earlier. Which is if natural gas is a bridge. And it seemed like people thought that made sense. It's a bridge from dirty field sources like coal. To something eventually that's cleaner like wind or solar. Does it make sense to try to put a ban on that bridge? I guess is the question.

It doesn't make sense.

But using it for electrical generation and using it in home for heat are two completely different things.

I agree with you.

Yeah.

And why do you agree?

Well I think he's right about the economies a scale. I think that's a technically correct point. Based on what I've read.

Sometimes things won't change until their pushed to forcing the change. You want to change to renewable energy sometimes you got to push people to do it.

Yeah and this part using it on a commercial side versus a residential side there's a significant difference. The impact would be different on a commercial scale versus a residential scale. And if they're just talking about saying you can't build homes with this type of gas, that's different than a company using cleaner natural gas versus coal powered gas or whatever.

[01:00:42]

At a plant you could also include a carbon capture technology whereas if your burning it on your stove, you can't do that in every home because you don't have-

All right, so let's keep on going. What I want to do now is have you discuss something called renewable natural gas. Anybody ever heard of any such thing? No, okay. I'm going to pass this out to you and then we're going to read it together.

Made from algae and what not, that sort of thing?

We'll soon see.

I love slime, cows.

Interesting.

All right so let's all read it together. I'll read it out loud, we'll read it together.

Renewable natural gas. Renewable natural gas is produced from local organic materials like food or agricultural and forestry waste, waste water or landfills. As these materials decompose they produce methane. That methane can be capture in addition to by-plant quality and delivered in an existing pipeline system to vehicles and homes and businesses. Where it can be used in the existing appliances and equipment. This provides a renewable energy option for the natural gas system. In the same way that wind and solar are used to generate renewable electricity. Enclosing the loop on what would otherwise be wasted gas. Renewable natural gas can provide up to an 80% carbon reduction benefit.

Can I ask a quick question to take some clarification. 80% carbon reduction benefit over what? What's the comparison here?

I guess it's compared to I believe the conventional natural gas.

You can twist stats to make any case basically. You can take a number and just make it justify anything if you twist it the right way.

Anytime your reusing waste products into something new. That's usually a good thing. Though sometimes it ends up not being as efficient as like the 10% ethanol gas which ends up polluting.

What do we think about this concept?

In concept, if the numbers work out, then yeah, that's awesome here.

How about the rest of you? What do you guys think?

I think the concept of it, I mean, it sounds nice, but there's not a lot of details that get - I mean it's saying 80% reduction, but there's a lot of questions with this statement and I also - I'm questioning like, so you're gathering all the methane waste from these things that were here and transferring it to natural gas. What if there's a leak, then wouldn't the leak or - are all of these methane sources, the leak, wouldn't that create more of an energy crisis or more of a carbon crisis?

What they're basically saying is in today's world, all of this is producing methane gas, it's not being contained at all, it's going in the atmosphere. So, basically [CROSSTALK] so, they're basically arguing -

[01:03:58]

It wouldn't be [INAUDIBLE] right now.

Yeah, they basically trying to -

It would eventually, right? So, it's just going to go out into the atmosphere eventually. This is like the forestry dispute in Oregon about whether or not trees are actually producing.

But it's not really known as methane. And methane is a much show more potent greenhouse gas than the carbon dioxide. So, switching what you're putting up, even if the quote says if you're putting up something that's less bad, it's an improvement.

I have an another question about the comparison though because it says 80% carbon reduction benefit. And I want to know more about exactly what the trade-off is here.

The other advantage of this is once you have the infrastructure in place, if you go away from carbon source entirely, you can use this for sequence [INAUDIBLE].

So would the 80% carbon reduction be like 80% carbon reduction from just the methane going out into the universe versus - and then you do it this way, then it's 80% less carbon. Is that with that?

Yeah.

It sounds like a good idea.

And that's factoring in the energy costs of the conversion process?

Yeah. Basically, what they're comparing it compared to just not capturing it at all. So, what were you asking, Kelly?

Kind of gotten sidetracked over here with a lot of stuff and things. But it comes down to the fact that right now animal's like 8% and if you can turn that into this renewable natural gas, it's a source that's natural, that is - it can offset all this other and when you should be considering doing these things because it's already here, you need to take advantage. It's called recycling and Oregon is good at recycling, you need to pull it together. And that is a source that we should be using. If somebody said I had five grand to either change my house

into natural gas or to geothermal, I'd be doing geothermal because that's just my person and my decision. But if you said natural gas versus the animal waste, renewable gas, I'd be going that way because it's just better.

[01:06:15]

So, you hit on something that I guess maybe, that's not coming through as much, but I'm curious whether it resonates with people. And in essence what you've described is recycling. You're recycling gases that are going to go up in the atmosphere anyway. So, if you can capture them and get some energy.

We need the animals, obviously we need them for lots of different things and food sources and all that. But they obviously have an impact.

So, if this were kind of positioned more as a recycling of what would otherwise be wasted gas, would that be helpful?

Yeah.

Mm-hmm.

Yes.

I mean, it sounds nice on that. It's a pretty package. It sounds nice.

Pretty package, that's the right word.

They've already started to change that. I mean, there are places and towns and stuff that are already doing this. People don't even realize you can go to Newburg right now and you could buy yourself, not Cedar chips for the yard, you can buy what is basically human waste that they've cooked down so well that you can put it in your yard. It's beautiful, it's black color, it doesn't smell, it's all clean. There's no bad things and it's good for your yard. Why aren't we all doing this? And why aren't we all aware of this?

So, does this concept, does this change your concept about natural gas in any way?

[01:07:37]

Just this right here?

Yeah, does this -

I would rather, you know, with the anaerobic digester, it'd be used in a natural gas power plant versus -

What is the anaerobic digester? What does it do?

That's the thing that converts the waste into usable fuel.

It just cleans it?

Yeah.

So, thoughts?

So, it sounds really good, but I would like to see more information.

I guess what I'm asking is, does this change your perspective? I mean, we've been talking about natural gas. Does this change your perspective on what natural - the fact that we're talking about something that's kind of recycling?

It's still in transition, this is - even helps it along further on that road, but it's still -

You're still burning it, right?

Yeah, but you're still burning it, but you're getting some energy out of something that would otherwise just go into the atmosphere and affect the atmosphere.

I think the concept is nice. I think that makes natural gas seem nicer now that you're able to create a renewable, natural gas. But like some of these other gentlemen have said, I would definitely want more details and more like specifics on it.

[01:09:00]

What do you want to know more about? What is it that still is up in the air that concerns you'd want to know more about, to convince you that it was a good thing?

I would want to know exactly how it's being burned. Like the way that it's being collected and yeah, it's giving me this renewable energy, but how are you creating that energy? Are you are you using a dirty type of energy to create this clean type of energy? Like I would want specifics on each step on how each step in this little cycle.

If you did that then you need to consider your solar that you were talking about earlier because, all the trees that make the solar windmills are so heavily polluted because they build these things and they send them to America to be used up there in the gorge and they have totally trashed the community over in the country where they make them. So, this is a waste product that they've used as heat sources for years even back before we had electricity. So, if you got all the electricity blown up and all the natural gas blown up in the world and you didn't have that you'll start looking at animals.

So, I would like to see them replacing some of the things like coal fired plants and oil, and get us away from the petroleum dependency.

That's what I think they're trying to promote. So, basically what we talked about before was a lot of electric utilities are already going to natural gas. Then this would be something that could impact - replace some of the natural gas.

Why not do this instead. Instead of drilling and whatever.

Would this type of product have any sort of impact on your perception about the utility companies that offer it? So, if you had a natural gas utility company that offered this versus the standard conventional natural gas, would you -

I would choose the company that offers the renewable -

[01:11:00]

Yeah.

Yes.

So, that you'd have a more favorable opinion about them?

Absolutely.

For me, it would depend on the assessment of this information in the first place. Like, so, what else do we want to know? Well, maybe some confirmation from scientists that we trust. I don't know where this came from and I'm not going to trust some industry scientists telling me what these factoids are. Whether they're right or wrong, there's a conflict of interest. So, some conflict and ways to address that, some conformation from outside the industry might help me get on board with this and then decide to go for a utility company over another.

Assuming this is accurate information then yeah, this would be great.

Under the assumption that this is accurate, yeah.

I would want to know why this is not a waste of time when we could putting more energy and resources into developing solar and wind power.

Again, the comparison, what exactly we're comparing to.

[00:11:50]

[01:14:30]

I think the argument is not so much doing one or the other, the question is can you utilize what would otherwise just be going out in the atmosphere? So basically, all of these, what this is basically saying is that all of these gases are going up in the atmosphere already. So, can you capture them and use them? Is the issue. Let's keep on going. I have another concept here that we're going to learn together. So, this one is called the noble hydrogen or power to gas. Power to gas is a process that captures surplus wind and solar energy and converts it to renewable, natural gas or hydrogen through electrolysis. This renewable energy can be stored and then blended into our pipeline system to one day serve homes, businesses and vehicles. So again, the idea is, there are times where you may have wind and solar energy, excess wind or solar energy. It could then be used for electrolysis, which basically splits water atoms into hydrogen and then the hydrogen and carbon could be combined.

The natural gas that this will be created through wind and solar surplus. Is it as clean as the wind or the solar energy that is surplussed? Or is it like - what would be the point of taking clean energy and creating something that's not really as clean? I guess is my question.

Also be creating hydrogen, when you burn hydrogen, you get water. So you're not -

It's like an alternative to a battery. Just storing the excess power in a battery or putting it into a different form that you can then keep around.

Except hydrogen is hard to store. It tends to leak out of containers because of - I would think using that excess energy to put into batteries would be - especially with all the advanced - all the money being invested in battery tech, it continues to go up in leaps and bounds, especially if they -

So, you're saying you think that maybe a battery approach would be preferable than this approach?

Yeah.

How about others? What do the rest of you think? So, basically it is correct. This idea is that you could then use this clean energy to create something that would eventually be - the byproduct could be water and when it's used from hydrogen or it can be combined with carbon to create the methane for trees. Any other thoughts about that? Positive or negative?

From what I understood there was a lot of hope in hydrogen, but just the ability to produce it was just too expensive and too difficult to do with the technologies that we have.

[01:15:00]

It takes a lot of energy to create hydrogen and then you have to compress it to be able to put it into a [INAUDIBLE] it leaks out everything.

So, what do we think about this concept?

Second to this one.

You don't like it as much as the first one. Why don't you like it as much as the first one?

Because like they're saying the expense and how - I don't know enough about it to really speak on it, but it's seems to be a more not as seemingly recycled to what we have thing.

Doesn't seem to be as a direct path as the other either. There's continued steps in the whole thing.

You're storing it in chemical via a battery, you're storing it via hydrogen and then you were burning the hydrogen. So, it's just additional steps instead of just using a battery.

[01:17:42]

It doesn't as easily connect to a [INAUDIBLE] that we're already familiar with, recycling. You also made it blue not green, so it's not like environmentally friendly.

So, now that we've talked about a couple of these different concepts, has that had any sort of impact on how you feel about natural as a power source?

What does the hydrogen paper have to do with natural gas, is this another form of natural gas?

Well, it can basically be used - in both of these cases, the thought is that you could then use the product of this through the normal sort of pipeline system. So, it could be provided and it could basically power your gas appliances, your gas heating. It can be used in the same way natural gas is used today. So, does that change - we've been talking about natural gas in a lot of different ways. Its pros, its cons, do these new concepts alter your perceptions of natural gas in any way, shape or form, either positive or negative or does it not move the needle at all?

Not really, it's still like as a transition power source until we get fully renewable, but it's miles ahead of coal.

Makes me have more questions about it. It makes me want to just be a able to learn more about it.

It's nice to see at least they're exploring other venues or other avenues rather than just being stuck in, OK, we're going to dig a hole in the ground and drill, finish stuff and yay. Because what happens when that all runs out? I'm sorry.

And it's not like Oregon doesn't know how to do this because there are cities and states already implementing this, they just need to talk and they need to figure

out what they're doing, how to do it, make it better or cheaper or whatever. But I'm sorry, we got a lot of Tillamook cows around so, we should be taking advantage of them.

[01:18:10]

Especially with this, because short term you can use it to burn, long term you convert it then you can basically add barrier back in the ground and sequester that carbon for basically carbon offset credits and whatnot.

So, am I picking up though that yes, there are some questions here, but that some folks feel like maybe this is moving things in a more positive direction than just the standard natural gas.

Yeah.

Maybe it's not the end all solution, maybe it's not the final solution, but it's at least going a little bit more in a positive direction.

It could be going in the right direction that's what the questions are about. Whether it actually is going in the right direction.

It seems to be going in the right direction.

So you'd want to have more confirmation that was going into it. But if you got that confirmation, it would seem like it's going in the right direction?

Yeah.

What I want to do now is have you look at another handout. What I'm going to with this is I'll read each one of these statements. Ultimately like you to take a moment and kind of rate each one of these individually on a 10 point scale with 10 being, I find it extremely compelling or one being not at all compelling, and you can rate it anywhere in between. So starting off with statement P, natural gas is a vital part of a reliable energy strategy because alternative energy sources like wind, solar, and hydro power are not able to meet all of the state's energy needs. Q, all forms of cleaner energy; hydro, wind, solar and renewable natural gas are needed in a balanced low carbon future. S, natural gas bands will allow utilities to continue using gas to generate electricity that will prevent individuals and businesses from choosing the energy source that best meets their needs. T, the existing natural gas

network can be used to deliver renewable natural gas and dramatically reduce greenhouse gas emissions as a result. And U, natural gas has a uniquely attractive energy source because of its affordability, reliability and cooking and heating performance. What was the question?

So, I'm not sure, is that it's a good thing that [INAUDIBLE], are we saying -

Just how compelling - just in your sense, how compelling of an argument is it.

The critical statement. Do you think it's right or wrong? Really right, close to right, 10.

[01:21:04]

[01:21:04]

So, take a moment. How's everybody doing? Is everybody done yet? Good. What I'm going to do is just do a quick count. So, on P, did anyone give it a nine or a 10? Did anyone give it a six through an eight? One, two. So, five or less was the rest of you? So that was all six of you. Q, anyone give it a nine or 10? One, two, three, four. Anyone give it a six through an eight? Two. And the other two of you gave it a five or less. S, anyone give it a nine or a ten? One. Anyone give it a six to an eight? One, two. And the rest of you gave it a five. So, five of you, is that right? T, anyone give it a nine to 10? Two of you. Six to eight? Two of you and the rest of you gave it five or less. U, anyone give it a nine or 10? One. Six to eight? Two. And the rest of you gave it a five or less? So now if you would, I'd like you to pick the statement that you thought was kind of the most compelling for you personally overall, and just circle the letter that you thought was more compelling, than the rest. Everybody got it. Let me just do a quick poll. So, anyone choose P? Anyone choose Q? Two of you. S? Two of you. T?

[01:24:34]

[01:24:33]

I chose S too.

Oh, you chose S. Sorry. T? Two of you. So, does that mean there's one left?

U.

U. So, let's talk about S. That was the one that got just slightly more than any of the others. Why was that more compelling?

Well, if I were opening a restaurant, I would want natural gas for the reasons that we've discussed. For cooking. And it seemed like he said, you don't really see electric stoves in commercial kitchens. So, in particular, it wasn't the individual parts so much as the business part. I don't know how you would run a commercial kitchen without a gas stove.

How about the rest of you? Why did you choose S?

Actually, for the things that it will allow you to use gas to generate electricity because it's a lot more utilization using it for electricity generation than for heat generation. Whether for heating a home or for cooking, it's using it for electricity generation is a much better use of it.

So, were you saying that you thought it was a good idea that, there was a natural gas ban?

Yes, I just read that on entirely different label.

It's hard because it's two different statements, the conjunction at two different statements.

And who was the third person that voted for that one? S, that was you. What did you like that one?

Just because it's like the most true to me and allows energy kind of like big companies that should be using something as such. I don't really think it's important for homeowners and individuals to have that as an option over - I mean if I had to choose between utilities using that or individuals, I would choose utilities, or like big plants and things like that. Big businesses.

So, I have question it seems like maybe Kelly might've taken it wrong. They're basically saying that they're going to ban new individual and businesses from having natural gas. So your restaurants that are brand new will not have it.

[01:27:01]

Yeah, it will prevent individuals and businesses from choosing their energy

sources.

An agreement that they'd get banned.

I think we had different takeaways from the same statement.

Yeah, [INAUDIBLE] statement it's true. It's has a tradeoff.

It's - yes, and I understand how the two different people interpreted that differently. So, let's keep on going. Let's go on Q. Those of you who chose Q, why did you choose Q?

I picked Q because I would like to see a more balanced situation all around where we're using all of that actual - all of the sources for all the energy rather than just concentrating on two or three or whatever.

I have a lot of wind in my yard. I could really run my electricity really well at my house. Like it's constant. You can be outside 90 degree weather and the winds come in and I can freeze. You have to put a sweater on in summertime. But I like the fact that I can choose and if I could have multiples to run my home, I would do it.

So, you'd like to have different sources?

Absolutely. Yes, as many as I could.

[01:27:42]

Why do you want all these different sources?

Because then you run better. Look, if I had geothermal, I wouldn't have such high electricity in the heating of my house.

Are you assuming that by having all these, there would be less expenses?

It's going offset. If I had untold money and riches and I could do it and I was building a brand new house.

But your assumption is that these are less expensive?

No, they're not. That's why I don't have them. I don't have solar panels because -

So, I'm still confused. You said you'd like to have multiple sources because it would be?

I would like to have the choice of having whichever I wanted in my home, I would like to have that choice.

And why do you care about having the choice? As long as your electricity comes on.

Life isn't that simple as just having electricity and one day your electricity can go off. If you don't pay your bill, they're going to shut you down.

But I guess I'm just trying to understand your rationale. So why do you care about multiple resources going into your electricity? What - why - how does that affect you or why do you like that idea? What's the benefit of having multiple sources?

To be able to go off grid as much as I could would be nice and it would be helpful to the system of things, the world in general, if we could all do that. If you have other sources of things, then it takes the pressure off.

Are you talking about going off the grid yourself? Is that what you're saying? Or -

Well, I'm just saying all forms of cleaner energy, air are good to have and balance it to be able to choose what I - you know, if I want a natural gas in my home which I see a lot of people do, my neighbor does, his bills are less. Do you see? So, financially it could be better off if you have a couple of them.

[01:30:12]

So, it's a cost type of thing? You'd like to have some -

Well, it's a conservative thing and it's good for the recycle, blah, blah, blah.

And lastly let me ask about those who voted for T. Tell me a little bit about why you like T?

Because you don't have to build new ways to deliver the energy. You just use your existing natural gas network and but use renewable natural gas instead.

And I just think it sounds the most appealing.

It was appealing to me because it was, one, renewable and the places that the delivery was already in existence, but it was mostly because of that reduced greenhouse effect of it. I thought that was very appealing, that statement.

Let me step in the back room just to see if there are any final questions for you and then we'll let you be on your way.

We never mentioned windmills causing cancer?

[01:31:37]

Right.

There's [CROSSTALK]

I think that'll do it. Thank you so much. If you would do me the favor of collecting your handouts and send them back my way and then if you wouldn't mind taking your name tags with you and depositing them on the way out. All the handouts would be great, and thanks again and safe travels home.

Thank you.

Thanks.

Project Name: **5234-E190117 - NW Natural Safety Communications**
Date: **10/29/2019**
Time: **6:00 PM**
Segment: **Day 2 Group 3**

So we're gonna start here folks. We have one, Connie, you go ahead and sit tight. Everybody else go ahead and follow me and we're gonna settle in over here.

Hi there.

Hello.

Welcome.

Thank you.

How's everybody doing today? Good?

Great.

Excellent. Come on in. Hi there.

Hello. How are you?

Doing great. How about you?

Good.

Excellent. So everybody staying nice and warm?

Yeah.

Kind of chilly outside. What's up with that?

I think it's going on everywhere it sounds like.

Yeah, pretty cold.

Which is not good.

Everybody got their phones turned off? And you got your name tags? Be sure to put your name tags facing me, that would be great. Leslie's got a lot going on here.

[LAUGHTER]

So you getting settled?

Yeah.

Well welcome everybody. So glad that you could all join us tonight. My name is Rob and as you probably figured out, I'm gonna be the moderator here today. We are going to be talking about the wonderful world of energy and energy sources. But I want you to know I'm not actually an employee of the sponsoring organization. I'm an employee of an independent market research firm. I go to the trouble of telling you that just so that you know that I have stake in the outcome of this research. So if you have something positive to stay that's awesome. If you have something negative to say, that's equally awesome. I'm really just looking for the benefit of your honest, candid opinions. Now we are in a group setting. What that means is I'm expecting each and every one of you to participate. Nobody gets to sit on their hands during this whole exercise. So I'm wanting you to all kind of express yourself somewhere along the way. Now, having said that, I don't want you to feel like there's any pressure to be falling in line with everybody else. I'm not seeking to have consensus on all the different points. In particular if you happen to feel like everybody's talking one way and you're thinking boy I couldn't disagree with that more, what planet are these people from, by all means please speak up because if you feel that way, more than likely other people in the population feel that way as well. Now, the other flip side of that is sometimes we get really enthusiastic participants and I hear from one person over and over and over again. Although I love to hear from people, I want to be sure that everybody has a chance to talk too. So we're gonna make sure that we kind of try to distribute it and have everybody have the chance to kind of participate. Now-

[00:03:40]

No-

Well you're doing okay, I'm hoping you're gonna be focused on the whole discussion here soon and not so much the eating part but we'll be good. So

once we're done, I also want to be sure that we have the-when you're having conversations if we can try to keep it to one conversation at a time as opposed to trying to do side conversations because every once in a while people break out in all these other kinds of conversations and that's a problem for me because then I can't hear all the great insights that you folks have. Couple of other things. Just want to let you know that we are going to be recording this session. I do have some colleagues in the back who are observing and taking notes, that kind of thing. But I want to assure you that we're going to be keeping all this information confidential. You don't have to worry about any of this showing up in a public domain and if you were hoping to become YouTube stars tonight, that's not gonna happen. So without further ado, let's do a quick introduction. We'll do kind of a round robin. I've given a little checklist here in the back. If you'd be so kind as to give us your name, your occupation or what it is that you do when you're not coming to focus groups that would be great. Then if you could tell us what kind of energy sources you currently have where you live and whether those have changed at all since you moved into your home. In other words, if you were all electric at one point, you put in gas or you had gas and put in all electric or what have you that would be good to know. So Shelby would you start us off?

Sure. My name is Shelby. I work for Portland Parks and Rec. as a coordinator for the senior recreation program for older adults. Currently my home uses all electric, same as when I moved in. Everything from the heater to stove, oven, everything's electric.

Great to have you here.

Thanks.

Jonathan.

My name's Jonathan. I work in cannabis, director of sales and operations. I have five teams in four states. And so I travel around quite a bit. I moved into a house that had all electric and it's still all electric.

Nice to have you here. Mark.

My name's Mark and I work in human resources for a manufacturing company. Let's see, our home is all electric except heating is gas and then we do also have a wood burning stove and it's no changes since we moved in.

Nice to have you here.

Thanks.

Leslie.

[00:06:40]

I'm Leslie. I'm disabled, stay at home but go out a lot. I'm Native American [INAUDIBLE]. I do all kinds of stuff. I garden. But when I moved in I had PG&E electric and then they said well you should switch to wind even those it's a little bit more expensive. So I switched to that, right? I mean that's what it is. I don't know, I switched to something that's more green and it's a little bit more expensive.

Well nice to have you here. Madison.

My name is Madison. I work in hospitality. I work as a reservations direction. I move quite often just because I recently graduated from college and so I'm living in a place that doesn't really include what I have so much as what is already there. Growing up, I think, though it's been pretty constant. I've always had natural anywhere I've lived because I grew up in the area. I got a gas stove.

Great to have you here. When you contribute be sure to belt it out because I want to be sure to be able to hear you. Yvonne.

I'm Yvonne and I am unemployed right now and since we've moved into our house, there's been gas for heat and woodstove. No change. And electric-

And electric as well-

Yeah, we've got that too.

Nice to have you here.

Thanks.

Marie.

I'm Marie. I'm a social worker and we have mostly electric and then gas for heat and that hasn't changed since we moved in.

Nice to have you here. And Leslie.

Leslie. I'm a case manager/social worker for an agency on aging disability and veteran services and I am doing for the last couple of months gas and heat, I meant gas as heat and then electric.

And has that been consistent?

I just moved in.

Oh, you just moved in?

I just bought my house.

Well we've got a great diverse group here so thanks so much for being here once again. What we've gonna start off and do is something called word association. So what I'm gonna do is show you a word or phrase and I want you to just chime in with whatever comes to mind. So we're starting with clean energy. What comes to mind when you think of clean energy?

Green.

Green.

Solar.

Wind.

Renewable.

Oh, you guys are too fast for me. So green, solar, what else did I hear?

Renewable.

Renewable.

Wind.

Wind.

Not dirty.

Not dirty.

No emissions.

[00:09:42]

Not cold.

Not cold.

No carbon.

More expensive.

More expensive.

The future.

You guys are good. Keeping me on my toes. What else? Anything else?

Sustainable.

Sustainable. Anything else?

Water.

Water?

Mm-hmm.

Yes.

As in like hydroelectricity? That's a good list. Let's keep on going. Electricity. What do you think of when you think of electricity?

Wind turbines.

Wind turbines.

Necessity.

Water power, I don't know.

Luxury.

Water power. Luxury? Tell me why it's a luxury?

Not everybody has electricity or needs it.

What else?

Lights.

Appliances.

Magical. Flip a switch.

Magical.

I think of all the help I've received through agencies to pay my bill.

So agency help.

Dams.

Dams. Anything else?

Multistate.

Multistate. What are you thinking of when you think of multistate? Why does that come to mind?

Grids.

Grids.

Across borders and to aid in [INAUDIBLE].

It also kills salmon.

Is this related to the dams?

Yeah.

Big power outages.

Over reliance.

Power-I know about power outages. I'm from California. And then what was the last one?

Over reliance.

Over reliance.

Ben Franklin.

This is a good list. Let's go to the next one. Natural gas. What do you think of with natural gas?

[00:12:55]

Not clean.

Not clean. What else?

Fossil fuels.

Fossil fuels.

I was gonna say cheaper.

Cheaper. What else?

I think, I don't know it if goes with it, I've seen like some shows and its fracking where they're going out there where they shouldn't be.

What else?

Heating.

Heating.

Dangerous.

Dangerous. When you say dangerous, what are you thinking of? What part is dangerous?

Explosions.

Yeah, I didn't know my house could blow.

Are you talking about just general usage or are you worried about-

Yeah, you smell the rotten egg smell-

We even had a leak once and I didn't even know.

So is this leaks, kind of leak related?

I guess, yeah, it's totally dangerous of blowing up. And we lived there for almost two years. We didn't know it was likely on the whole time.

Explosions. Anything else under natural gas?

The pilot light goes out.

Anything else?

Preferred way to cook.

Preferred way to cook.

Invisible.

Invisible. The gas itself.

Achoo.

Bless you.

Excuse me.

Well it looks like a good list. That's great. Well let's pick up on some of these topics that you raised and I guess I want to start off by asking you what do you think about-you've talked to me about the kinds of home energy sources you currently have. What are some of the factors that you consider when sort of choosing a home energy source or sticking with a home energy source that maybe you already have? What are the factors that you consider?

I would consider price and how complicated it would be to switch. If it would be worth it or not.

Availability and options.

What's already available. I guess that's the same thing.

[00:15:58]

So how do you decide, for those of you that-I think most of you basically have kept what you had when you moved in it sounds like. So why have you decided to stay with what you've got?

The hassle of getting quotes and finding someone to change it and doing research to figure out what I would want to switch to.

So that's-go ahead-

It's expensive, all electric house adding natural gas.

So it's expensive to go to natural gas or expensive-

As far as I know which might mean nothing.

So you've got all electric and going to all-to natural gas would be expensive is what you're saying-

If I wanted to add it into my mix.

And where do you see the expense coming in? Is it the putting the infrastructure in or is it the actual burning of the gas or what-

The infrastructure and then the appliances.

So the plumbing-plumbing your house with the gas lines as well as getting the appliances.

Yep, yep.

And I rent so he's chose to stay that way so far. He's asked us each time and we're just like we're fine. We don't want him to have an expense we pay too.

So as a renter, I guess I'm curious, do you care-is that even something you think about when you think about a place to rent? Do you care whether it's all electric or natural gas or-

I actually never had really cared except for baseboard. When I see a baseboard I don't want to live there. That's it.

But you're not seeking out a particular-

No-

One way or the other? As long as it has some sort of heat.

Yeah. If it was my forever house I would but not renting.

How about the rest of you?

I rent too. And when I-it's not that I look for a certain type, it's usually the price. If it's included in the rent or additional. I assume if it's included it's probably going to be the cheapest option but also with renting you don't really have the agency to choose.

But you have the choice of where you could go and rent? And I guess my question was really is it important enough to you that you seek out an all-electric or a mixed gas-

I've never said no to a house because it has-

And it sounds like that's not really been something on your checklist either?

Financially if I had more money it may be higher up on my checklist.

Any other thoughts about important considerations for your energy sources?

Well for me I switched to the greener even though it was a little bit more expensive.

Tell me more about that. Why did you switch?

Well I read about it. They sent flyers and I sort of have a low sales resistance so I thought well this is-it sound good.

So tell me again what you switched from to?

Well it's a program with PG&E. You have regular electric and the you can switch to the higher, the one that cost more-

[00:19:05]

So you pay a little bit more to get sort of a green source?

Right, exactly. So I thought well that's okay-it didn't-it was easy to switch. It wasn't any-

I think I've had those people come door to door.

Yeah, they do and they talk you into it.

So tell me what it was that convinced you that was the right thing to do?

Just that I don't want any more salmon getting killed and you know it's important.

So you switched to an energy source that was-did they say that it had nothing to do with hydroelectricity or what did they tell you?

Well-

What source did you switch to?

It's wind-

So it's just wind?

I think so. I think it is.

Can we ask questions?

I don't know.

What question do you have?

Is there anything-did they do something structurally different? Do you see something different besides your bill? So you don't know if they gave you anything different actually because the only thing that you're seeing different is-

Is paper-

Is a payment, right?

Well, I'm not that cynical. I think they did. I know PG&E is just PG&E has also helped me. They have this assistance thing so I just-

But the driving force was not just that you wanted to be more environmental but you had even more specific concern which is you wanted to save the salmon?

Right.

Any other factors that we haven't kind of touched on that you consider when evaluating a home source?

The direction it's facing.

The direction it's facing. Tell me why is that?

When I was looking for my house, I was looking for a southwest, southeast facing roof for the potential of adding solar.

Oh, so you were thinking about eventually maybe doing solar?

Yeah.

You haven't received that at this point?

There's a big-ass tree that'll probably lower my ability to get any sort of incentive to go solar.

So you've got the southwest-facing home, just, you didn't count on the tree?

It was a perk. It was part of my - it was on my radar, I guess.

Let's keep on going. When it comes to heating your home, I guess I'm curious about - I want to kind of talk about advantages and disadvantages of a couple different energy sources. Let's start with natural gas. What do you perceive as being, sort of, the advantages of natural gas, when it comes to heating your home?

More consistent. If a power line goes out -

That's what I just was hearing. If the storms happen, we would still have heat, at least.

So it's kind of a reliability issue. It's more reliable?

Yeah.

[00:22:05]

What else?

I'm a month in, and it's cheaper.

Cheaper than electricity?

Yeah.

What else?

We used to have a gas fireplace that heated the home, and it was cozy to have the fireplace. Now with the electric, it's not as fun to turn the heat on.

Any other advantages?

I haven't noticed much of a difference, from when, compartments where I lived

that had all electric and now I live in a house that has gas.

How about disadvantages? Any particular disadvantages of home heating with natural gas?

Old leaks, if you have them. Like I was saying, we had one, and we did not smell it. We had a little fireplace we never turned on, and supposedly it was just a hair on. Someone came to do something and said, "You guys better get out now." We're like, "We've lived here almost two years and nothing." Thank God we didn't blow up, that's what we thought, too. The fear, that's the common fear of that.

This was a fireplace that had a small leak?

Yeah. And, my daughter lived in a tiny, little place that had, I think, a little light thing that you were talking about - a pilot light. It was a one-bedroom place, with a bedroom that was - no room, pretty much, you'd say it's a one-room place. She had to go to the hospital. She didn't smell it either, didn't know any difference, she was like 20. It's something you don't - really catch that smell all the time.

Any other disadvantages of natural gas or heating your home? Let's switch and talk about heating your home with electricity. What do you see is the advantages of heating your home with electricity?

I can't think of any.

It's just always been there.

No advantages at all?

I don't believe so, because it is cheaper for my natural gas.

There's a convenience sometimes, when I think of heating a room or area, you just plug in a space heater or something.

Like she said earlier, it's magical. It's quicker, fast.

I honestly think it usually goes out - a power outage - I don't know, where I live. We don't really [INAUDIBLE].

Remind me again, which one of you have electric heating today? You folks don't see any particular advantages?

No. [LAUGHTER] It's more expensive.

[00:25:10]

Let's get into disadvantages. What do you see is the disadvantages of electric heating?

It's expensive. If you have the floorboards, or you have the in-wall - whatever that's called, where you turn the little knobby - it's just expensive. When I was looking for a mini-split - I think that's what it's called, where it's just like a big unit on the inside - they've gotta plumb that into the wall, and it's obtrusive. But, if you had natural gas, it's like some heater in the corner that you don't ever see.

Any other disadvantages besides the expense?

The heat will go out if the storm happens. I've had to heat the house with wood stove before.

It's not as reliable, or can be unreliable during a storm.

I don't know if this has anything to do with the foundation of the house, or maybe the installation, but it doesn't sustain heat as well as natural gas either.

You feel like it doesn't keep the heat in the -

Right, but it could be structural.

For those of you - any other disadvantages?

The quality of the heat - somewhat similar to what you're saying, Leslie, the quality of the heat - it does seem like it dissipates, doesn't penetrate as completely.

You're saying that you've noticed that with natural gas, the heat lingers longer or stays heated longer than with electric?

Yes.

I've always - even my mom's house - had a fan going in it. A couple rooms, always. I've felt like she's always - whatever heat it was, had it circulating. Now there's a tip.

Coming from an apartment where the heat is below, or coming from the baseboard - heat rises. Being in a house, now that the heat is vented from throughout the house, it comes down from the ceiling in someplaces -

Different places of heat.

Why not switch to natural gas if electricity isn't -

How? It looks like they need to inform us on how much it might be, or more, or that it's not as expensive to change our house inside, maybe, if we're all thinking it's expensive to change.

For those of you who have the electric heating today, what keeps you from going?

Do I want to put money toward natural gas? Is that going to increase my property value? Or should I put that money into something else? That's the question that I think about. What's the point of putting the money into something that I only need half the time?

[00:28:15]

You were arguing that it's a lot more expensive with electricity. If you're saving money with natural gas -

How much is it? I guess I would need somebody to come by and run an analysis.

We need more informative stuff out there for us on that, I guess.

I'm happy with what I have. When you're saying, "Why not switch?" I guess - what's it called when you have a furnace and it comes through vents?

A ducted furnace?

Forced air.

But it's electric. I have that, and then I have A/C. You program it so that it - the

temperature goes down when you're out of the house. I like it.

Let's switch gears and talk a little bit about cooking. How many of you have electric cooking appliances? Most of you. Would you ever consider going from electric to natural gas for those cooking appliances? Let's start with the folks that said yes first. Why would you consider potentially going to natural gas?

I prefer cooking on a gas stove, even if it's just heating up water. It heats it up way quicker, and you have more control over the heat when cooking. Although, I have no idea what it would take to get natural gas in my home. Figuring out how - I live in a condo building, and none of the units in the building have natural gas, so I have no idea what it would take to get natural gas into my unit, and if that would even be an option, since I'm part of a larger building.

What about the rest of you, the ones that had thought you might consider natural gas for cooking?

Same reasons. I don't think it would push me to go get natural gas though.

Just a faster, better performance?

Also same reasons. It cooks faster, the quality of the cooking, there's a lot more control I feel like. We have natural gas for heating. If there's no electricity, there's no air moving the heat throughout the house. But we've thought that if we changed - if an appliance dies, is not repairable, we've thought about switching to gas stove for cooking, and a gas hot water as well.

Some of you said that you wouldn't consider switching over from electric to gas -

I am scared to light the stove, I'll admit it. [CROSSTALK] I just hate it, but I'll do it. I've never had a place that had it yet, I've just been at places that I've had to do it. That's probably why.

[00:31:22]

You're nervous about the lighting. What else? What are the other reasons for not switching from electric to natural gas? Marie?

I like the all-flat electric stove. I like the way it looks, it's much easier to clean, and I don't really cook very much, so that works fine. I would rather it look nice

and be easy to clean, I don't care about the performance.

It's the flat surface that you like, and kind of just for maintenance -

Yeah.

Because you're not a big cook, you're not worried about the performance issue as much.

It's fine, it gets hot.

It might be easier to light now, I don't know.

Any other reasons? Any other things that are holding you back from going from electric to natural gas cooking?

I don't know what the cost would be, but when I'm listening to everybody, I'm thinking "Oh, maybe I should." I'm susceptible, it sounds good. [CROSSTALK] I know gas dryers are way better, I've had friends that have -

Why do you think gas dryers are better?

Just like you said, performance. Then the cost. I just don't know to switch.

Let me go through a few other miscellaneous things that we've touched on a couple of them, but I want to just touch on a couple other points of comparison. I'd like to get your opinions about whether you think electricity or natural gas has the advantage in these areas. When it comes to the cost of appliances, electric or natural gas appliances, which are less expensive?

I feel like electric's less.

Is that what people feel like?

Are you talking about maintenance? Are you talking about buying the appliance itself?

The actual appliance itself.

I feel like there's more out there -

Does anybody have it?

Madison, you said what?

With appliances, I feel like there's more out there. There's more of them -

More of what?

Appliances.

More of what kind of appliance? Natural gas or electric?

Electric. It's moving towards the future, so they're able to make more of them cheaper, but less quality. I remember - I've always grown up with a gas stove, and I remember when I moved out of my childhood home, and my mom moved into an apartment, she was so disappointed to have an electric stove. Visually, I hate the look of the flat-top, although I agree, it's much easier to clean. There is something with the natural stove that I think people agree, is traditional. The quality of the cooking - it's more homey.

It sounds like there's - I think I saw there was kind of a nodding of the heads there, consensus that we think that the appliances are cheaper, electric appliances are cheaper. How about safe usage? Do you feel like one is safer than the other?

[00:34:28]

Electric.

I don't feel any difference.

It seems safer.

What seems safer?

Electric.

I think it seems safer since there isn't the worry of spark. But I find that my electric stove stays hot for really long after I'm done using it, and I don't remember it being that way when I had a gas stove. I felt like the element cooled down faster, and my current electric stove stays hot for like half an hour after I'm

done cooking. And that makes me nervous.

Those of you who feel like electric is safer, why do you feel like electric is safer? What is it that makes you feel that way?

Anything that you have to strike a match or actually light to get it to work, that doesn't -

And be scared to do.

You've got to turn on the gas and strike a light. No.

I feel like part of it is, too - you were saying about the gas is invisible, you don't know if it's - if you leave the stove on, you might not realize for a while.

I also feel that way though, about electric, where it's - I feel weird not seeing a flame. What is heating my food? [CROSSTALK] It feels unsecure.

Tell me more about that, why does it feel unsecure?

It feels fake.

Do you feel like you're more likely to injure yourself, because you don't know there's a flame there?

It's one of those concerns like, "Is this bad for my health on a larger scale?" Not the food - seeing a physical flame, to me, feels natural. It's kind of scary to be like, "This is electric and this hot surface -" my instincts should be like "There should be a flame, there should be some sort of fire."

Sounds like I've got a little bit of a divided opinion on the safety aspect. Let's go to the question of energy efficiency. Which do you think is more efficient, electricity or natural gas?

Gas.

I feel like, electricity, there's more options. I think what you were talking about, Leslie, with the PGE thing, is just that a portion of your electricity is from renewable sources. I've talked to them as well. I feel like there's not that option with natural gas.

You like that idea of multiple sources? You'd like some different, original sourcing.

I think it's more flexible with electricity. There's more options for sustainability.

More sustainable resources. How about just in terms of efficiency, so the kind of energy that you get out of natural gas versus electricity? Any sense of whether one's more efficient than the other?

Natural gas seems like it pumps out more heat - like Shelley was saying. It heats up your - boils your water a lot faster than electric.

Lasts longer too, like Mark was saying earlier. It feels like it lasts longer.

[00:37:30]

Anything else? Any other opinions about efficiency? Those of you - I know we have a mix of people here - some who use natural gas, some who don't. Let me just ask, first of those who use natural gas - if your natural gas were to go away, tomorrow, what kind of an impact would that have on your life? Would that be a major deal or would that - ho-hum, no big deal?

I think that tomorrow's supposed to get really cold. [LAUGHTER]

You wouldn't have a heater.

I'd fire up the wood stove. But yeah, we'd miss it.

So that would be a big deal?

I don't think it'd be a big deal to me, because I grew up with electric and a wood stove. So I think I could - it's just the price would change, going back to electric for all of it. It would go up.

Anybody else who's got natural gas today that - if it went away? Do you have natural gas today, Leslie?

My heater is natural gas.

How big of a deal would it be if it went away?

Because I don't have the information or the knowledge to adjust to something different, then it'd probably be pretty hard.

I think that first impact is hard, but you can adjust.

Money wise, I guess everybody would have to figure out a way, if we did have only gas, to get to electric, however you do that too. [INAUDIBLE]

One of the things about having - those of you who have natural gas, you obviously have electricity and natural gas - so you've got a couple of different energy sources. If one were to go away, or temporarily be interrupted, you have, still, the other one. Would the lack of having that sort of redundant energy source be a problem, if natural gas went away? Would you care? Is that an important aspect of what you've got today, or is it not so much?

Yes, I like a hot shower, and that's hot water heat. That's very important.

Even if your power went out, you can have a hot shower. If your electricity went out, you can still get a hot shower.

Yes, because that's a gas furnace. But I guess if I didn't have a gas -

You mean a gas water heater?

Yes. So if I didn't have that though, and I had to resort to boiling water, then that would probably be an inconvenience.

How about the rest of you? Do you value that fact, that you've got different sources of - one gets interrupted, it's -

Yes.

Let's switch gears and talk about the people that don't use natural gas. What would it take for those of you today who don't use natural gas to consider using it as an energy source?

[00:40:33]

Zombie apocalypse. All kidding aside, what would it take?

What would need to happen for you to consider it?

I'd have to move into a house that already has it. Or, I'd have to really become informed on what the transition would be.

What is it that's - when you said "Zombie apocalypse," what was it that caused you to think that it was so outrageously, such an outrageous idea? Why couldn't you consider doing it today, in your current home?

I don't see any reason to switch. If there's a zombie apocalypse, I'm sure there's no electricity pumping, and I'd have to find a different way to have a hot shower.

You've got all electric. You concede that it's more expensive, but you're still not sure whether that conversion -

My electric bill, on average, is probably $60. [LAUGHTER] $25 in the summertime, and maybe $70, $80, $90 in the wintertime, depending on how cold it is.

You have good insulation.

A lot of layers.

Anybody else? Would anyone else consider it and what would it take?

I would need a lot more information on what it would take to install it. I mean I would have no idea where to begin even getting natural gas to my home much less, figuring out, replacing appliances.

Yeah doing the new pipes underground all of that. We are just not informed

Okay, great.

I would do it if there was financial incentive. Because I don't know exactly. But I've just heard that there is.

Okay, cool. Well let's move on. Let's now talk a little bit about some of the other aspects about energy sources that you folks have touched on briefly that has to do with things like the environment. The first question I have is, what do believe are the greatest contributors to climate change today?

Emissions.

What are the greatest emitters? What's creating the most carbon emission if you will today, in today's world.

Coal.

Coal, what else?

They say cows.

Cows.

I'm seriously, their burps and farts. Yeah, I'm not joking.

When you think about it worldwide, what are some?

Vehicle emissions.

Vehicles.

Amazon, they're everywhere driving trucks.

Large corporations.

So trucks and vehicles.

[00:43:35]

The big corporations.

Manufacturing.

Yeah, manufacturing, yeah.

Okay, others?

Plastic.

Plastic.

Oh, yeah.

What energy sources do you feel like are playing a positive role when it comes to climate change?

Wind, solar, hydro, nuclear.

Trees.

Renewable sources.

We got to keep there trees going.

We got wind, solar, hydro I heard and then nuclear. So what we think about that? Why are those on the list? What do you see as being positive about those particular forms of energy?

Natural.

I'm sorry?

Because they're natural**.**

Is nuclear natural?

Not nuclear.

So your thinking of wind, solar and hydro as being natural. Now hydro seemed to have some issues though. At least Leslie seemed to feel like that. Talk to me a little bit more about your feelings about hydro.

Well it's just bottom of a damn the salmon can't get up. They got these little ladders but it's killing the fist. But, it's not just that it's climate change where the waters warmer and it's killing the fish.

Yeah, no water for them to even go up half the creeks.

Are you of the opinion that they are they should be trying to move away from hydro?

Yeah, but I don't.

I heard they were trying to change the steps. I don't know but I used to take my kids there all the time. Since they found out it was like a problem they were going to try change it. I don't know if it was plans in progress or what.

So has the Bonneville damn been a source of controversy. A lot of focus on salmon.

It was recently though. I think it's very pro save the salmon. Like they're trying to change their ways.

Yeah and they've been that way for at least 10 years solid. So I felt like something might of come from it.

I think there's loss of that now. And the tribes are not requesting or mandating it. So not only the Bonneville but, there's other damns that they're really looking at ways to have.

Changing the way they make them. Because maybe they didn't understand a long time ago.

How do we feel as a group about damn in general? Using Bonneville damn as kind of an example.

It's been a great.

Is hydro renewable or does it have its own set of problems?

It has its own sets of problems. We shouldn't necessarily add more damn. We should probably take damn down. But, it's a baseline energy versus intermittent. I mean energies part of the mix versus just getting it all from one.

[00:46:43]

You're arguing that maybe retain the damns that we have today. Or maybe reduce some of them over time. But, you need a kind of a mix of energy sources?

Yeah, I think that's best.

Keep expanding wind and solar and other forms along those lines, and reduce hydro over time.

The reason I'm probing on this is I kind of want to get the sense of when we were talking about sustainable energy and renewable energy. I kind of want to understand what's that really all mean. Are some of these energies really as green as they claim to be? Or that we think they are? How about the rest of you. Do you have any other thoughts about wind, solar hydro?

The thing about hydro is, my mother used to work for Farm and Garden Administration. When they have what they all extra energy, they'll sell it to another state. But there's all types of hi jinx going on with that. That worries me that different stuff going on.

Where does natural gas bit into the mix when it comes to addressing climate change? Does it have a positive role to play? Does it have a negative role to play? Where do you feel like natural gas comes out?

I heard in the long run that no matter what the little tiny bits that do come out are smaller than coal and all that. So the emissions are as small as we could get them I would hope. Because I looked up awhile back.

Is that good? Is that bad?

It's better because the little bits that do come out are smaller particles than we can get from coal or anything else. So we're doing kind of something good.

So it seems cleaner, is that what your arguing?

The air is cleaner except to get it is awful. Like she was referring to fracking earlier an environmental [CROSSTALK].

Yeah their going where ever they find it if they can now.

It causes earthquakes.

Has anyone besides Johnathan heard about fracking?

I heard about it.

They're just kind of going anywhere and going down seeing if they can find the pockets of it and there it is. And then I don't know if they buy the land or what they do. Land addition that they're doing even Indian reservations. So they don't

do it there.

Is that a concern than?

It is because we don't know enough about it.

What about the rest of you?

Tribes are really desperate for money so their selling their natural resources rights. And then their fracking and that ruins the soil. It's basically ruining the earth when they do that. So, yeah that's a tough one. I don't know what the lesser of the evils is honestly.

[00:49:46]

Yeah.

What I'm hearing is that on the one hand there's concern about the processing, the kind of getting it out of the earth. On the other hand from a burning standpoint it might be an improvement over some forms. Is that what I'm hearing?

Yeah.

Yes.

So it's cleaner on the back end. Cleaner than what?

From the choices we have of like coal and everything else so far.

So cleaner than coal? How does it fit into what you were talking Johnathan in terms of this? You sort of articulated that you thought it was important to have a mix of different energy sources. Does that fit with your thinking? Does natural gas fit into that mix?

In the near term. As we get more renewable solar, wind online. Or battery innovation and the climate of those.

Important in the near term but with a goal of trying to expand.

Get rid of coal, get rid of natural gas. Get toward wind and solar and other forms

of renewable. And figure out ways to store energy or battery or some along those lines.

How about the rest of you? Where do you come out on that? How do you feel about natural gas and where it fits in the scheme of things today?

I think we should have a mix definitely. You want a backup for everything.

Okay, others? Good to be a part of the mix?

Yes, it has a place in the foreseeable future until the technologies, you know.

Some west coast cities are considering potentially passing or implementing new natural gas hook up bands. So that if they're doing new construction. Some municipalities are thinking about actually banning natural gas in new construction. I'm curious what you think about that? Does that seem like something you support or do you have some reservations about them kind of keeping you from having a choice?

I Support.

Why do you support it?

Because than there's less consumer buying it. And then there's a lot more opportunities for the switch and help people get there.

The abilities your deciding, yeah.

How about other folks, what do the rest do you think?

I'd be curious what the reasoning is. If it's a safety concern based on issues that places have been having that are wired for natural gas. Or if it's based on climate concerns.

[00:52:50]

I believe that for the most part it has to do with their thinking about climate issues.

Who has accessibilities to natural gas and who doesn't? And who does it affect the most and impact the most? These bands.

If would basically affect anybody who was in those municipalities that were going to be doing new construction. Let me through another variable in and just see how that effects your thinking. While those municipalities may actually do a ban for new construction. At the same time that would not effect the electric utilities companies which actually are switching from coal to in fact natural gas. So they are actually.

Might need to find a way to do a switch to that's going to help.

I guess what I'm really saying is that a lot of the utilities are actually moving to natural gas to fill their buckets. I guess what I'm asking is does it make sense on the one hand to have a municipality that sort of bans it on the individual level but, allow the electric utilities.

Yeah.

That's weird.

It does or it doesn't?

It's not right.

That's not right, that's not okay.

And why isn't? Why do you think it's not okay?

Because I don't have to spend time on the individual. Just for the reason you said. I don't have a choice on an individual level. But on a global scale, if they're going to natural gas it just doesn't seem right. The playing field is off it.

Any other thoughts? So you sort of feel the same way?

Yeah.

Any other thoughts about that?

I was going to say that this ban in Brooklyn is only on new construction. It's not going to affect poor people. That's all I can see arguments. It's like poor people are still going to have to pay high prices for whatever type of energy they have and they're not going to have a choice. Even if they want brand new

construction.

So they won't be able to happen there at all? Or it won't just be put into the new housing. Can they change after or is this ban?

Yeah, you wouldn't be able to do new installation. So things that were new.

Yeah, that doesn't make sense if we're moving towards it. Because you'd want to have choices.

I guess there could be you know. And the reason of course why the electric utilities are moving to that is that they don't have enough capability today with solar and wind and others to kind of fill the need. So they're moving to natural gas. Any other thoughts? And Johnathan your thought about that does that change at all, given that?

I agree and disagree. Like yes, but also how do you change how we get our energy is going to come from the bigger players and from peoples voice. So that municipalities out to make those types of decisions than that will change ultimately how an energy company will source. If California was like no more natural gas than there would be a shift in where energy companies are eventually going to get their mix a lot faster than get it done.

[00:56:31]

I think the real question and I don't know the answer to this. Where are they today in terms of these being able to source energy from solar and wind and those kind of geothermal, those kinds of things. Versus the need and how quickly could they really get to all renewable kind of a load. But I hear your point.

I don't believe that in California, sure. But here in Oregon we're not going to run out of electricity so that switch to gas. Because we do have longer power. So, we're not going to have to worry that the electric companies going to switch.

And those are wired electric companies. They're not switching to those.

They don't have no hydro I guess. Somethings are [CROSSTALK]

All right so I want to switch gears now and talk about a different product. Something called renewable natural gas. Has anybody ever heard of that?

No.

No.

Heard of that, don't know anything about it.

Here's what we're going do. We're going to talk about that so take one and pass it along if you would. And then once you have it I will read it out loud. And while you read it along silently. all right? So, renewable natural gas. Renewable natural gas is produced from local organic materials like food, agricultural and forestry waste, waste waters or landfills. As these materials decompose they produce methane. That methane can be captured, conditioned to pipeline quality. And delivered in the existing pipeline system to vehicles and homes and businesses. Where it can be used in existing appliances and equipment. This provides a renewable energy option for the natural gas system. In the same way that wind and solar are used to generate renewable electricity. Enclosing the loop on what would otherwise be wasted gas. Renewable natural gas can provide up to an 80% carbon reduction benefit. What do we think about that? What are your initial impressions?

Approved.

Right.

Another way we should go.

Yes. I say let's do it.

So tell me why? I'm hearing positive things but elaborate a little bit for me. Why is it positive?

Seems less wasteful.

Yes.

It's not mining it out of the earth somehow.

And we have so much garbage.

Using a sustained.

The garbage dumps.

Tell me about the garbage. And we'll come back to you Leslie, hold that thought. Tell me about the garbage. What is it about the garbage?

Garbage is just piling up everywhere in every state and everywhere. If we could have a way to have us. We already recycle here. We could do some recycling otherwise.

Do you think of this as recycling?

Kind of. Well, no I guess they're doing it in their own way. But if they need food, like recycling. We could all give them some food. Like there's ways to do it definitely.

[00:59:35]

I guess what I'm wondering I mean, so they descried here where their taking methane. That would otherwise escape.

A compost pile.

By using it, is that a form of recycling.

Yes.

Yes, cause we've done it in my backyard. My mom did it all of her life. Everything goes way out back and then they use the soil to grow the vegetables.

Okay so it's a form of recycling.

Absolutely.

Leslie I'm sorry, you started to say you had some qualms.

I think it just sounds a little too good to true, 80% reduction. I don't know.

Why does it sound too good to be true?

I'm just cynical of this.

The number sounds too high to you?

Yeah, it really does.

I think the way to think of that number is that think of all this methane that currently isn't being captured. And so it's just going off into the atmosphere.

Up in the air, yeah.

Right.

What they're basically saying is their able to kind of capture it and use it. And therefor prohibit a bunch of it going off into the atmosphere.

Where I live there actually is a place that does that. And you see steam and stuff coming off of it. Because they mix all the stuff on the piles.

Tell me what place is this that your referring to.

It's right by Clackomos Town Center. I've grown up there always and we always seen these piles and they redo like, I think it smells like animal waste and some wood chips. And I don't even know what. But, it smells pretty ripe some years. And then you see it. So it's wasting up into the air there.

What is your understanding of what they're doing there?

That they can do it.

And who is running it?

I don't know. Maybe some wood place. I don't know what they sell there. What their reselling, fertilizer might be.

Bark dust.

Yeah bark dust, something of the sort. But if they're doing it and I see that methane going off. If they have some way I think it would work easy.

What else was it that your liked about this concept that we haven't talked about so far? I get the higher level idea that your taking something from waste.

Is there anything else here in this description that appeals to you?

It would be more of a baseline energy source than solar or wind.

What does it mean by baseline energy source? What do you mean by that?

It's consistent. There's no indeterminacy of the suns out and you have power. If the winds blowing than you have power.

So it would be a consistent energy source.

Yeah we're going to get a lot of animal waste and food waste always.

And that it can use the existing pipeline system.

Is that important?

I think that's less wasteful too in itself. Not having to replace all the infrastructure. Is also eco-friendly in itself.

Okay, terrific. Anything else? Does this? I'm sorry.

I had a similar reaction to Leslie where it seems almost too good to be true. I'd be curious what this anaerobic digester in the conditioning equipment. You know what kind of emissions those let off. How much energy does it use to run those? Is it really offsetting if we're having to go through all the processing to get it into natural?

[01:02:57]

Yeah. I think- great question, so you'd like to get some reassurance that this isn't sort of pumping more energy in to get energy out. My understanding is that the beauty of this is that there's a lot of biology at work here. And so it's the natural process that's getting off methane. So the garbage dump, the reason why you smell things is-

It's working.

It's happening on its own.

I think the bye product is there's soil in it that can be used.

So there's a possibility that you can have some bye products that you can still use as well, okay.

I just wonder as my daughter would say, if it's hella expensive, to do all this. Otherwise they'd be doing it now.

But some places are doing it and this is just on a larger scale, I think.

Because I didn't know anything about it.

So now that you've heard about this, does this change your concept of natural gas in any way?

Yes.

In what way?

More positive.

The extraction method is not nearly as environmentally awful. It's actually-

And you don't know how long are they going to go around looking for pockets of it, how many pockets are left. So this is a way for them to start thinking of this instead of looking for the pockets in the earth.

And how would this make you feel about a utility company that actually offered renewable natural gas? If you knew that they were offering that as opposed to somebody that offered only conventional natural gas? How would you feel about that organization?

I would like it.

I mean what would that say about the organization itself and its characteristics? [CROSSTALK] Sorry?

Innovating and addressing potentials for climate change [INAUDIBLE] carbon.

So they're innovating but also showing some concern about the?

Concern about reducing the output harm.

Any other thoughts about what it says about a company that offers this kind of a product?

Forward thinking.

Innovative.

Risk taking.

They are about the environment and the future. [INAUDIBLE]

We have another concept I want to run by you and this one is called renewable hydrogen or power to gas. I'll read this one again, while you read silently. Power to gas is a process that captures surplus wind and solar energy and converts it to renewable natural gas or hydrogen through electrolysis. This renewable energy can be stored and then blended into our pipeline system to one day serve homes, businesses and vehicles. So just a couple of little side notes, when they talk about capturing surplus wind and solar, one of the things that is true about wind and solar today is a lot of times you're capturing it during the day when the demand is lower and there's not a good way to necessarily store it in all cases. So that's part of what the thinking here is, that you would be able to use that excess that is generated and use it to kind of go through this process and what this process is showing is a process of separating water into hydrogen and to oxygen. And then using either the hydrogen as power or combining it with carbon dioxide, so just extracting carbon dioxide from the atmosphere, combining it with a hydrogen which creates methane and then you could use that as a gas source. So that's the concept, what do we think?

[01:07:30]

I'm a little less interested in this compared to the other one.

Tell me why?

It's making methane and we're using an already renewable energy and trying to transform it. When you can figure out a way to store the renewable energy to be used at a different time.

So you're arguing that you'd rather see the effort put into finding a way to

store the renewable energy-in a different sort of way this is in fact storing the energy. It's just not enough battery form, it's in a different chemical form.

The methane is a pollutant.

Now what about the hydrogen side, so what's a little confusing about this diagram is it shows two different forms. One could be that it creates methane but the other is that it creates just hydrogen that you can use as a power source. And when you use hydrogen the bi-product is water at the back end, does that change your opinion?

I don't understand the concept of hydrogen solves being available at some point to power vehicles and I don't understand the chemical process.

So the chemistry behind it all. So it feels a little mysterious still? And it's not totally clear as whether it's as clean as maybe-

Yes, gas goes through electrolysis, all these [INAUDIBLE]

It's also just not visual, with the renewable, natural gas.

Yes, you was just like I've seen it, I've seen these things. Because it's harder to see on the logo and if you don't understand it, you're really putting your trust into the larger company.

Well let's pull this apart because I just want to be sure I leave with a clear understanding of where the hesitation is. It may be in a couple areas, one of the things Johnathan brought up was his initial concern was that you were taking renewable energy in the form of say wind and solar and transforming it into something else. That seemed kind of weirdly happened, it didn't make a whole lot of sense. Is that one of the hang-ups that people have?

One, yes.

Do other people have that hang up or is it the second part which is the chemistry part is a little unclear how the chemistry all comes together and whether the chemistry is really that clean?

Yes, I'd say for this one it is for me.

What is which?

The chemistry is clean and what because that's a lot of who knows what.

[01:10:31]

So for you it's more the chemistry issue as opposed to converting?

Yes.

How about for the rest of you?

It's both.

It's both?

And it seems like with this one that may actually cause more [INAUDIBLE] than it cleans up. I mean the risk may be even higher.

Hydrogen, I mean there's a hydrogen bomb, right? So I don't see turning that into-

Yes, but you've probably heard of and admittedly there aren't many on the road but you've heard of hydrogen vehicles, right. And there are some companies that are selling hydrogen vehicles and their emission is water.

Wow, I didn't know that.

But the issue is making the hydrogen but then it's been powered.

I guess I don't know enough about it at all. It's too scientific.

So this isn't necessarily, I'm not sensing the same level of enthusiasm as the first one.

No.

And this wouldn't necessarily move the needle for you in terms of this doesn't change your opinion in terms of natural gas? Your perception of natural gas? If this was offered.

I think I would want someone who wasn't the utility company to explain it to me

because this one I definitely feel like I don't understand it well enough. And I'm probably missing something.

Fair enough. So let's go back to the renewable natural gas thing for a second. If utility was offering renewable natural gas, would it still make sense, I mean would you be supportive of municipalities banning natural gas for those new constructions if in fact utilities were offering renewable natural gas?

Say that again?

So those of you who were supportive of the idea of banning natural gas for new construction in some of those municipalities we were talking about earlier. Would you still be supportive of that if you knew that the utility was actually offering renewable natural gas? Would you want the utility to be unable to provide renewable natural gas in those municipalities?

If in fact they did actually not provide natural gas from fracking.

Yes if they did ban it, this would be a great choice for anywhere.

So you would be supportive of a utility being allowed to offer renewable natural gas?

Yes, anybody should-

But the difference between-

And not be banned, in other words. [CROSSTALK] So allow the renewable even in the situation where they would otherwise ban natural gas? Is that right? Is that what I'm hearing?

[01:13:40]

Yes, but what natural gas is coming into your home? I've signed up for the same thing as Leslie for renewable energy and you pay a higher fee and I believe that dollar amount goes toward the purchase of renewable energy. But the energy that is coming into your home, you don't know how that energy is created. So if natural gas is-

Is one of the ways?

Yes, I'd want to know if the natural gas came from this versus-

[INAUDIBLE] supporting that?

Pardon?

Or just like in the PT example, if this were available that you were paying to support development.

Yes, for it to be a lifted restriction that I'm not sure.

So in general though, I think what I'm hearing is if you knew that renewable natural gas was what was being offered, you would want that to be unrestricted. You would want that for everyone to be able to get, have the opportunity to get, renewable natural gas.

Is this a company that offers multiple renewable natural gas and natural gas or solely renewable natural gas?

Well I'm guessing that companies that would get into this would at least at one point be offering both. But I guess my question-

I mean in the future right-

I guess my question was really more in terms of the cities that might consider banning if they had this as a choice, would it make sense to eliminate the ban for this particular kind of product?

I don't see them lifting the ban if they-

Or avoid the ban, I shouldn't say lift the ban but I mean if this were an option would there even need to be a ban, I guess is the question.

Yes, because more people might start going towards this rather than-because how do we know how many, like I said I don't even think the companies know how much is down in there. The real natural gas or whatever company, they don't know how many more pockets of gas they're going to find. So they probably want to start down this themselves.

I'd be afraid that it would only be for rich people, honestly. When I look at this it seems like boy, this is expensive.

Why would this only be for rich people?

Because I think the toll of developing this whole process would be very expensive and they would pass it on to the consumers.

So they would need to kind of prove to you that it's an inexpensive process and it wouldn't add significantly to the bill, if at all. Again my sense is that this biology at work and so-

Yes I feel like this is more farm-if you think more farm wise and a natural way to doing things then there's going to be only one or two steps and then you've got the [INAUDIBLE] stuff and this is totally, who knows what. I'd rather go for this always.

[01:16:53]

Got one more handout for you, so please take one and pass it along. And what we're going to be talking about here in the last remaining minutes is some different messaging for natural gas and what I want you to do is I'm going to read all of these statements out loud. And then I want you to spend a minute or two just kind of determining which one you think is the most compelling statement of the five statements here and put a checkmark by it. And then I want you to indicate which one you think is the least compelling, the least convincing statement and put an X by it. So first statement is natural gas is a vital part of a reliable energy strategy because alternative energy sources like wind, solar and hydropower are not able to meet all of the state's energy needs. Second statement, all forms of cleaner energy hydro, wind, solar and renewable natural gas are needed in a balanced low carbon future. Natural gas bans will allow utilities to continue using gas to generate electricity but will prevent individuals and businesses from choosing the energy source that best meets their needs. The existing natural gas network can be used to deliver renewable natural gas and dramatically reduce greenhouse gas emissions as a result. And lastly natural gas is a uniquely attractive energy source because of it affordability, reliability and cooking and heating performance. So take a moment, choose the most compelling and what you consider the least compelling. How are we doing, has everybody made their choice? We're all good, okay. Let's start with the most compelling first, I'm just going to go down the list and if you've chosen it as your most compelling just raise your hands, so I can count you, okay. Did anyone chose P as your most compelling? Q? Two of you. S? T? One, two, three, four, five, six. So nobody on U, I'm

assuming? So let's talk a little bit about T, the existing natural gas network can be used to deliver renewable natural gas and dramatically reduce greenhouse gas emissions. Why was that the most compelling?

[01:20:54]

I like it because it gives people who already have a home setup to use gas a more clean option without having to switch over to electric and changing all their appliances.

I also underlined existing [INAUDIBLE] could use the pipelines already, that feels like it's recycling itself.

Any other thoughts on that one?

Well it says dramatically, that got me. It didn't say 80% but it still said dramatically reduce.

So that's more believable to you?

It's a little bit better, yes.

No over promising for you? Anybody else? Any other thoughts, the six of you who chose that. What particularly you found compelling about it?

I like the tone.

Tell me about that, what is it about the tone that you liked?

I mean it just covered a lot of the elements that are compelling to me.

Like what?

Existing natural gas network, renewable natural gas, dramatically reduce greenhouse gas emissions as a result. It just covers everything.

It kind of shows the cause and effects too, it's showing you-

Cause and effect?

It's showing you what could happen by doing this and it's a positive outcome.

That's what I was thinking, if then, if you do this then.

Now a couple of you chose Q, so I'm going to give you your time as well. What did Q stand out for those of you who chose it?

Because I think we need everything, we just need all our choices written down until we get it down. They're all important.

And who else?

I agree with Yvonne, just the way it was worded, I liked the fact that it's specifically says renewable natural gas instead of just natural gas. And I like the fact that it's grouped among options. And it's not saying that others are the cleanest, I don't know, all the power options I think will have their own impact. Some more than others and if you're not just looking at carbon impact, which I think is critical but I don't know I guess that collectivity and talking about the future of a balanced and low carbon future, all of that was appealing.

So the sense that balance is kind of key, you have to rightly reflect that different energy sources all have their trade-offs?

[01:23:58]

Yes. I think that's true.

Let's switch to least compelling, and we're going to go through the same exercise. Anyone choose P as their least compelling? One. Q as their least compelling? S as their least compelling? One, two, three, four, five. T? U? Two of you. Let's talk about S, why was S not very compelling?

Because you can't choose, you need choices. It's preventing individuals and businesses from choosing. And the more we know, the more we'll want to choose.

How about the rest of you? Why did the rest of you choose S? How did you interpret it?

To me, it just - it highlights the fact that individuals and businesses wouldn't be able to use natural gas, but the electric companies would to sell you electricity, which is bizarre.

Power differential is crazy.

That's bothersome?

Yes.

Yes, that's what I found strange about the natural gas ban in the first place, is natural gas would still be used, just to produce electricity, and then that's our only option, or our business's only option.

Anybody else who chose that have any thoughts on why you chose that?

It's confusing, actually, because it's like it's saying natural gas bans are no good, but just the way it's worded and the way it's not really clear as to what are they -

What are they trying to -

The idea, are they -

Are they arguing - it's not clear whether they're arguing for natural gas or against natural gas, is that what you're saying?

Right, it's - yes, that's what I think.

It was kind of confusing?

I don't know.

A couple of you chose U, natural gas, the last one, is uniquely attractive energy source. Why did you choose that as least compelling?

It just sounds like a commercial. It doesn't sound sincere, like if I read that somewhere I'd be like "Oh, great," want me to buy more natural gas.

I also [CROSSTALK] chose this one because it obviously is not compelling and it does sound like a commercial, but I do want to point out that it is exactly like what we were saying earlier. Sometimes they're like, better cooking or [CROSSTALK] I just said I don't care about those things [CROSSTALK] That is not compelling to me. [CROSSTALK]

Who else -

It's funny.

Chose this as a not compelling? And why did you feel it was not compelling?

[01:27:04]

It seemed basic in its delivery.

It was the - was it just that it was uninspired delivery, or was the message somehow lacking? What was the -

The message doesn't - I'm not going to - the message doesn't evoke much emotion to me.

Did you feel like the message was accurate?

It's accurate.

But it didn't really -

But it's not compelling, I'm not like -

But it -

"Oh my God, that's amazing."

It also feels like it's on a small scale. All the others are focused on a larger environmental impact.

And this is just about your cooking and heating preferences.

It's reliability and affordability.

Fair enough. I am going to step in the back room just to see if we've got any final questions before I let you go.

Does anybody understand the chemistry on this?

I know. Just the wording on it has too many chemical things they're going to do

to water is what I figure, and this one, like we say, we've kind of known about this our whole lives if you farm or anything at all. And we know it can work.

But what if this conditioning equipment is this? It doesn't really break it down, it just says conditioning equipment.

But with natural stuff I feel like it's just some not amoeba things they put in with all this stuff instead of some weird chemical, then instead of chemicals or some weird - [INAUDIBLE] natural, so have it in itself.

I looked into an anaerobic digester for food waste once upon a time and the byproduct was a soil benefit you could add to farms or whatever, gardens.

That's even better.

But the process to turn it, I don't remember the process to turn into energy, though.

What about that hybrid hydrogen cell? I guess that's what I've heard, that it's - the byproduct is - or is water. I just don't know how it works.

How to strip chemicals and change them?

That's very interesting.

And if they're doing it in cars now, I have not heard of that one. [INAUDIBLE] So we can just fill up on water when we get those cars? I don't know.

I don't know either. Just -

Interesting.

[INAUDIBLE] chemistry.

[01:30:04]

We just all need to be more informed, it's just a true fact.

I do have a couple of quick questions here. When we were talking about the renewable natural gas, a lot of you were saying this seems pretty cool if it in fact was possible and all of this. How would you feel if you knew that it was

available now?

They should be using it. They should get it out there.

They should definitely be -

Are you - would that be something you'd be excited to start using right away?

Yes.

And they should be promoting right away?

Yes.

I feel like I have heard about it [CROSSTALK] but I haven't honestly cared about it because I've never talked this much about natural gas.

Is there - there actually is a Portland wastewater treatment plant actually is an example of where that's going on.

Wow. [INAUDIBLE]

So thumbs up is what I'm hearing you say?

Yes.

An enthusiastic thumbs up. Those of you who are also into electric and had some questions about - pretty supported the electric, if you knew that 60% of electricity that's generated today was actually generated from fossil fuels, would that change your opinion -

That's -

About electricity?

That's still stuff from the earth, like rock or air - or gas, also -

It could be -

Fossil fuels are gas?

It could be coal, it could be -

All those ways.

Natural gas, it's all the different fossil fuels out there, so does that change your opinion about electricity?

Yes.

That's a lot.

Kind of, but that's also why I signed up for the [INAUDIBLE]

That's why we need this because everything's being taken from the earth, so we need to do something from this, which is just wasting all over on earth.

Would - was that a surprise, when I said 60%, was that kind of a surprise -

Yes.

To hear that that much was being used to generate electricity?

[INAUDIBLE] If that's true, it is, yes.

So it's more -

Sort of shocking?

Of our earth being used.

What was it five years ago, though?

That -

You know what I mean?

To answer your question.

It's going down.

Are the -

I thought it was hydro, though, electricity.

What -

I'm surprised it's that low, honestly. I didn't think that we were actually getting that much energy out of solar and wind and I thought those were kind of smaller things.

It could be also hydro. Hydro I'm sure is part of that, geothermal and some of these other things.

Is part of the 60%?

No, is part of the 40%. And then the last thing I wanted to run by you is - and this is actually kind of in response, Jonathan, with - to something you were raising, which was back on that hydrogen to power concept, where they were doing the transition from excess wind and solar and converting it into hydrogen or methane or whatever, and you made the point that you'd rather see it go into a battery storage as opposed to doing this conversion. If you knew that the battery storage was only good for a matter of hours, because that's kind of where we're at today with the futility scale storage, whereas this conversion could actually allow you to convert and have this energy stored for months, because it's converting it from something that's transitory into something that's now a gas that you can hold onto for months, would that change your opinion at all or not?

[01:33:36]

If - in some ways, if that's my alternative. Is it just natural gas or is it renewable natural gas made like this? Then I would take renewable natural gas made like this versus the other.

The fact that - I guess what I was really testing was this idea of - because I get what your point was, which is about if you could wave your magic wand and you had a battery that could store this for an infinite period of time, that would be preferable. But I was just trying to get a sense of if you knew that the battery could only store it for a matter of hours or you could convert it into this gas that could be stored for months, whether that would change your opinion about the - that other?

Would you have a choice of this one, this one, and it - or in the future - ?

It was specifically -

Choice in this one?

It was specifically - I'm specifically talking about the second one, the second one.

In the future, we may have a choice of this one, this way, getting it another way, or a regular way?

What I - no, I'm sorry if I'm -

No?

Confusing people. What I'm saying with this second one is that with excess solar or wind power today, Jonathan was saying "What if you could just put it into a battery and store that extra wind and solar power?" We all think that would be great. What I'm saying is the technology today can only store it for a matter of hours when you're talking about a huge scale of electricity. But with this process, you could take that same energy and convert it into these gases and you could store those gases for months as opposed to hours. My question was does that change your opinion about this second concept?

Yes, giving us more info on it, I think it does, yes.

Suddenly this one seems a little more viable?

Yes, little more -

Little more -

Acceptable and just -

Understandable.

Maybe need more info on this part.

A little more understandable?

Yes.

If there's anything [INAUDIBLE] your point, I was like "Why would you do that," but -

No, I hear you.

It's true, the battery, the capability for storing.

No, I think you bring up an excellent point and I'm glad we had that - the follow up on this. You guys have been a terrific group, I really appreciate all your insights and all the contributions. You've been really a super group. If you could do me a favor of handing in all your handouts, and if you would also do me the favor of taking your name tags with you since the likelihood that the next group won't have your same names, that would be great. Thank you all.

Thank you.

Safe travels.

Thank you.

Project Name: **5234-E190117 - NW Natural Safety Communications**
Date: **10/29/2019**
Time: **8:00 PM**
Segment: **Day 2 Group 4**

Hi.

Hi.

How are you?

Good. How are you?

Welcome. Hello.

Hi.

How are you?

Okey doke.

Good. How's everybody doing tonight?

Good.

Keeping out of trouble?

Yeah.

Stay in more.

So far so good? I always think it's a good thing to keep out of trouble. How about staying warm? Is it pretty chilly out there?

It's chilly.

Mm-hmm. [INAUDIBLE]

So everybody have their name cards by any chance? If you do, if you could put them facing me, that would be awesome. Terrific. Well, welcome everyone. My name is Rob, and as you probably figured out, I'm gonna be the moderator

here this evening. I am here to have a discussion with you about the wonderful world of energy and energy sources. Now, having said that I want you to know I'm not actually an employee of the sponsoring organization. I'm an employee of an independent market research firm, and I go to the trouble of telling you that just so you know I have no stake in the outcome of this research, and in turn, what that means is if you have something positive to say about what we're talking about today, that's awesome. If you have something negative to say about what we're talking about today, that's awesome. We're really looking for just the benefit of your candid honest opinions. All right? Now, we're obviously in a group setting. I'm not doing a one on one interview. But I am counting on all of your to participate. Nobody gets to sit around and listen to everybody and say mm, very good. No, you got to participate as well. But that doesn't mean you have to jump on the bandwagon and agree with what everybody else is saying. I'm not looking for a consensus necessarily. I just want honest opinions. So if you happen to agree with everybody, great. But importantly, if you hear somebody say or several people say something, and you're thinking to yourself what planet is that person from? I couldn't disagree more. By all means, please speak up. If you feel that way, no doubt other people in the population feel that way as well. Now, now that I told you that I'm looking for all of you to participate, I also want there to be kind of a balance. So sometimes I get some individuals that are so excited that they want to be front and center on every single question. Try to be considerate and let everybody participate. But I think this looks like a group that's gonna be willing to kind of share and kind of dive in and have different opinions shared. So that will be great. Couple of housekeeping things. I want to be sure that when we have our conversations, it's one conversation at a time. Again, every once in a while people get so riled up about things, they start having these side conversations. Drives me nuts. I can't hear all the great conversations that are going on. I can't kind of record all of that, and that's really important to me. So one conversation at a time if we could. Also, we are going to be recording this session and I do have some colleagues in the back that are observing, taking notes, that kind of thing. But I want to assure you that we're gonna maintain confidentiality. None of this is gonna show up in the public domain, and as I always say, if you were hoping that this was gonna be your breakout moment on YouTube, you're gonna have to come to another session. That's not gonna happen tonight unfortunately.

[00:04:24]

Do you have sessions for those people?

I keep wanting to have one of those sessions, but it hasn't happened yet. So.

And it's not gonna happen again tonight unfortunately. So I think we've covered all the rules of the road, and what we'd like to do now is kind of get to know each one of you just briefly. So I've created a little cheat sheet in the back. If you wouldn't mind telling us your name, your occupation or whatever it is you do when you're not coming to focus groups at this time of night, and then what I'd love to know is what kind of energy sources you have both now, meaning do you have all electric, all natural gas, some sort of combination, and then also I want to know if that has changed at all since when you first moved into your home. Did you switch anything out so that you know you went from electric to natural gas or vice versa. Any of that kind of stuff. OK? So without further ado, David, would you mind kicking things off for us?

My name's David, and I'm retired military. Retired journeyman electrician, and right now, I'm a- I work as a- at a Bridge car restoration place for antique British cars.

Cool.

So that's what I do for fun now, so.

Nice.

Home energy sources now is natural gas. Then was natural gas. I'm probably the scourge of the community because I have a fireplace and I do burn wood but I think-

So you have natural gas for what? Your heating?

Heating.

Water, heating.

Water.

But you have electricity as well.

Yeah.

But it's basically been the same ever since you've been there?

Yeah. The only thing I've changed is all compact fluorescent energy efficient

lamps, so.

Great. Well, terrific to have you here. Natalie?

I'm Natalie, and I'm a software engineer. And my home is all electric.

All electric?

It was when we moved in, and it still is.

Terrific. Well, nice to have you here. Don?

My name's Don, of course, and I just retired. I was a plumbing salesman for a wholesale company forever. And my house is electric. I replaced the heater. There's forced air unit in the living room, and the baseboards have all been replaced because they were old and inefficient. But-

But always electric?

There's no way to get- the complex is 80 homes and there's no gas in there. It's just right off 123rd too.

But- I mean conceivably, it would have gas?

If they piped it in off the- the main clubhouse has gas, but that's as far as the gas company went.

Well, great to have you here. Kurt.

[00:07:25]

My name's Kurt Ramer. I work for a mortgage servicing company and also the Hillsboro Hops.

And I'm sorry. Also the?

The Hillsboro Hops.

And what's that?

It's a baseball team in Hillsboro. Minor league baseball. And I have a gas water

heater and an electric furnace. And that's the way it's been since I lived- moved.

Terrific. Well, nice to have you here. Brianna?

Hi. Brianna. I work at a Q center as operations coordinator.

Sorry, a what?

Operations coordinator.

No, a Q center?

Q center.

What's a Q center? Sorry.

The LGBTQ center.

OK, sorry.

And before that I worked at energy efficiency companies and I've worked in construction. And then right now I have natural gas, electricity, and a fireplace, and it's been like that since I moved in.

Great. Well, nice to have you here. Sarah?

Hi, my name is Sarah, and I mostly am a stay at home mom but I do a little housecleaning on the side. And we have lived in our house for a long, long time, and it has always been all electricity. Similar to somebody that said they had the baseboard heats, and when remodeled, we went from those to the- where you turn the knob or they run on a-

Fan?

Thermostat. Thank you.

Forced air kind of thing?

Yeah. And the reason why we've never gone electric- or gas is because it only comes down to the end of our road and would cost a lot of money to have it ran the rest of the way. We've looked into it before. So yeah, we're all electricity.

Well, nice to have you.

Thank you.

Renee.

I'm Renee. I'm a bartender/server. I just moved, My house was electric and gas, and now, I just- I like in an apartment that's all electric now.

So you're renting?

I'm renting, yeah.

And when you rent- when you were looking for a place to rent, were you seeking an all-electric? Or did it not really- did it really not matter when you were choosing a place to live?

Cheap rent was what mattered to me. [LAUGHTER]

So if it was cheap rent and it was run by oil pump or whatever, you'd be OK with that.

I guess I didn't think about it. I didn't even realize until I moved in, but.

So you're all electric now though?

Yes.

Great. Well, nice to have you here. Dominica?

You said that perfectly.

Excellent.

Dominica which is frequently mispronounced. I am an administrator at a civil engineering company. My- I pay an electric bill and power bill, a gas bill. So that's what I know. [LAUGHTER]

[00:10:32]

You know that you've got gas and electric, but you're not sure what's driving what.

Yeah. Nope. I don't know. I know my stove is electric, and I've been there for over 20 years.

So things haven't changed since you've been there. Great. Well, what a great group we've got. Nice diversity. It sounds great. A lot of different experiences, so I'm sure that will be really helpful for tonight's discussion. What I'm gonna do first is go over here and we're gonna do a little exercise called word association. And it's super simple. I'm gonna put up a word or a phrase, and I want you just to chime in with whatever comes into your head. Here we go.

Do you want us to raise our hands?

Nope.

Just call?

I just want you to- just to chime in, so when you see clean energy, what do you think of?

Windmills.

Windmills.

Hydroelectric.

Windmills. Hydro.

Solar.

Solar panels.

Solar. What else?

Those buses that are what? LPG or something like that.

LPG?

The diesel buses or the-

The electric buses?

Propane.

Propane bus.

The propane buses.

Propane buses.

Biofuel.

Propane buses. Biofuel. What else?

The corn they put in gasoline. They-

Ethanol?

Yeah, ethanol.

Clean energy. Clean energy. What's it come to mind?

Policy changes.

Policy changes. What are you thinking about when you think policy changes? When you- meaning?

What we consider clean energy [INAUDIBLE]

So there are gonna have to be policy changes to get to clean energy? Is that what you're saying? OK. Any other thoughts?

I honestly do not know what clean energy is, but would it be like powered by water or anything like that?

That's- yeah. Hydroelectric.

Because I did not know that.

Electric vehicles that, you know. Electric vehicles.

Electric vehicles.

And I do have a friend who has a natural gas car.

Really?

Yes. He was a natural gas engineer I guess, and so he designed his car.

I rode in a Tesla. That was wonderful. [INAUDIBLE] Amazing.

Let's keep on going. How about electricity? What do you think of when you think of electricity?

Power.

Power. Lights. Coal. What else?

You get water. Water like dams.

Like hydro? Hydro again. Hydroelectricity. Dams. What else?

I think solar [CROSSTALK] too.

Nuclear.

Solar. What else?

[00:13:35]

Nuclear. Nuclear power.

Nuclear.

Flexibility.

Flexibility?

Yup.

Expensive. Sorry.

Expensive.

And I think of it as inexpensive, so.

Really?

All right, well, we're gonna have some interesting conversations coming up. What else? Anything?

Batteries.

What's that?

Batteries.

Batteries.

That's a good one. I mean the thought of that.

Natural gas?

Nice.

Nice.

Less expensive.

Less expensive.

Cleaner.

Cleaner, yeah.

Cleaner.

Awesome for cooking.

Yeah, better stove.

Oh my goodness, I wish.

So awesome cooking.

Drilling.

What else?

Drilling.

Grilling?

Drilling.

Oh, drilling. Anything else?

I think of having to have a wrench to turn it off in an emergency.

Anything else? Well, that will get the juices going.

How about pilot light?

One more. Pilot light.

Yeah, that works. Gas furnace has a pilot light. Water heater has a pilot light.

Cool. Well, now that we've got the sort of creative juices going a little bit, let's talk about what are some of the factors that you feel are important to consider when you're trying to decide about what home energy source you want to use or to maintain. I realize that most of you have stayed with the energy source that you moved in to, but what are the factors that you consider as to whether you want to adopt an energy source or maintain an energy source?

I put in new windows that are kind of- they're super energy saving. That's cut my electric bill down. The house is much warmer. It's amazing.

So is the factor cost?

The factor of the- No. They were expensive.

For energy- OK.

But they're tinted and they have a reflection so they don't let-

The cost can be [CROSSTALK]

[00:16:36]

So I guess what I'm wondering though is what helps you- let me be a little more specific. What are the factors that help you decide whether to choose say electricity versus natural gas versus a wood stove versus

Natural gas is more comfortable.

- rubbing two sticks together? What are the factors that make you decide which one of those energy sources to choose?

I've had natural gas my first- other house, and the house was warmer. It gets instantly warm.

So it gets instantly warm.

And it's clean. Unlike oil.

Clean in what sense?

It just- it doesn't smell. There's no- it instantly heats up all the rooms and-

You're talking as opposed to an oil furnace.

Oil furnace or even baseboard heaters. I mean it takes forever for a baseboard heater to heat things up.

I don't know if it's because my house is- I don't know. The electric heaters smell like burning. It's like-

It's when the- probably because at first when they first come on.

Yeah, when they first come on, it like-

They're dusty and they stink.

They're dusty and it burns the dust.

Yeah, so I don't like it. I just moved in, so I don't know. I never had that before. So I was like I thought my house was-

So what-

Factors for me would be the cost of the appliances. And the cost of installation. I mean some of them were saying that they could have natural gas if they paid a bunch of money to have it- have it put in.

So just the upfront investment in terms of the infrastructure and the appliances. What else?

I'd say expense, but cosmetically too. I would love to be natural gas because I don't like having to look at these little white heaters on my walls everywhere. And then when we remodeled, you have to figure out where you have to put them conveniently with the thermostat and all of that. It'd be so nice to not have that visual of anything.

But is that the difference more of forced air- or central air system versus-

Because I could go- if I had natural gas, I could have a stove. I wouldn't have to worry about wall units. All of that.

So help me. Let's go down that path. Just so I can understand. How does- how would natural gas be more cosmetically appealing to you when it comes to your appliances? I'm- help me understand that.

Well, because I would love to have natural gas and I can't. Because of having it come down our road because I would get a gas stove, a gas-

But is that a cosmetic. Is that a cosmetic improvement?

Partly cosmetic.

How would it be cosmetic?

Well, because I- because cooking wise. I- you know, like at my aunt's house or if I go on vacation and there's gas stove, it's always to have. Because-

But is that more of a performance issue or is it how it looks? When you said

cosmetic, I think-

Well, cosmetically for the vents. That portion. But as far as a stove, having a gas stove, it's- they're just awesome to cook on. That type of thing.

[00:19:37]

I think she's talking about the heaters on the wall. We have these white square heaters on each one.

Yeah, exactly.

And then I have one in the living room. When it comes on, it's noisy, and it interferes with my television. And I don't like it.

Same exact, yup.

And that's why I wish to have gas.

So this is not a forced air kind of thing. This is just a wall-

It's a wall unit with the forced-

You haven't heard of Cadet heaters?

It's got a fan- they're called Cadets.

They're called Cadet heaters.

But they're more efficient than baseboard heaters.

It's fan powered radiant heat.

So- and then you also wish- another factor would be how it affects your cooking. So-

Yeah, because I'd love to have a gas stove. That would be a dream.

What other factors are important to you? Why do you stick with what you already have today?

My cost. Mine's just cost. Like they were saying, just the upfront cost of putting- changing.

So it's just that's the big barrier is the upfront cost.

I'm not really all that excited about having natural gas because I've had it in a former house and one night, I don't know how it happened. Somebody must have leaned against the stove or something and didn't- it turned on the gas, but it didn't light it.

So the gas is going into the house and it felt dangerous.

Into the house all night. It was scary.

Fair enough. So let's kind of dig down and just kind of explore both of these in a little more detail.

There's another thing that I'd like to mention, if you don't mind. I realize I'm talking a lot and-

No, that's all right.

But when you have gas appliances, they're more difficult to change out than an electrical appliance because you can't just pull the plug. You got to have somebody come in and do it.

True.

So gas appliances more difficult to remove. Does that also imply they're more difficult to install?

Yes.

So to remove or install. Well, you actually anticipated where I'm going next which is really I want to just kind of take each one of these and kind of talk about the pros and cons of each. All right? So let's talk about natural gas. What do you see as the advantages of- what are some of the advantages of natural gas? And you've ticked off some of them, but let's talk about them again.

Instant heat.

Instant heat.

Cooking.

Cooking. And when you say cooking, you mean what?

Like you can throw a tortilla on the stove and it cooks better than having to put it in a pan and stuff.

So you can actually literally cook certain items on the- directly. So you can do direct-

[00:22:39]

You can adjust the temperature better.

You can adjust the temperature.

On a gas stove than electric.

Anything else about-

And it cooks a lot faster.

And faster cooking?

It gets hotter faster.

Hotter faster.

And we- in one of our houses we had- it was propane heat, but it wasn't natural gas. But I assume that the natural gas is the same. We had a tankless water heater and you could wash dishes and take showers and whatever and you always had hot water.

So you're saying that- now that sounds like- is that a natural gas? Or is that electric?

That is not electric because-

Natural gas and-

- with my electric water heater, I have to-

So you always have-

I have a tank. It takes a while to heat up. And then you can take a shower. You might get two showers out of it, but the third person's definitely gonna have a cold shower.

So with natural gas, you're claiming that gives you always some hot water.

If you have a tankless water heater.

If you have a tankless water heater.

Which means that it heats it as it goes through the pipe. I don't think you can do that with electric.

They do make it but it costs like thousands of dollars.

Really?

And they're light- they're smaller. And they only have- because it's what I sold. And they-

I was gonna say we have a built in expert here.

They can run at 110 or 220 but they don't- they can't keep up with the demand for a whole house. So you got to put a bunch of them in.

Really?

Yeah, and it's not cost effective really. What's effective- well, it is cost effective because it only runs when you have the water on.

Sure. Well, what other advantages of natural gas? Anything else that you can think of?

Efficiency.

How so? How is it efficient?

Because it's less expensive than electricity.

So less expensive.

Yes.

Anything else?

When my electricity goes out, I can still cook.

So it's reliable.

Very reliable.

And your electricity goes out- like for the majority of us it sounds like in here that all have electricity. When the power goes out, that's it. That's it.

How about disadvantages? Natural gas disadvantages?

Earthquake.

What about earthquake?

Well, one of the big issues. The earthquake comes, natural gas, it knocks it off, and then you have a potential leak.

So leak. Potential leaks.

Or fires.

Leaks. Fires.

It's just generally less safe.

So just causing a safety-

Safety concern.

- issue after an emergency.

Or even like Natalie said, it got turned on by accident and-

In this house that we had the propane in, it was in the south, and they had these lights that you could light over our porch. It had a great big light, and you could turn on a flame in this light. And that's- that was the lighting for the porch. And it was really cool, and I really, really wanted one of those. And we ran it for one night, and it emptied our entire tank out. So I'm a little bit skeptical now about how much energy that actually burns. And I know a lot of people have natural gas fireplaces, so-

[00:25:59]

So you're wondering if it's really efficient.

Right.

So you're questioning the efficiency.

Right. We taped the light switch down after that. We will not turn this light on.

Anything else on disadvantages? Natural gas?

Disadvantages. I'd say the carbon. Doesn't natural gas causes carbon-

Carbon emissions?

Carbon emissions coming out the pipe out the top of the roof of the house. But it's not as- but in electricity if you have just dams and windmills, there's no carbon. That make sense?

Does that- it does.

If it's right. I may be wrong.

No, it does. Now the question is is electricity all by hydro and-

That's the problem. That's why I said those two things.

And it can't be, and I know this because I applied for a job at the company that did software for windmills. And you have to have a main source, and the windmills can only supplement that. And they have to tell them how much

electricity that windmill is gonna produce on whatever day. And then the electric company only buys that much electricity from the windmills, so.

Well, this is a good segue into my next question. So let's talk about electricity and advantages of electricity. What do you see as the advantages? Those of you who have all electric houses or even those of you who don't have-

Turn a switch and you have light.

What's that?

Turn a switch and you have light.

So immediacy. Kind of just immediate.

Having one bill I guess. I don't know.

One bill.

That's nice.

What else? What are other advantages of electricity?

So one of the things that Sarah and I differed on was whether or not they were expensive or not, and we lived in Idaho at one point and we actually got a kickback from the company on our electric because of the hydroelectric that they used and they owed that to the customers. So it was actually more inexpensive to have electricity.

Now, that's Idaho [CROSSTALK]

Oregon's different.

But in Boston, I have a friend that lives in Boston. And his electric bill runs between $500-600 a month for a 2,000 square foot home because it's so cold there. It's really high for electric.

Do we have-

Mine in the winter coming up now will be 350.

So we're quickly moving into disadvantages but do we have anymore- so I think I'm hearing a lot of arguments for cost. But are there any more electric advantages? Any things that you like about electric?

You don't have to pipe it in like natural gas.

No piping.

It's instant- I mean you-

Plug and play.

Plug it in and you got heat.

Plug and play. Well, that gets back to the appliance issue. You can plug in an appliance and-

You can get ductless systems I know, which we've looked into those. My parents just put one in, and I was impressed with it.

[00:29:01]

Duct- I'm sorry?

Ductless what?

So it kind of- it's the unit that goes inside your house and still run with electricity, but it-

It's got a heat pump on the outside and it sits- in our complex, we have about 20 people do it already.

And what is this called?

Mitsubishi. It's called a Mitsubishi.

Yeah, but they also have one that I'm trying to think what they're called. I thought they were like- it's a way- so not having to run stuff underneath your house. It still uses your electricity.

So what's the benefit of this heat-

That's what I meant.

What's the benefit of this heat pump? What is it doing?

Because it costs-

The costs go-

Half the cost of regular electricity. And it's- like a Mitsubishi, and it's got a big fan on it. And they pipe the plastic up and they duct it into the house and they can run the pipes and the plastic into the attic and put it in anywhere. And my friends- my electric bill's 170 in the winter, and I talked to my neighbors. They put it in. There's was only 79. It was half the price.

Wow.

Well, how about disadvantages? What do we see as the disadvantages of electric? We already talked about several of you feel like cost is a major one, but what else? What other-

Power outages.

Power outages.

It can get cold.

And I'm sorry?

It can get cold when the power goes out in the winter.

Oh, when the power goes out. What else? Any other disadvantages to electric?

Well, you look at California. They're shutting electricity off to everywhere because of the fire danger.

Fires, yeah.

They have to keep up the equipment, keep up the poles, and they're not doing that in California and that's what's causing the problem.

You're telling me. I'm a California resident. I know this only too well.

I watched too much news today.

What else? What else besides-

It's run by coal for the most part.

So you've got fossil fuels that-

Coal plants. Some areas that's all they have. And-

And nuclear.

Well, like in the island there in Japan, they use- they dug that whole island with just- for coal miners. And they use the coal for electricity and heat in Japan.

Any other disadvantage that we haven't touched on?

Nuclear. That was one of the things. What do you do with it once it's been-

The nuclear waste.

I think they should put it in a rocket and shoot it into space and get rid of it. That's what I think.

So let's talk about- those of you who have electric. I'm curious would you consider switching to natural gas for heating or cooking?

Absolutely.

So and then why would you consider it first of all? What would be the benefit of switching from electric to natural gas?

Well, I just did the switch, and I already miss having my gas stove and gas heating. I just moved back, so already know I like the other one better.

So you're already missing the gas stove for the performance aspects of it?

[00:32:02]

Yeah.

Of course, if you-

Don, why are-

- got gas heating, you can't use it if there's no electricity. Because it has a fan that runs by electricity.

Right, yeah.

So you said you would consider though, Don. Why would you consider it?

Because I like the heating better. It just heats better.

You like the heating capabilities better.

Can we clarify something?

Of course you can.

If you do have a gas stove, you can use that when the electricity is out?

No, you can.

Yes.

I didn't know that. I never knew that. What turns it on then? Don't you use electricity to-

No, it's just the spark that's in the.

The gas just keeps coming out when you open the nozzle.

I never knew that. Interesting.

See, these are educational.

It is educational.

You leave these smarter than you came in.

Why would you want electricity versus the gas if you need electricity from the start to do all the things?

Who else might consider going from electric to natural gas?

Me.

Why would you consider it?

Well, I said earlier being able to get appliances that were gas, like a gas water heater, a gas stove.

But why would you want those?

Because I like cooking on gas.

The cooking part. But why the other- why the heaters and water heaters and things.

The heaters because it's more efficient like-

A water heater's the biggest user of electricity in the house.

Gas is a lot better.

I just lived in our house for almost 24 years- well, over 24 years. And I've always wished I could have gas.

So what's holding you back?

The biggest thing is expense. Where we live, we're literally only two houses away from where the gas line is. When we checked on it last time, it was gonna cost $3,000 just to run a gas line down our road to get it.

So you could have done it. It's just that it would cost that- you'd be out of pocket that amount of money.

Yeah, at the time. I probably should look into it now, which we haven't even done. Like I said, it'd be aesthetically pleasing not to be able to have those grates all over your house and your bedrooms and- well, we don't have one in our

kitchen, but in the living room. That kind of thing.

Anyone else here-

Have a gas fireplace.

Anyone else- I'm trying to remember who else has all electric today.

I don't have all electric, but I would be open for gas. I grew up having a gas stove, so I do like that as well. I guess I just have other things I need to put money into. So it's not necessarily at the forefront. I haven't had time to compare the cost differences. but to rerun pipe work and get the appliances. My first initial thought is initial cost.

Expenses.

And I have other things I need to do before I do that.

You couldn't put gas heat though in your house because you don't have any ductwork. And ductwork is very expensive. So you'd only be able to do the water heater and the stove.

[00:35:02]

Stove.

Well, let's talk a little bit out a couple of other things and I just want to get your sense of the advantage or disadvantage. Well, which of these has the advantage. Electricity or natural gas and a couple of these things. So when it comes to a reliable uninterrupted supply, which has the advantage? Electricity or gas?

Gas.

Gas.

Gas.

Gas. How about cost of appliances? Which one has the advantage?

Electricity.

Electric or gas?

Water heaters are the same price. There's no difference.

What about other-

I don't know about stoves. I've never priced gas stoves.

Gas stoves are a lot more expensive. At least the ones I know and want.

What about a gas dryer? Do you know?

I don't know how much a gas dryer is.

They're about the same price.

But I forget that you could even get those too. A gas dryer.

But you got to have the pipe in the wall.

You've got to have it installed.

Everything.

How about safety usage? Which do you think has the advantage when it comes to safety of operation?

Wow, that's a hard one.

Me, I would say electric.

I would say the same too.

Gas because I'm not as familiar with it because I've had electric my whole life is the- you know, afraid when you hear click, click, click, I'm gonna lie. It makes me a little nervous because you're like-

Is it- it's the lighting?

You smell it.

It's the lighting of the-

Yeah, the lighting

Of the stove.

Or if your water heater- I know-

You have to do the pilot light [CROSSTALK]

Or if it went out or something and it's like- who over here said they had a gas leak at one or-

That was me.

If you live in an old house with old wiring, my old roommate, her house caught on fire. Her whole house burned down. She lost everything, and it was from electrical. It was an electrical fire.

So you're arguing that maybe electric is more dangerous than gas.

I mean I think they both have their own dangers, but it's not that electric is-

Now, imagine that you had gas in that house. Boom.

Then it would explode.

Big time.

So I think gas is probably more but electric also- like if you live in an older house. I'm more afraid of having-

So you don't see it as a clear cut kind of thing. You see it as kind of a tradeoff- sort of a-

Yeah, like where I'm living, I'm gonna be living in probably an older home that hasn't had the remodel up to code-

Up to code.

- wiring and then if I-

Not a tube or something.

And if I plug in a multiple outlet and then I plug, I have my light and my fan and my TV and my computer and my phone charger. It's gonna-

Overload the plug.

Overload and possibly catch my house on fire, so. [CROSSTALK]

The question would be what is more reliable within your- where you live, rather than overall. Because my house, I've lost electric service probably three times in the- what, 25 years I've been in the house I'm in.

[00:38:23]

But I think-

Never lost gas.

So we're talking- you were talking about reliability, but I think one of the things we were now talking about was safety. Which is perceived more safe?

Safety is another- when you have an electric service or you have a gas service or you have a car or you have anything else, it requires maintenance. It doesn't just over time-

So you see them as equally safe?

I have- I think gas is- it's simpler. It- the gas is on or it's off. It's always gonna burn, and it provides- you can't run a computer off of it, but you can run just about anything else off of it.

Let's go to the next one I have which is which one do you think is more energy efficient? Which one produces the most bang for your buck if you will?

I think gas.

You think you get more energy from the use- the gas uses it more efficiently than electricity?

I believe so.

I was gonna say electricity, but I was gonna change my mind to gas just for the fact that I have a tendency of leaving things plugged in and so when I use gas I'm not using it. It's usually on or off, where I have a lot of things that I leave plugged in so I'm always using electricity when I don't really need to be using electricity. So I think I would change my mind a little bit to more gas side I think.

How about the rest of you? What do you think is more efficient? Gas or electricity?

I've never had gas, so I can't really- I would say electricity because that's what I use. You know what I mean? I don't know.

So it's a question mark.

Yup.

The rest of you kind of question mark as well? Not quite sure or?

I, you know, they perform different functions, but I think by and large I use more electricity in the summer for cooling and hardly any gas at all during the summer, but in the winter, I use gas and then the blower for the heat, and I- so it's really a wash.

Well, now, I know that we got a mix of folks here, so I'm gonna ask kind of this in a two part one. So for those of you who use natural gas, I want you just to kind of do a what if mind experiment right now. Let's assume for a moment that your natural gas were to go away tomorrow. How big of an impact would that have on your life? Would that be a big deal? Or would that be an eh, I could live with it, no big deal, figure out a way to life, wouldn't be very inconvenient? What would you say? How big of a deal would it be?

[00:41:35]

Well, I know for a fact my bill would be a lot more because my gas bill's really low but it does for the heating of the water and stuff like that. So.

So if you- if your natural gas went away, you'd think that your-

I know it might.

- monthly bills would go up.

Oh, yeah.

How about the rest of you?

I only use gas for heating and the water heater. So it would probably change a lot. I wouldn't have any-

So you- what would be the impact on you?

No hot water.

No hot water.

There'd be no heater. Heat or hot water. If it was all gone. Or I'd have to get it rerouted to be electric or something.

Do you mean temporary or do you mean for good?

Like if it was gone for good, would that be a big deal?

I would heat my water, and then put it in my tub on my electric stove. So I guess-

Would that be a big- would you want to do that the rest of your life?

I wouldn't, but you work around it, right?

Yeah.

I mean it would be a pain in the butt, but-

So you'd do a work around, but I guess my question is does that seem like- would that be a major deal for you to have to have to heat your water on your electric stove every night to take a bath?

Probably for my family it would be. Probably not as much for me. But yes, it- probably for my spouse and my kids.

How about- I guess the other question is for those of you who have natural gas as well as electricity. Obviously, one of the issues that we talked about before that Dominica wasn't aware of is if your power goes out your gas can still be on. How important is that sort of- the fact that you have different power sources so that if one is out, the other is still on. Is that important to those of you who get gas today? Or is that not something that you care about?

I care about that. And unlike David who said he's only had the power go off a couple times in- ours goes out a lot, so if I do, I'm glad you can turn on the gas stove. I-

Make sure it goes click, click, because if it doesn't, then make sure you put a match on or you're gonna have gas everywhere. [CROSSTALK] Tell her everything. I don't want you to turn it on expecting-

So how about the rest of you? Is it important to you that you're not reliant on just one energy source or does that not matter.

I mean it would be nice to have a backup for sure. I don't have that luxury, but yes, it would be really nice to- if your power goes out, you have-

You could still cook. You can still make food. You can still-

Yeah, the making food thing is a big deal. But if you have a barbecue that uses propane, you could use that too. So there are different reasons-

Well, and this was actually- we're getting- we're backing into my next question which is for those of you who don't have natural gas, I guess I'm curious about what would it take for you to consider adopting natural gas.

[00:44:38]

Winter night with no electricity.

But I mean [CROSSTALK] a couple of you have shown some interest in it, but what would it take you to get over the hump to actually go and pursue it further?

Didn't you say you couldn't use your furnace if you didn't have electricity?

I don't have- I know. That's what I said. [CROSSTALK]

Finding out the cost of it now.

So what would that- you would need to- if you knew what the cost of it would be, that might be helpful. So Don, what would it take to you to actually more seriously consider gas-

Have the power company put in lines for 80 houses and-

Can you not run in a separate line?

No. It has to be done- if the whole- it's a community. It's a retirement, 55 and older.

Like a retirement community.

And we got our own individual homes and they're all- there's 80 of them, and it's all private and fenced and the gas comes to the clubhouse, 1966 when it was built. And that's as far as they went. And now if you go further, it has to go all the way down three blocks and feed everything.

I totally feel like I know where you live. [LAUGHTER]

There you go. Anybody else here have all electric. I've forgotten.

I do.

And what would it take for you to consider potentially going to gas?

It would have to be available. I live out in the country. There's probably no chance it would be available.

So you'd know if it was available. But if it were available, would that be all it took?

No, I would have to- I would have to get really comfortable with it. I mean I-

Comfortable in what sense? Would you have to get comfortable in?

I've had a gas stove and a gas oven before. I didn't really enjoy it that much. I didn't like having to light it and that kind of stuff. In the house that we had

propane in, I had them remove the propane stove and put in an electric stove.

So is it the concern about the danger of gas? Is that the concern?

It's- there is the concern about the danger of gas because I had two toddlers at the time. But also, I learned about the expense of how much the propane was, and if you don't have any propane, you can't cook.

So you need to- you'd need to be convinced that the gas wasn't gonna be expensive.

Yeah.

Is- if you knew the gas wasn't expensive, is the gas danger still a big concern?

That is still a big concern for me.

Since you had your other house, they've done some changes. Like now, a new gas stove doesn't just run gas out of it, but it's got automatic shut offs so it doesn't do that. And the water heater, if the pilot goes out, it shuts itself off. So you don't have the chance of the- but back when you-

That house was brand new in 2010, so I can't imagine it's changed that much.

But propane could be different. I don't know. That could be.

That could be. I don't know.

Well, that's great. This has been a great conversation. What I want to do now is steer us to a slightly different discussion, and it has to do with kind of the environment. Energy and the environment. So my first question has to do with your perception about what are the biggest contributors to climate change and specifically carbon emissions. What is your sense of the source of the greatest polluter sources, if you will, when it comes to-

[00:48:06]

Cars.

I was gonna say cars.

Corporations.

So cars. Industry. What else?

Farming.

Plastics.

Plastics.

Animals.

Animals.

Other countries.

Anything else?

Coal.

Coal.

You burn it, and the exhaust and the pollution.

Anything else? How about- what energy sources do you feel like are playing a positive role when it comes to climate change?

Positive role?

Yeah, what are the ones that you feel like are least damaging to the environment these days?

Solar.

Hydroelectric.

Solar. Hydro. Anything else? [CROSSTALK] Hydro is the water. Wind. So solar, hydro, wind. Anything else? So what makes those- why do you consider those being positive players?

They don't cause any pollution.

So no emissions?

No emissions.

They all have their drawbacks though. I mean solar doesn't happen when there's no sun. Hydroelectric has problems because the fish can't swim upstream. Wind has problems because it kills birds.

There you go. And sight.

I mean everything has a problem. I'm sorry?

And sight.

And sight.

The visual-

They are.

- deterrent sometimes too.

So I'm hearing kind of the argument that there's no perfect source of energy is what you're saying.

I agree with that, yeah.

Like when you go to eastern Oregon, you go above hood river, but on the Washington side, there are windmills everywhere. And they pollute- I mean that's all you see is windmills. There's no- you can't see the beauty of the ground or anything, so they got their-

So are you arguing that windmills are a negative, just aesthetically. Or-

Well, they kill animals. They kill birds. And- but they give us energy. Just by spinning. There's nothing-

And what was the issue with hydro? What did you?

Fish can't swim.

Fish.

Oh, the fish.

Honestly, we're gonna have to change the whole infrastructure of the way the world works because it takes so much energy to keep our appliances, electronics, everything going. We would have to change the infrastructure. At the rate we're going, it's just all- everything has a drawback. Obvious solutions are all temporarily trying to replace gas or whatever we're using now. But in the sense, really minimalism or those types of routes have changed and what it is doing complete out of the box idea at that point.

[00:51:21]

So-

Probably the best one that I can think of right now is actually wood burning because it does release carbon into the air but carbon is what plants use to grow and so it makes new trees.

It's still a finite resource.

It's- not if you have managed forests.

Well, there are certainly things releasing carbon in the air, clearly besides wood, but I- that's certainly a- one that I'll add to the list. Now, the question I guess I have next is where does natural gas fit into the equation? So is natural gas helping when it comes to climate change or is it hurting when it comes to climate change or is it doing a little of both? Where do you see it falling into the whole scheme of things?

I think it helps.

Tell me why you think it helps.

Because it doesn't give any- because it doesn't give as much- because electricity you got the coal and everything else. And I think it's got probably the least amount of impact on the environment. As what I've seen and watched and heard, that's what-

What do the others of you think?

So natural gas actually is naturally occurring under the earth, and it comes out when you pump oil out. And so it's there. And if you don't use it, then it goes up into the atmosphere and it causes problems also. So you may as well be burning it.

So you see it as being sort of a natural resource that why not use. What about the rest of you? How do the rest of you feel about it?

I think it probably should be left in the ground. I guess I've never heard of it being a negative thing if it's not being drilled. It stays in the ground. It should be just-

In the ground. [CROSSTALK]

Now, tell me what your thoughts are about it. Do you feel like natural gas is a net positive, a net negative, or a kind of neutral when it comes to climate?

I think it's a net negative, but mostly just because of the way it's extracted and the way we use it, but also it's a finite resource at the end of the day.

So let's pursue a few of those because you mentioned several interesting points. So you said that one of the concerns was the way it's actually processed or-

Extracted, yeah.

Extracted. Tell me more about that.

Well, just the- it's destructive in a way. And the whole process of extracting it is destructive.

So the fracking?

The fracking, yeah, and other things and just the act of drilling into something and causing- it causes damage to the surrounding area and you have to count that as part of the net negative.

[00:54:27]

So then you said it's a finite resource. So tell me more about that. Why is that a concern?

Well, eventually, if it runs out, then what are we gonna use? And the more that it becomes rare, the-

The more expensive it'll be.

The more expensive it becomes. The more vicious people become. It's just- it adds into the net negative.

And you mentioned something else. What was that? The way it was extracted, finite resource, and then?

Fracking, she said. But I don't know is fracking for gas?

Well, it just the emissions.

The way it- the emissions?

That you have to use to get it. Just kind of the idea of-

So the fact that there are emissions just in using it is a negative. How about the rest of you? Where do the rest of you come out on it? Net positive? Net negative? Kind of neutral? Where- how- is it helping or hurting?

Well, I appreciate her conversations because I wasn't really sure how it was harvested, and so that was kind of where my thought was going as well. It's like I don't know how they get it. And so I was kind of curious-

Don't they just drill for gas?

What it goes through to get, right. So I was- that's an interesting conversation.

How about- so a lot of people were talking about coal earlier and the whole issue of electricity- a lot of times electricity is generated by burning coal. So knowing that, how does that affect your feeling about natural gas? As an alternative. Is that-

I think it's an alternative. I think you compare the pros and cons. I know that at our house, we just changed from coal to- with PG&E to all natural wind, water,

hydro, their plan they have for all natural resources to try and help offset some of that. The- I think the thing that always gets me is going towards electricity and I was trying to deviate for a second. I was like electric cars. Yeah, that helps lower emissions, but then what happens to all the car batteries when they're done. Do they just sit in a warehouse and then all of a sudden there's corrosion and erosion, and so yeah, it might be a good alternative but in the long run, is it? Because then you have all these batteries, but then you're burning coal and fossil fuels. So to me, it's more trying to find out which one is the least amount of damage and then go with that.

Does anyone have a sense of whether natural gas is better than coal or coal is better than natural gas? Does anybody have a feeling for that?

I think natural gas is better than coal.

Yeah, I agree with that.

Yeah, it's cleaner.

It's cleaner. And to get natural gas, they just drill into a gas pocket and then just pipe it up out of the ground.

But then that hole falls and collapses, right? Because there's no gas holding it up anymore.

[00:57:31]

They refill them with carbon dioxide, CO2.

Is that healthy? Because then to me all of a sudden they have all this carbon dioxide in the ground where all the roots of the plants and stuff go. I'm just curious.

Let me kind of just- sorry to interrupt, but just to kind of- I want to kind of get the bigger point. So I think because I didn't hear anything over here. I kind of got the sense that maybe three or so of you think that gas might be cleaner than coal, but the rest of you are kind of uncertain. Is that fair to say?

I mean the word natural makes you think that's it's better, so I guess I would say- but that could just be like- I don't know. I don't really know what it is until we're all talking about it.

I think it burns more fulling when it burns than coal does. I think coal probably leaves some soot.

Well, let me go to the next issue, which is- and you may- some of you may have heard this that in certain west coast cities that some cities are passing or considering bans on new natural gas hookups.

They are?

So for new construction.

I didn't know that.

And would the- so the goal would be that- I think the thinking is that for reasons of climate- you know, climate change considerations or whatever. So it would be in those municipalities what they're considering is banning new construction. So if you already had it, it would be grandfathered. But new construction would be prohibited from using natural gas. So my question for you is how do you feel about that? Is that something that you support or is that something you feel like is an overreach on the part of the local government?

That's interesting because I used to work for a housing corporation, PCRI. And I actually rent from them still for 20 years. Every time they make a new- now they're building the homes. They- all the houses are touted up as being gas. You know if it's natural, it's better. More efficient. Cheaper. So that's really interesting to me. What all their new builds are saying that that's what they're doing is having gas efficient homes.

So if they- I guess my question is if they- if your town was to say hey, we don't want to allow any more natural gas.

I wonder why.

Well, as I said, I think that in some cases, some people think that that would be- they're doing it for purposes of trying to address climate change. But the question-

But you're either gonna burn it at the point of the house or you're gonna burn it at the power station. It's gonna get burned one way or another.

So your argument is that what?

That it won't fix anything.

That it doesn't make sense.

Are you arguing that the electric utilities actually use natural gas?

I am arguing that, yes.

[01:00:31]

Are the rest of you aware that that's what going on?

No. [CROSSTALK]

So Natalie is in fact correct. It is in fact correct that the utilities, electric utilities, one of the things they're doing is moving away from the worst pollutants, which is in fact coal. And they're moving to natural gas. So now my question is this if you knew that the electric utilities were using a big chunk of, you know generating a big chunk of their electricity from natural gas, would it make sense for the municipality to ban individual residences and businesses form using natural gas on their own?

That begins to smack of saving it for the power companies to use.

Politics.

But politics, yeah.

That's what I'm thinking.

Is that how you folks think?

Yeah.

It makes me raise that question, so yeah.

Because the power company wants to make all the money.

Who gets the money? Who's benefiting from that change?

How about the rest of you? How do you feel about it?

I feel the same way because it sounds weird to me. Why would they do that? Can I get a tissue?

Of course. Of course. So in a situation like that, would you be supportive of a ban or would you be not supportive of a ban? If you knew that the electric utilities were basically- if you were basically forced to use electricity, but the electricity was being generated largely from natural gas, would you be supportive of a natural gas ban in your local community?

No. Because electricity's always more expensive. I mean unless they were making it the same price as what the gas company was using because if they're using the same thing, then they should be charging the same price.

So the electric company is using natural gas to lower their cost, but ours is there. So it raises their profits.

Well, I don't know if it's- I can't speak to the lowering the cost part of it. What I am speaking to is that they are in fact trying to improve their emissions by going from coal to natural gas.

But if you're trying to create enough energy for a whole town, but yet, you're burning the gas to do that. Then you're still burning the same amount of, I would assume, without seeing numbers, you're burning the same amount, so what are they actually improving?

Well, that's the question.

Which then makes me go back to who's making the money.

In fact, that sounds less efficient.

The real question is if you were a power company and a bunch of people said, "Well, we're not going to use any of your electric appliances except for five amps here and five amps there to run your igniter on your heater or this or that or the other thing, and another ten amps for your TV and your computer," the electric company's going to say, "Well, doesn't sound to me like it's worth it for us to run a feeder out to your location. Or maybe you just want to set up your own distribution plan and put up a solar array or a bunch of windmills, and you guys

can deal with it, because we're going to stick around town where the big usage is in these areas. And you people that want gas only, you figure out how to get your electricity." And the government's going to say, "Well, hold on. We'll pay you to do that." And I can see it going down that road. That's the ultimate way this ends up.

[01:04:25]

Well, we're going to switch gears now, and I'm going to ask you about a new concept. Has anyone heard of renewable natural gas? No?

Yes. From algae?

Well, what have you heard?

I've heard that they have these farms where they're growing algae and making - produce natural gas off of that. Is that what you're talking about?

Well, we'll read this together and see if this is what you're thinking. Take one, pass it along, and then once everybody has a copy I'll read it out loud while you read alongside with me. Renewable natural gas. "Renewable natural gas is produced from local organic materials like food, agricultural and forestry waste, wastewater, or landfills. As these materials decompose, they produce methane. That methane can be captured, conditioned to pipeline quality, and delivered in the existing pipeline system to vehicles and homes and businesses where it can be used in existing appliances and equipment. This provides a renewable energy option for the natural gas system in the same way that wind and solar are used to generate renewable electricity. Closing the loop on what would otherwise be waste gas, renewable natural gas can provide up to an 80% carbon reduction benefit." So what do we think about this?

It's perfect. It's great.

Awesome. Things we use, so might as well -

So tell me, generally positive?

Yes. Well, in the dump site like they do down in Oregon City, they had to put pipes in the ground that extract the gas from the garbage that was buried. And they used that gas. That gas was used, so that's what they're talking about. Stuff

like that. I agree.

What is it that you like about this concept? Why is it so positive?

Because it's something that's already there and we get to use it.

Well, it's using waste for clean fuel, which is -

This is just replicating the natural process that happens already. But -

Well, it's not even replicating. It is the natural process. It's just capturing what's happening anyway.

Right. But the thing - because my question is who is doing this? And I feel like we're coming from the idea of, "This is great. We can start maybe using methane captured from all the garbage that we have, a lot of garbage." If we can do that, that sounds like a great idea. But then who is going to benefit from that? Who is actually doing this, and will it actually be used to cut down using gas that is already -

So the answer to that is that it could be your natural gas utility company, and in fact, this is in fact available even as we speak. So what do you -

I thought so.

What do you think about that? Does that -

It's great.

[01:07:26]

So then why don't we just do that and go away from completely drilling for gas? If we know that this process exists, if we have enough garbage it sounds like to do this, why isn't that just already done and not -

Is that where you'd like it to go?

In some way, shape, or form, yes.

If you could wave your magic wand, would you go down that path?

Yes, along with other options like solar and things like that.

Well, it doesn't say that you couldn't go after solar and what have you. But you would pursue this if you did?

Yes.

So I like the idea too. My curiosity is how they create it. And kind of like I said with the electric car, there's a battery. What's being released and what are they using to make it, and are there environmental impacts with how they're creating this?

Sure. And so -

The thought seems nice.

So basically you'd like more information that reassures you how - make sure there's not more energy going in than what's coming out and all that good stuff.

And how are they -

So the answer is that this is a natural biological kind of helmet. So what Don was explaining is exactly right. It's basically doing what Don was describing, which is taking garbage and just taking the - siphoning the gas that is naturally coming off of decomposing waste that would otherwise go up into the atmosphere, capturing it and being able to use it.

Like chicken farms. There's so much waste, they could build a place and put it all in and cover it and let it -

So it's a biologic -

Biologic?

The answer is it's a biological process. It's happening regardless. It's just a question of whether you let it go up in the atmosphere or whether you capture it and use it.

Well, and I hear what you're saying. And I hear that. But is that what - and I don't know how fast it decomposes to create the gas and breaks down. I'm

assuming a company would probably figure out some way to enhance that to make it happen faster. And if they do that because they need to meet a consumption, how are they making it happen faster?

I got you. So again, you want some assurances that there aren't shortcuts being taken that are going to have negative environmental -

Right. And by extracting this, what happens? What's left? What's left of the material? Is it just -

So these are all great questions. So things that would all make you feel more comfortable knowing ahead of time, and make you -

The expense of it. Is it more or less expensive?

Sure. Let's go back to the concept here, because these are all great questions. But before we abandon this, I want to just understand. It seemed like people were generally positive, but I want to go in, dig into it. What was it that you liked about what you saw here?

[01:10:29]

Well, for me, one of the things that's already happening is that dairy farms have to clean out their animal pens. So they have a lot of manure and it all goes into a big pit. And that is where this is taking place. And it has to be done anyways for the health of the animals. It has to - it's going to get broken down into its components, which tends to include things like fertilizer and stuff like that. And you may as well take advantage of the natural gases coming off of it. But the same thing - the other things that are listed here are agricultural waste and food waste. And the same things happen to those things.

What else? What else grabbed your attention when you read this?

Well, I don't mean to keep talking. But the animal waste was - I remember one of the questions when back I mentioned animals, and I think it was because of the carbon emissions. And that was one of the reasons I mentioned that, because animals do produce the most carbon emissions. And so the practical use of using that, I like that.

So really focusing on animal waste, because you're right. Animal waste creates a huge amount of methane, and so capturing that -

My question also is where is this going to be happening? Because generally right now, anything that pollutes anything is generally happening in disenfranchised communities. And is that going to happen with this process?

Well, so the Portland wastewater treatment plant already is doing this kind of thing. They're already taking gases coming off of the wastewater.

That's in North Portland?

I'm not sure, because I'm not from here.

[LAUGHTER] North Portland don't like the waste sewage plant.

That's another thing in North Portland.

Have it be a sealed system. It can't be out in the open. It's got to be sealed so they can extract - just like the dumps.

Right, but -

So basically, if I'm hearing you, your concern is "how do we make sure that this isn't just dumped in low-income, disadvantaged communities?" Is that right?

Yes. And is it going to smell like - this sounds like a really nasty process. It seems like - how are they going to -

Well, and I think - but to Don's point, I think it's a good one, which is that part of the smell is the methane that's coming off of that. So what you're going to want to do is you're going to want to contain things.

Capture that.

It only lasts for so long because where Home Depot is down in Oregon City, that was a garbage dump. And 20 years ago, there was pipes everywhere taking the methane off of it. And once it's done, they flatten it out and they put Home Depot on top of it. So when you go there -

There's still a dump over there, though.

Yes, but that's just a collection area for it goes somewhere else.

So again, not to beat a dead horse, but I want to just make sure. Did we get any - is there anything else here that stood out for people that you particularly liked?

Does it - this byproduct will combine with your natural gas in your home?

[01:13:32]

It could be combined. Yes.

Not liquid propane. Not -

It could be used exactly as your natural gas is used today. And it could be done through your existing pipeline, delivered to you the same - seamless.

So my question then is -

Which first, let me stop you there. Is that a good thing? You guys like that?

Absolutely.

So you would have the option to do this if you wanted, versus it coming from a different source.

It would come from your regular utility.

You'd never know it was different.

So you like the fact that it's seamless and that you can use the same infrastructure.

Plus it's always there. I think in the future, this is what we're going to end up doing. It's going to be perfected, and this is what we'll do to keep - because everything else could run out, but there's always going to be waste.

To me, this reminds me of PGE going with the electricity. So instead of going to burning coal, we're going to windmills and hydro. This is going from natural gas to another -

So my next question is does this change your opinion of natural gas or perception of natural gas? Does it make it seem more appealing, less appealing?

More appealing.

More appealing.

More appealing.

How would you feel about a utility that offers something like this? What would you -

Separate?

What would you think of the - how would you characterize a utility company that offered renewable natural gas? How would you -

That'd be great.

Forward-thinking.

Forward-thinking? How else would you describe them if somebody was going -

Future.

What would be the -

More environmental option.

More green.

More green option.

But how would you characterize a utility that was investing in something like this? What would you - how would you call them? How would you describe them? How would you think of them?

Progressive and -

Progressive. Forward-thinking.

Forward-thinking, environmentally friendly.

Environmentally friendly.

Looking to improve, make things better.

We're going to go to another concept here.

Do we get to keep this?

No.

I just -

It actually is in existence, but just -

I know. You don't want to put this on the Internet. Should I just print it?

I do think it's interesting how they have a cloud for the equipment, where you're not really seeing what the equipment is. And they're just trying to show you there's gas. But really, they're not showing you what it's making.

Well, we're going to get into this next one, and you're going to see a lot more of the nitty-gritty. And we'll see which one you actually prefer. This one's called renewable hydrogen. "Power-to-gas is a process that captures surplus wind and solar energy and converts it to renewable natural gas or hydrogen through electrolysis. This renewable energy can be stored and then blended into our pipeline system to one day serve homes, businesses, and vehicles." Let me do a little side supplemental description here. When they talk about surplus wind and solar energy, what they mean by that is that oftentimes that energy is generated during the day when demand for electricity is at its lowest. And the problem is that that's not easily storable. So it could be generated, but then not be able to be used necessarily right away. So that's why they're talking about it being surplus. And some people might say, "Well, why couldn't you just put it in a battery?" And the reason for that is that batteries that you would need to store this kind of electricity would be - they're able to store it for a matter of hours, but not necessarily days or weeks or months. So that's what's going there. Now in terms of the diagram, let me walk you through the diagram, because I know that they can be a little confusing. So basically what they're

showing on the left-hand side is you've got this renewable energy, the surplus wind and solar. They're then applying it to water molecules and splitting water, which is hydrogen and oxygen. They're splitting that apart. And the hydrogen is a gas that can actually be used on its own. It can be used to power things on its own. And when it's used, it can actually create just water on the backend emission. So it's very user-friendly. An alternative is that they can extract carbon dioxide from the atmosphere, because there's lots of carbon dioxide out there, and they can combine it with this hydrogen and then use it - convert it into methane gas, and then use it in the gas pipeline as well. So that's the concept. What do you guys think about that one?

[01:18:56]

Sounds expensive. To take something and convert it - to take energy and to convert it into gas, to then provide that service seems expensive to me.

What else?

Where's the methane coming from?

And that's where this gets confusing. So the methane is coming from a combination of them using the solar and wind to break up - this is where the chemistry comes in. They break up the water molecules into hydrogen and oxygen. And then they combine the hydrogen with the carbon dioxide. And those two combine into creating this methane gas, which can then be burned. So the concept here is with this, you're taking excess wind and solar power, say, generated during the day that would otherwise be lost, sending it on, converting it into hydrogen and/or methane by doing this combination. And by doing that, you can then store the gas for days, weeks, months as opposed to losing that solar/wind energy that day. Does that make sense? Are you following?

Can we do that already? They know how to do that?

They know how to do that. So -

This is an alternative to using battery banks and converters to -

This is an alternative battery. And as I said, and this is just my understanding, that to be able to store this large amount of energy, there's capacity constraints, and that they'd only be able to store it for hours as opposed to weeks or

months. Whereas if they could convert it into a different energy form, they could store it in gas form and use it as needed down the line. Does that make sense?

Yes.

Are you asking us to compare this separate from this?

I'm asking you just to get your appeal for this independent of the other one. So what do we think about this one?

I like how you mentioned it not during the day with the windmills and all that going. Instead of it being wasted, taking it and using it for another resource.

So that's an important element that needs to be elaborated, because I wasn't obviously here. I had to talk you through it, right?

Yes. But I like -

But that was an important part of it?

Yes.

Normally businesses, manufacturing, all of that stuff runs during the day. Back east, they have rates that are higher during the day for peak demand usage. And as a consequence, they've got a bureaucracy within companies that handles energy management.

[01:22:09]

Right. And again, I don't want to be claiming that I'm an energy expert. At the beginning I told you I'm not actually with the energy company. But I will say that my understanding of this is it's more - and I may have oversimplified by saying it is during the day or whatever. There's also seasonal issues. So when it gets to winter -

It's darker.

- things get darker, but also there's more heat needed and all those kinds of things. So the question is -

[CROSSTALK] wind during the winter too.

So the question then becomes being able to use it and store it for when there are peak demands, which are obviously more in certain seasons or in the hot summer months or whatever. But your point is -

I agree with you. I once had where it was less expensive to [CROSSTALK].

But you're right. They do have different dates and times during the day that you can have different -

But regardless of that, we're talking about using wasted energy.

And the other thing is -

Could be used for energy.

- solar power. I went to a - had a class for continuing education, and the guy that was giving it was - his company was - they built solar panels. And they said that they just had a groundbreaking event that they had just topped out 1.1% of the solar market. In other words, solar electricity is less than one percent.

So it's in its infancy.

Yes. And it's only in areas where they get that sunshine.

I just want to be sure, because I have one more thing I want to do. I just want to be sure. Is there any more feedback on this particular concept, either positive or negative?

I was just going to ask real quick, is the separation of the hydrogen and oxygen - is that a safe thing to do? Or is that a -

Yes.

Yes. I think -

All the time.

I was just curious.

And all it takes is electricity, really. One of the things that I was going to say was that most of the time, batteries such as your lithium batteries and things like that are actually really hazardous. If you break one of those batteries, it can explode. So this actually sounds like a much safer way of storing electricity, because while it is combustible, it's not explosive in the same way as - you're going to be handling it in the correct environment. And so it's not as dangerous as, say, having a battery that has to be disposed of properly and can't do the same job of storing as [CROSSTALK] as this.

Any other thoughts about this?

I think it's the future. I think this is another item that can make it to where you can be energy-efficient without running out of energy.

[01:25:16]

And I want to be sure that I'm getting any negatives too. I'm not pushing this. I just was trying to explain how this works. So are there any negatives with this?

Well, my question is how efficient is it to get it, and does it lower our bills?

Yes, the expense of it. Not knowing the expense.

[CROSSTALK] energy that's created, but are you putting more effort and time and cost to changing it, and it'll be more expensive?

Got you. Got a last exercise here. So if you can take one and pass it along. So this one is - we're now switching gears and talking about natural gas messaging. So what I want to do is I want to read each of the five following statements. And then what I want you to do is evaluate which one of these you think is the most compelling statement when it comes to natural gas, and mark that with a checkmark. And then I want you to look and determine which one you think is the least compelling statement, and mark that with an X. So I'm going to read this aloud while you read alongside. "Natural gas is a vital part of a reliable energy strategy because alternative energy sources like wind, solar, and hydro power are not able to meet all of the state's energy needs." "All forms of cleaner energy - hydro, wind, solar, and renewable natural gas - are needed in a balanced, low-carbon future." "Natural gas bans will allow utilities to continue using gas to generate electricity, but it will prevent individuals and businesses from choosing the energy source that best meets

their needs." "The existing natural gas network can be used to deliver renewable natural gas and dramatically reduce greenhouse gas emissions as a result." "Natural gas is a uniquely attractive energy source because of its affordability, reliability, and cooking and heating performance." So take a moment. Choose the one that you think is most compelling. Mark it with an X. And choose the one that's least compelling. Mark it with an - I'm sorry. First, most compelling with a checkmark. Least compelling with an X. How are we doing? People still working on it? David, are you still working on it?

[01:29:09]

I'm still working.

We good?

Yes.

What I'm going to do is just do a quick poll, and we'll go down the list. And if you chose it as most compelling, just raise your hand. So anyone choose P for most compelling? Two of you. Q? One, two, three, four. S? One. T? One. That should do it, right? Yes, that's eight. Let's talk about this. So Q was the big winner for most compelling. For those of you who chose Q, why did you choose it? Why was that so compelling for you?

Because it says exactly what - it's the future.

So what's the future?

Energy and reusable gas. Using these two items here that we saw.

As we can see also, most people - a lot of people in here have both. And there's -

So was it the fact that it's all forms?

Yes, because like we talked about - I'll go back to analyze. It's pretty easy. But there's carbon to use to possibly natural gas. There's wind to help use electricity. So it combines everything. That's why.

I think as a statement, that's what I thought too. That summed everything up.

What summed everything up?

Well, if we're saying that all these things were necessary for the result that we want or the -

So there's this balance that's needed. You can't rely on any one, and that's the important point.

They're saying renewable. I took that to mean the -

I thought that too.

Suggesting that this was the "all forms of cleaner energy" that you had listed. It doesn't say anything about the existing natural gas reserves that we're actually using now. So -

But as they move to increasingly renewable natural gas, what they basically are asking is does this make sense? Would this be the message that would make sense?

Mm-hmm.

So were there any other thoughts about that one, for those of you who chose that one? How about - two of you chose the first one, P. Why did you choose P?

So I guess I wasn't aware that natural gas is a reliable energy that has state energy needs where the other ones don't.

[01:32:12]

That it -

That they're not able to meet.

That the others aren't - there isn't enough - they can't produce enough energy?

I didn't know that.

And for me, it's because of the statement that says we can't meet all of our needs with the other clean energies. And that is the most important thing to me, is that without natural gas, we won't be able to meet our needs. We might have brownouts or something like that. And then the fact that we can do it renewably

is just icing on the cake for me.

Well, that's great. Let's now switch gears and talk about the least compelling. I'm going to do the same routine, walk through each of the options. Anyone choose P as least compelling? One. How about Q as least compelling? One. How about S as least compelling? Two. T as least compelling? One. And U?

I had U.

Two of you.

No, no. After T.

What did you vote for? You haven't voted.

U. I thought you [CROSSTALK].

So you were U, right?

Yes.

So we've got two, four, six. Somebody isn't counting here. I've got eight people. Let's do this again. How many people chose P as least compelling? One. Q? One. S? One.

Least compelling marked with an X?

Yes. Was that S?

Yes.

So two of you for S. How about T? Two of you. That was part of it. And then U was two of you. That's where I missed. Wow. So we were really spread all over the place.

Hard answer. That one's [CROSSTALK].

That's interesting. Well, let's just do quick round-robin. So S, the reasons why you didn't think S was compelling?

I didn't think S was compelling because - so it's saying that basically, it'll allow

the gas companies or whoever to do what they want. But then the businesses aren't going to be able to choose what they want to use with it. That's what I got from that sentence.

What about T?

The future.

Why did you find it -

Compelling?

- least compelling? Two of you chose it as least compelling. Who chose it as least?

Me.

Why did you find it least compelling?

[01:35:14]

Because I don't really know that much about the greenhouse emissions.

I just picked it because the others sounded a lot better.

It's not that you didn't like it. It's just that -

Well, I like it, but these other ones are so much more sense than that one does, because it's way in the future and it's not here yet.

How about U? Those of you who chose that as the least compelling, why?

I thought it was just a regular marketing or advertising slogan kind of thing. It didn't really -

Just sounded pretty generic?

Yes.

That's what I felt too. Why are they trying to promote cooking and heating? I kind of feel the same way.

[CROSSTALK] U too.

I'm going to step in the back room just to see if there are any final questions before I let you go.

It's hard between T and U on that one. I didn't know which one was the -

There's no wrong or right answer.

I was here once for [INAUDIBLE sounds like: lottos]. It was kind of fun. And we got scratch-its. We got to scratch and scratch. And you had to say which ones you liked the best.

All right, gang. Looks like you guys have answered every question that needed to be answered. So you've been a great group. Thank you so much.

It was quite enjoyable.

If you could do me a favor of sending all your handouts my way, that would be awesome.

And the sheet here?

Yes. That'd be great. And thank you so much for being here tonight, and safe travels back home.

Thank you.

Thank you.

[INAUDIBLE] separate those. [CROSSTALK] Are we supposed to separate them?

No.

We're going to make him separate it.

No, no. I don't expect you to do that.

That's some interesting information. I didn't know they were already doing some

of that stuff.

It's pretty -

[CROSSTALK] they were using the garbage dump with the pipes. I know those pipes [INAUDIBLE] system, but -

It's definitely interesting stuff.

This department was -

Thank you.

Thank you.

Enjoyed it.

Take care. That's good.

Thanks very much.

Thank you.

Thank you. It was interesting.

Thanks. Appreciate it.

I learned new stuff.

Got to go home, figure out what I didn't know.

Where are you from, then? Where do you live?

I live in northern California. So I'm going through all those power outages you've been reading about.

They just shut off for [CROSSTALK] million people.

Yes, I'm one of the million.

Are you really?

As they say, nice to be one in a million, huh?

[01:38:16]

I watch the news. They're saying that some of the problems with the power company, they have upkept the - that's the poles, their systems.

It's really a combination of that and the fact that it's just a very - they cover a huge territory including a very rural, arid area.

One little spark -

And the climate change that's [CROSSTALK] has really had an impact too. They were having 100-mile-an-hour winds at one point.

Tonight they're supposed to have 75 or 80-mile-an-hour right - LA, coming down the hill from LA. And that's -

It's brutal. And they get these starts, and then they can blow a mile.

That's what they said. Then they land.

I really feel for the firefighters. Well, that and everybody at home, too.

Really hard.

Thank you.

Thank you.

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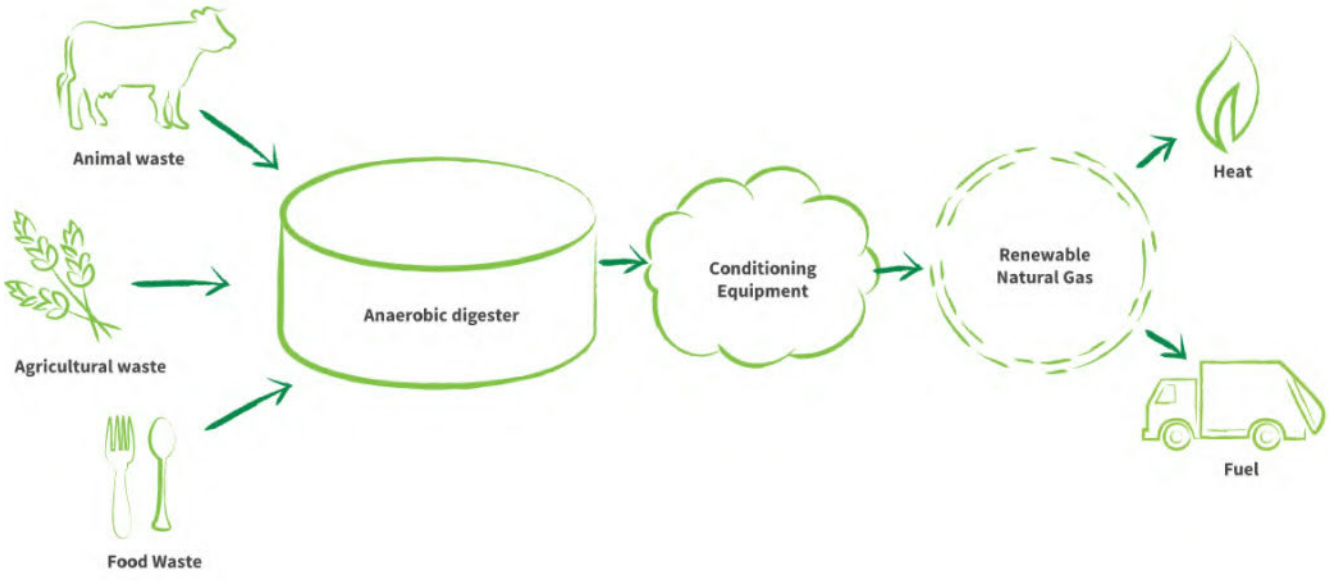
Renewable Natural Gas

Renewable Natural Gas (RNG) is produced from organic materials like wood waste, food and agricultural waste and come from sources such as dairies, landfills, wastewater treatment plants, forest debris and other organic waste. As these materials decompose, they produce methane gas which can be captured and used.

Renewable Natural Gas is interchangeable with conventional natural gas. It's produced locally from waste streams that would otherwise be emitting methane directly into the atmosphere. RNG can be used with existing pipeline systems to deliver this energy to vehicles, homes, and businesses. In closing the loop on what would otherwise be waste gas, Renewable Natural Gas can provide up to an 80% carbon reduction benefit.



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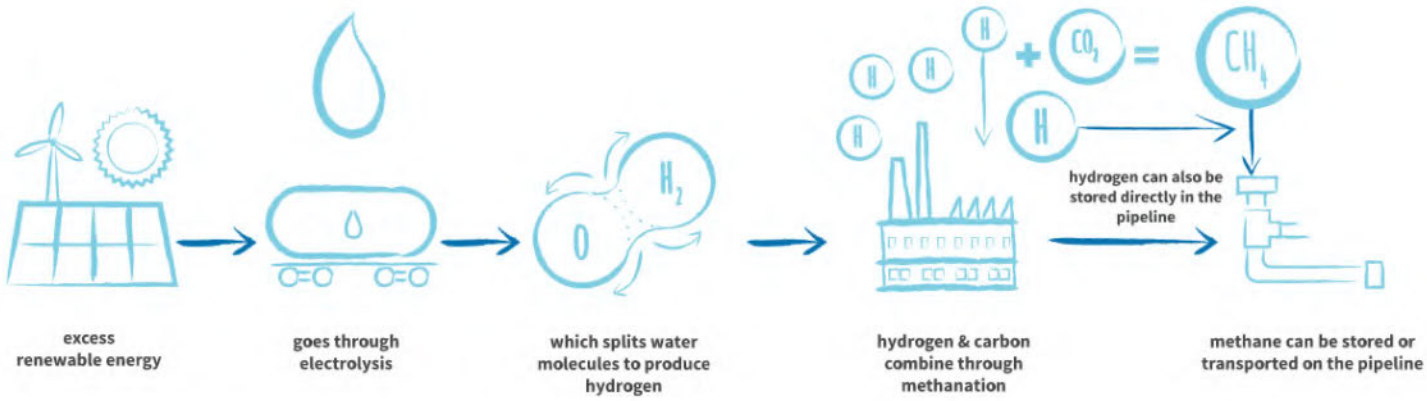
Power to Gas

Power to Gas is a process that captures surplus wind and solar energy and converts it to hydrogen or renewable natural gas. Through this surplus energy, water molecules are split to produce hydrogen, a clean energy source that only produces water when combusted. Alternatively, carbon can be added to the hydrogen to create renewable natural gas. In turn, the hydrogen or renewable natural gas produced by the Power to Gas process can be blended in and delivered to individuals and businesses through the existing pipeline system.



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Natural Gas Messaging

Please review the following statements and use a ten-point scale (10 = extremely compelling, 1 = not at all compelling) to indicate how compelling you personally find each of these messages.

_____ P. Natural gas is a vital part of a reliable energy strategy because alternative energy sources like wind, solar, and hydropower are not able to meet all of the state's energy needs.

_____ Q. All forms of cleaner energy—hydro, wind, solar and natural gas—are needed in a balanced, low-carbon future.

_____ R. Renewable natural gas offers a similar climate benefit as wind and solar energy by dramatically reducing greenhouse gas emissions that contribute to climate change.

_____ S. Although well intentioned, natural gas bans will allow utilities to continue using gas to generate electricity, while preventing individuals and businesses from choosing the energy source that best meets their needs.

_____ T. The existing natural gas network can be used to deliver renewable natural gas and dramatically reduce greenhouse gas emissions as a result.

_____ U. Natural gas is a uniquely attractive energy source because of its affordability, reliability, and cooking and heating performance.

_____ V. By replacing gasoline and diesel as fuel for trucks, buses and heavy vehicles, conventional natural gas and renewable natural gas can build a cleaner transportation system for the future.

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DISCUSSION GUIDE

Date	October 21, 2019
Reference #	E190117
Topic	NW Natural Gas Perceptions/Attitudes

I. INTRODUCTION (~ 10 MIN)

1. Moderator introduction: energy sources as topic, neutral role of moderator
2. Respondent roles and guidelines: participation vs. consensus, being open and candid
3. Housekeeping: recording/others listening in, confidentiality
4. Respondent introduction: name, occupation, home energy sources now vs. when moved into home

II. ENERGY EXPERIENCES, PERCEPTIONS, AND PREFERENCES (~ 30 MIN)

5. We're going to begin tonight with an exercise called word association. I will show you a word or phrase and I would like you to then tell me what other words or phrases come to mind.
   a. Clean energy?
   b. Electricity?
   c. Natural gas?
6. What are the most important factors to consider when evaluating a home energy source? Why are those important?
7. When it comes to heating your home:
   a. What do you perceive as the advantages of using natural gas (cost, performance, etc.)? Any perceived disadvantages?
   b. What do you perceive as the advantages of using electricity (cost, performance, etc.)? Any perceived disadvantages?
8. Would you ever consider switching from electricity to natural gas to heat your home? Why/why not? What barriers might prevent making that change?
9. When it comes to cooking appliances:
   a. What do you perceive as the advantages of using natural gas (cost, performance, etc.)? Any perceived disadvantages?
   b. What do you perceive as the advantages of using electricity (cost, performance, etc.)? Any perceived disadvantages?
10. Would you ever consider switching from electric cooking appliances to gas cooking appliances? Why/why not? What barriers might prevent making that change?

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11. Would you ever consider switching from electric water heating appliances to gas water heating appliances? Why/why not? What barriers might prevent making that change?

12. Do you use natural gas in any other way in your home (e.g., gas clothes dryer)? What do you use and why?

13. When it comes to the following, does electricity or natural gas offer the greatest advantage? What makes you feel that way?
    a. Reliable, uninterrupted supply?
    b. Cost of appliances?
    c. Monthly bills?
    d. Safe usage?
    e. Energy efficiency?

For those who use natural gas:

14. If your natural gas were to go away tomorrow, how big of an impact would that have on your life? Would the lack of a redundant energy supply be an issue?

For those who DON'T use natural gas:

15. What would it take for you to consider adopting natural gas as part of your energy source? Would having a redundant energy supply be a significant benefit?

III. ENVIRONMENTAL AND GOVERNMENTAL ATTITUDES (~ 30 MIN)

16. What do you believe are the greatest contributors to climate change today? More specifically, carbon emission reduction

17. What energy sources are playing a positive role when it comes to climate change?

18. Where does natural gas fit in? Does it play a positive or negative role in addressing climate change? *Probe on issues of fossil fuel vs. cleaner "energy bridge" to renewables*

19. Some West Coast cities are passing bans on new natural gas hookups for homes and buildings, with the goal of eventually banning it altogether. How do you feel about that?
    a. Should local government play this regulatory role? Why/why not?
    b. Is it fair to consumers to limit their energy choices? Why/why not?

20. I'd now like to discuss something called "renewable natural gas." Has anyone heard of it? What do you know about it?

Moderator passes out renewable natural gas stimulus, reads it with group, then asks the following:

21. What are your impressions of this renewable natural gas concept? Positive/negative? Why?

22. Does it address any of the concerns you otherwise had about natural gas? Why/why not?

23. How would you feel about a utility who offered renewable natural gas?

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Now I'd like to discuss something called "power to gas."

Moderator passes out power to gas stimulus, reads it with group, then asks the following:

24. What are your impressions of this power to gas concept? Positive/negative? Why?

25. Does it address any of the concerns you otherwise had about natural gas? Why/why not?

26. How would you feel about a utility who offered power to gas?

27. Now that we've discussed these last couple of concepts, have your thoughts on the gas bans we discussed earlier changed at all? Why/why not?

IV. MESSAGING (~ 20 MIN)

Now I'd like us to read the following list of messages together and then for each, I'd like you to rate each statement on a 10-point scale, where 10 = extremely compelling and 1 = not at all compelling.

Moderator hands out and reads the list of statements and gives respondents time to record their ratings. Once respondents are done, moderator asks the group the following for each statement:

28. How many of you gave the statement a 9 or 10? 6 – 8? 5 or lower?

29. What makes you feel that way?

After all statements have been discussed, moderator states the following:

Please take a moment and circle the letter of the statement that you feel is the most compelling argument for natural gas overall.

Moderator gives respondents time to record their ratings, polls group, and then asks following:

30. Why was X considered more compelling than the rest? How about Y?

31. Where do you go to get information on environmental topics?

32. If your utility wanted to keep you up to date on its activities, what would be the best way to reach you and keep you informed?

V. CLOSE

Moderator checks in back room for any final questions, and then dismisses group.

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Northwest Natural Environmental Perceptions and Message Testing

Attitudes Regarding Energy Sources

November 12, 2019

Prepared by:

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NW Natural®

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Background and Objectives

Background

As a leading natural gas supplier in the Northwest, NW Natural serves a large number of residential and business customers in Oregon and Southwest Washington.

With the growing concerns about climate change and carbon emissions, there has been an increasing focus on energy sources and their impact on the environment. As a result, there is increased scrutiny as to the role that natural gas plays as an energy resource.

NW Natural is therefore interested in learning how both customers perceive natural gas vs. alternative energy sources, as well as how they respond to messaging around two new product concepts.

Objectives

- Better understand the perceived advantages and disadvantages of natural gas and electricity
- Determine how individuals think about natural gas and whether it helps or hurts in the battle against climate change
- Explore attitudes about municipalities potentially banning natural gas in new construction
- Gauge receptiveness to Renewable Natural Gas and power-to-gas concepts and messaging

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Methodology

Approach

Focus groups with natural gas customers and non-customers to discuss their attitudes and perceptions of natural gas, other energy alternatives, and new natural gas concepts and messaging.

Stimuli used to describe and evaluate appeal of new product concepts as well as messaging statements.

Logistics

- Total of six focus groups conducted over two days in Portland and one day in Eugene, OR
- Each group was comprised of eight respondents
- Group sessions were 90 minutes in duration and were video-recorded
- Group sessions were conducted on October 28 and 29, 2019 in Portland, and on October 30, 2019 in Eugene

Key Recruiting Criteria

- Customers confirmed to be using natural gas
- Non-customers confirmed to be using alternatives to natural gas
- Mix of homeowners and renters
- Mix of gender and age
- Range of education and income
- Variety of employment in and around Portland and
- Geographic distribution of respondents within NW Natural service area

Respondents

Three types of group sessions were conducted: groups with customers only, non-customers only, and a mix of customers and non-customers

	Portland	Eugene	Total
Customer Groups	1	1	**2**
Non-Customer Groups	1	1	**2**
Mixed Groups	2	0	**2**
Total	**4**	**2**	**6**

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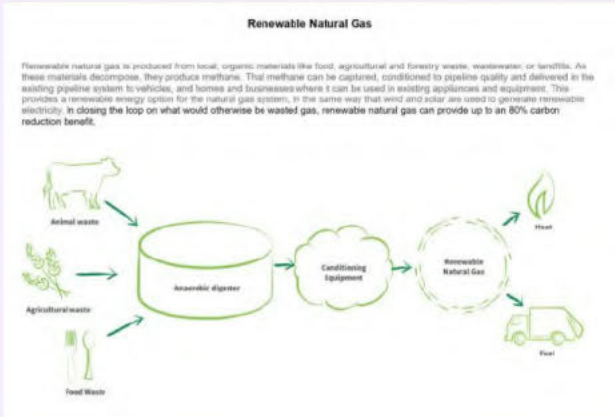
Stimuli

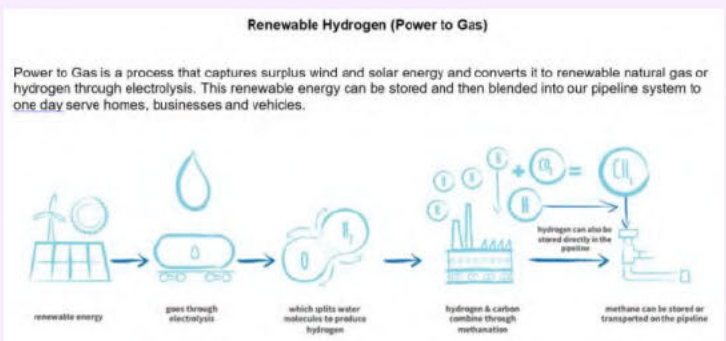
Renewable Natural Gas

Concept of natural gas produced from organic materials



Renewable Power-to-Gas

Concept of hydrogen and methane produced through wind and solar-powered electrolysis



Messaging Statements

Five statements used to measure resonating themes and messages

Natural Gas Messaging

Please review the following statements and choose what you consider to be:

- The most compelling statement and mark it with a √
- The least compelling statement and mark it with an X

____ P. Natural gas is a vital part of a reliable energy strategy because alternative energy sources like wind, solar, and hydropower are not able to meet all of the state's energy needs.

____ Q. All forms of cleaner energy—hydro, wind, solar and renewable natural gas—are needed in a balanced, low-carbon future.

____ S. Natural gas bans will allow utilities to continue using gas to generate electricity, but it will prevent individuals and businesses from choosing the energy source that best meets their needs.

____ T. The existing natural gas network can be used to deliver renewable natural gas and dramatically reduce greenhouse gas emissions as a result.

____ U. Natural gas is a uniquely attractive energy source because of its affordability, reliability, and cooking and heating performance.

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Executive Summary

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Key Findings

1 **Cost issues are still key to energy decisions, although environmental concerns and performance are secondary factors**

2 **While valued for convenience and some environmental benefits, electricity is also considered to be expensive, not fully "green," and subject to performance issues**

3 **Natural gas is perceived as offering cost, performance, and reliability advantages, while also generating fewer carbon emissions than coal**

4 **The perceived drawbacks of natural gas relate primarily to environmental concerns and safety**

5 **Non-customers feel that superior cooking performance is the greatest motivation for considering the adoption of natural gas**

6 **A key barrier to natural gas adoption is a lack of availability and the associated financial implications**

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Key Findings

7 Fossil fuels and methane are considered the primary contributors to climate change

8 While desiring a quick transition to renewables, most agree that a mix of energy sources is necessary in the near term, including natural gas

9 Response is mixed to municipal bans of natural gas given the tension between freedom of choice and climate change concerns

10 RNG receives enthusiastic support as a "greener" alternative, and utility suppliers are perceived as responsible corporate citizens

11 Consumers are confused by the Renewable Power-to-Gas process and question the conversion of clean energy to methane

12 "All forms of cleaner energy" statement is strongly favored for its "low-carbon emissions" goal and its realistic, balanced approach

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Recommendations

Findings	Recommendations
Cost issues are still key to energy decisions, although environmental concerns and performance are secondary factors • While valued for convenience and some environmental benefits, electricity is also considered to be expensive, not fully "green," and subject to performance issues • Natural gas is perceived as offering cost, performance, and reliability advantages, while also generating fewer carbon emissions than coal • The perceived drawbacks of natural gas relate primarily to environmental concerns and safety	**Position natural gas as cost effective/consistent/safe while also developing and promoting the benefits of Renewable Natural Gas** • Reinforce perceptions that natural gas is affordable • Highlight the areas where natural gas outperforms electricity (e.g., cooking) and how using natural gas has become easier and safer over time (e.g., auto ignition) • Remind consumers of the benefits of uninterrupted power supply (e.g., cooking and hot water when power out) • Develop Renewable Natural Gas and educate the public on how it helps to both meet energy needs and minimize impact on climate change
Non-customers feel that superior cooking performance is the greatest motivation for considering the adoption of natural gas • Cooking is recognized as offering some of the most tangible, easy to understand benefits	**In terms of promoting natural gas applications, focus on the benefits of cooking with a natural gas stove** • Demonstrate and describe instant response and temperature control, as well as cooking items over an open flame or in a range of cooking vessels • Consider pursuing testimonials from chefs as well as home cooks attesting to the benefits of cooking with natural gas

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Recommendations

Findings	Recommendations
A key barrier to natural gas adoption is a lack of availability and the associated financial implications • Many do not have gas lines on their streets or gas line plumbing in their homes, so the installation of this infrastructure would be expensive	**Investigate providing different financial incentives and tools for evaluating the adoption of natural gas** • Consider developing an online tool to help consumers analyze the cost/benefit of installing and using natural gas vs. other alternatives • Explore viability of offering different financing/incentive plans (e.g., subsidies, zero interest loans, etc.) to reduce the upfront financial burden of installing gas lines for non-customers
Fossil fuels and methane are considered the primary contributors to climate change • While desiring a quick transition to renewables, most agree that a mix of energy sources is necessary in the near term, including natural gas • Response is mixed to municipal bans of natural gas given the tension between freedom of choice and climate change concerns	**Promote natural gas and Renewable Natural Gas as critical parts of the energy mix** • Position natural gas as an important bridge/transition from “dirty” coal to renewable energy sources • Simultaneously develop and introduce Renewable Natural Gas • Rather than battle municipalities regarding conventional natural gas, work with them to implement Renewable Natural Gas programs within their cities

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Recommendations

Findings	Recommendations
Renewable Natural Gas receives enthusiastic support as a "greener" alternative, and utilities are perceived as responsible corporate citizens • Consumers conceive of this concept as a form of recycling, something that they are familiar with and have long supported • RNG is also highly appealing because the production process involves capturing gases from natural processes rather than extracting gases through fracking • Consumers also appreciate that new pipeline infrastructure isn't necessary to support RNG	**Commit to large scale implementation of Renewable Natural Gas while touting its many environmental benefits** • Position the reclamation of methane as "recycling" wasted gases from naturally occurring processes • Explain how the use of these gases for energy has less of an environmental impact than allowing them to escape into the atmosphere • Emphasize the environmentally-friendly nature of RNG production (i.e., no fracking involved) • Highlight the cost effectiveness and efficiency of utilizing the existing gas pipeline network to deliver RNG • Address key consumer questions regarding RNG's impact on monthly bills, production processes/location, and what environmental side effects are involved (e.g., disposal of any remaining organic waste)

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Recommendations

Findings	Recommendations
Consumers are confused by the Renewable Power-to-Gas process and question the conversion of clean energy to methane • The chemistry and production process seems complex, overly complicated, and potentially expensive, and leaves consumers with more questions than answers • Doesn't address when and why there would ever be "surplus wind and solar" or why this concept would be superior to storing excess energy in batteries • While the production of hydrogen seems potentially acceptable, the production of methane is not regarded favorably	**Evaluate whether Renewable Power-to-Gas is really commercially viable, and if so, tailor it to be more consumer-oriented** • Given the vastly more popular RNG concept, determine whether NW Natural should focus its resources on RNG vs. pursuing Renewable Power-to-Gas as well • If committed to Renewable Power-to-Gas, help consumers better understand the rationale behind the concept (e.g., when there is "surplus" energy, why batteries aren't viable, the storage benefits for converting energy into gas) • In order to increase its environmental appeal, consider whether it would be viable to produce only hydrogen while avoiding methane production • In turn, promote the fact that there are no negative byproducts from using hydrogen as an energy source
"All forms of cleaner energy" statement is strongly favored for its "low-carbon emissions" goal and a realistic, balanced approach to achieve it • Consumers are looking for both energy solutions that are both environmentally friendly and pragmatic	**Focus on showing how NW Natural is being innovative in addressing the issue of climate change** • Acknowledge that addressing climate change is a critical goal while also meeting today's energy needs • Spotlight RNG as evidence that NW Natural is being innovative and responsible in addressing climate change • Avoid references to potential municipal bans and only describe natural gas advantages (i.e., cost, performance) in the context of environmentally-friendly RNG

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Detailed Findings:
Energy Perceptions

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Clean Energy Perceptions

When asked to define "clean energy," respondents do so by both defining what it is as well as what it isn't

What "Clean Energy" is:

- "Green," environmentally friendly
- Renewable/sustainable resources
  - Solar
  - Wind
  - Hydroelectric
  - Geothermal
- Critical to saving the future of the planet
- Will require infrastructure investment and policy changes
- Alternative energy for vehicles (e.g., electric, hydrogen, propane, natural gas)

What "Clean Energy" isn't:

- No carbon emissions
- No "dirty" fuels (e.g., coal, other fossil fuels)

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Key Energy Source Considerations

While some base energy decisions on environmental and performance issues, cost considerations still play the biggest role in energy decisions

- Cost/investment considerations
  - Using what is in place vs. cost of installing infrastructure
  - Cost of purchasing/replacing appliances
  - Operating cost/monthly bills
  - Life expectancy of equipment
  - Return on investment/payback (e.g., cost to install vs. monthly cost savings and home appreciation)
  - Renters: lowest rent regardless of energy source
- Positive and negative environmental impacts associated with different energy sources
- Performance characteristics: heating/cooking speed and effectiveness, efficiency, degree of control
- Ease of implementation (i.e., using what is already in place)
- Reliability and redundancy offered by different energy sources

"I look at the operating cost, the investment I need to make, and then the return on the investment."– Eugene Mixed

"I like that I have my natural gas fireplace to keep me warm and my water heater for hot showers even when the electricity is out." – Eugene Customer

"I am paying my electric utility more for power from wind so that I can help save the salmon."– Portland Mixed

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Perceived Electricity Advantages

Electricity is appreciated for its convenience and environmental benefits

- Many of its generation sources are renewable (e.g., hydroelectricity, solar, wind, geothermal)
- The readily accessible nature of electricity in homes makes it an extremely convenient, flexible, and easy-to-use option
  - Homes are always built with electric outlets and lighting, so it is easy to "plug and play" devices
  - Electricity is flexible enough to power appliances and automobiles, heat space and water, cook food, and provide light
  - New electric stoves with flat tops are easier to clean
- Other advantages include the greater selection of electric appliances and their lower costs as well as all-electric customers who pay one energy bill rather than two

"I like that a portion of your electricity can come from renewable sources."– Portland Mixed

"I can use electricity to run everything."– Eugene Customer

"Electricity is convenient. When I want to heat a room or area, I can just plug in a space heater."- Portland Mixed

"I can't run my TV on natural gas."– Eugene Non-Customer

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Perceived Electricity Disadvantages

Electricity's downsides include cost, coal as an energy source, performance constraints, and outage impacts

- All find electricity to be more expensive than gas
- Has historically used coal as a generation source, one of the dirtiest resources
- Offers less precise control relative to natural gas
  - For cooking: longer to heat up and cool down, less fine control, can't use certain cookware (e.g., clay cooking pot)
  - For heating: slower to disperse heat
- Power can be disrupted during storms which prevents use of lights and electric appliances and devices, and damaged power lines can become a source of wildfires

"Electricity has always been super expensive in the homes that I've had." – Eugene Customer

"All of the electricity in Midwest and the East Coast comes from burning coal." – Eugene Non-Customer

"There's certain types of cookware that you can't really use with electric. For instance I wanted a cook with a Japanese clay cooking pot, which needs an open flame." – Portland Non-Customer

"If you have trees, and snow, or wind. You may be without power for an extended period." – Eugene Customer

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Perceived Natural Gas Advantages

Natural gas is seen as superior to some alternative energy sources relative to carbon emissions, cost, performance, and reliability

- Acknowledged to be cleaner than coal and less expensive than electricity
- Recognized for its superior cooking performance
  - Fast heat
  - Precise control of heat source: instant on/off, fine tuned control of increasing/decreasing heat
  - Can cook foods directly over open flame (e.g., vegetables, tortillas)
- Valued as an excellent heat source (e.g., furnace and water heater)
- Appreciated for its reliability/infrequent outages and availability during power outages (e.g., cooking, heating, fireplace, hot water still available)

"Natural gas is a hydrocarbon. But it's more efficient than coal, puts out a lot less pollution."– Portland Non-Customer

"If my natural gas went away, my monthly bills would definitely go up."– Portland Mixed

"You get more fine control with gas and you can actually cook a vegetable or tortilla on the flame, you don't have to have a pan." – Portland Non-Customer

"We have power outages, but we rarely have 'sorry your natural gas isn't coming through.'"– Portland Customer

"If we have an ice storm that takes down the power, it's nice to know that I can still cook on my stove."– Portland Customer

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Perceived Natural Gas Disadvantages

The perceived drawbacks of natural gas relate primarily to environmental concerns and safety

- Consumers have concerns about how natural gas affects the environment from the point it is mined to when it is used
  - Fracking seen as creating significant detrimental impacts (e.g., contaminating water supplies, creating earthquakes)
  - As a fossil fuel, is not considered sustainable or as environmentally friendly as renewable resources (e.g., solar, wind)
- Several are nervous about the safety of natural gas pipelines (e.g., leaks, pipeline explosions) as well as safe usage of natural gas (e.g., fear of lighting burners, catching things on fire, carbon monoxide poisoning)
- Other disadvantages include its "rotten egg" odor and limitations in powering fixtures/devices

"Fracking is destructive and irreversible.– Eugene Customer

"It's like the lesser of two evils. It's better than coal. But it's not saying that it's good. It's just better than something else that's bad." – Eugene Non-Customer

"We actually did put in a gas line to the stove and put in a gas kitchen stove, and my wife was terrified [because of safety concerns]." – Portland Customer

"I have more control over who is providing me [electric] energy as opposed to natural gas which I know is coming from fracking." – Portland Customer

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Motivations for Adopting Natural Gas

Non-customers feel that superior cooking performance is the greatest motivation for considering the adoption of natural gas

- Several would prefer to cook with natural gas because of the control, precision, and quality results that it would offer
- Others feel that natural gas would do a better job of heating their homes and that there would be value in having energy access during power outages (e.g., ability to cook, heat, have hot water)
- Several indicate that they would consider switching to natural gas if they received financial incentives and had a better understanding of the cost/benefit analysis

"I'd consider switching. Cooking with gas is incredibly versatile, you can find tune the amount of heat and the amount of fire you produce." – Eugene Non-Customer

"I would if it was affordable. If they would give me a break. If you're going to be a customer we'll put this line in for a reduced price or something." – Eugene Non-Customer

"I would need a lot more information on what it would take to install it. I mean I would have no idea where to begin even getting natural gas to my home much less, figuring out, replacing appliances." – Portland Mixed

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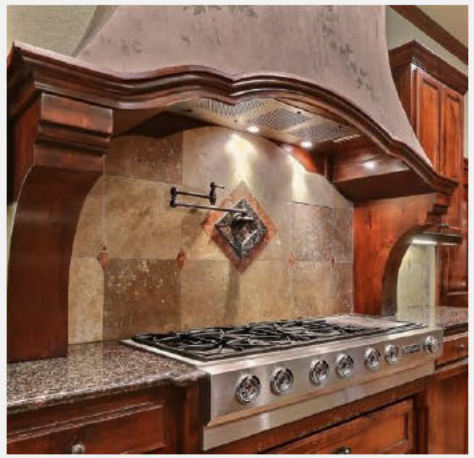
Barriers for Adopting Natural Gas



For those without natural gas today, a key barrier to adoption is a lack of availability and the associated financial implications

- Some do not have gas lines that extend to their homes while others don't have their homes plumbed for gas, so the installation and related expenses would be significant
  - In some cases, consumers would need to pay to extend gas lines down their street
  - In other cases, homes would need to be plumbed for gas and renovations made (e.g., exhaust vent for cooking)
  - The cost of buying/replacing appliances is also mentioned as a financial barrier
  - Gas appliances are also perceived as being more difficult to install and remove

"Gas isn't universally available. Not every street has gas piping." – Eugene Customer

"There's no gas line to my house, and they said it would be $25,000 for me to put it in myself because it has to run from the street all the way down to my house." – Eugene Non-Customer

"I like cooking with gas but I don't want to prepare my house for gas if the benefit isn't enough to be worth the hassle and the cost." – Portland Non-Customer

Areas Where Consumers Are Not Informed

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Consumers are not well versed in comparisons of energy efficiency or in the specifics of electricity generation

- Consumers are generally unclear whether electricity or gas is more energy efficient overall
  - No real understanding of how energy efficiency is measured
  - Have no easy way to consider the efficiency of natural gas to electricity
  - However, most recognize cooking with natural gas to be more efficient in the sense that there is greater control over the heat source
- While understanding there are many sources generating electricity, majority are not aware of the increasing role of natural gas
  - Many recognize that coal has historically played a major role in generating electricity while simultaneously recognizing it as a "dirty" energy source
  - However, most are unaware of the significant role that natural gas plays today in generating electricity and replacing coal as an energy source

"Using it in a large scale plant for electrical generation is more efficient than an in-home use for heat where a lot of energy ends up being wasted." – Portland Non-Customer

"One would have to compare the cost of producing electricity from gas, and delivery systems. It requires so much analysis and mathematics, I don't approach it." – Eugene Customer

"I'm surprised [that natural gas generates only 60% of electricity], honestly. I didn't think that we were actually getting that much energy out of solar and wind ." – Portland Mixed

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Detailed Findings:
Environmental Considerations

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Perceptions of Climate Change Contributors

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While fossil fuels are considered the primary contributor to climate change, many also understand the damaging role of methane gas

- Fossil fuels (e.g., coal, oil, gas) are seen as prevalent and having a negative impact in multiple ways
  - Powering transportation vehicles of all kinds (e.g., autos, trucks, trains, planes)
  - Supporting manufacturing, industry, and military
  - Generating electricity (e.g., coal-fired power plants)
  - Manufacturing and incineration of plastics
- At the same time, there is an increasing awareness that methane gases from decaying garbage and agriculture (e.g., farming, livestock) are an increasing global greenhouse concern

"I think transportation is the largest single source of carbon emissions." – Eugene Customer

"Coal. You burn it, and exhaust and pollution results." – Portland Mixed

"Methane from the animals and waste sites are both major contributors to climate change."– Portland Customer

Role of Natural Gas Relative to Climate Change

While natural gas is preferable to coal in terms of climate change, most hope that natural gas is a "transitional" energy resource

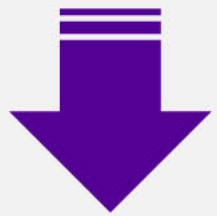
- Natural gas is perceived as a better option than coal, but not the "ultimate" solution to environmental challenges
  - Although it burns cleaner than coal, natural gas still creates carbon emissions
  - Consumers also understand that given finite natural resources, natural gas is also not sustainable
  - Many are also very concerned with the environmental impacts of fracking to mine natural gas
- The majority believe that a transition from natural gas to renewable energy sources should occur as quickly as possible to address climate change
  - Energy sources like solar and wind are preferred because they do not contribute to carbon emissions and do not deplete natural resources

"The problem with coal has largely to do with particulates whereas natural gas burns off very cleanly." – Portland Customer

"It's still like as a transition power source until we get fully renewable, but it's miles ahead of coal." – Portland Non-Customer

"I feel like you should use natural gas as long as there are other sources that are worse that could be replaced." – Eugene Customer

"You need base load even with wind and solar. Something to provide when the wind's not blowing and the sun's not shining." – Eugene Non-Customer



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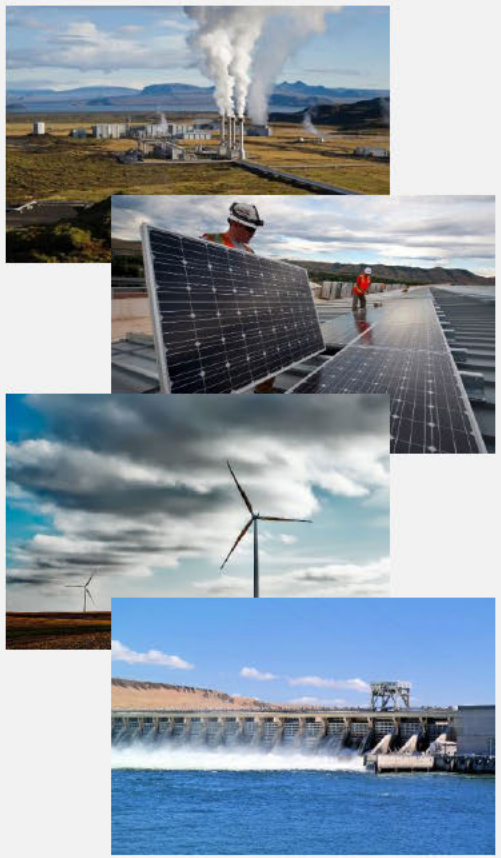
Need for a Mix of Energy Sources

Acknowledging that there are no "perfect" energy sources, most agree that a mix of energy sources is required in the near term

- While interested in moving toward renewable energy sources as a way to combat climate change, most recognize that there are downsides to all energy sources
  - Hydroelectric dams hurt fish
  - Windmills only work when there is wind and they also kill birds
  - Solar only works when sun is out and panel production often uses materials/chemicals that are harmful to the environment
- Additionally, most understand that renewables aren't ready to meet all energy needs today, so a combination of the best alternatives (including natural gas) will be necessary



"I don't think that there is a one size fits all solution to energy problems." – Eugene Non-Customer

"Everything has a downside. Wind turbines, for example, kill a surprising number of birds." – Eugene Non-Customer

"Dams change the ecosystem of rivers" – Eugene Customer

"I hope that these newer energy sources get fine-tuned and get to a point where they'll be easier, more readily available, cheaper, and run efficiently. I just think that's going to take a little bit for that to happen." – Eugene Non-Customer

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Perceptions of Natural Gas Bans

Response is mixed to municipal bans of natural gas given the tension between freedom of choice and climate change concerns

- Some are bothered by the prospect of a mandate that restricts individual choice and would drive up expenses
  - Given the higher cost of electricity, some worry about the financial impact on those with less means
  - Several feel that a ban would put an undue burden on restaurants that need gas for cooking
  - Some find it misguided that individuals are being targeted rather than industries (e.g., utilities) where there could be greater impact
- However, several believe that climate change is a significant and immediate threat to the planet and that municipal bans are justifiable as a way to move away from fossil fuels
- Most agree that it wouldn't make sense to ban Renewable Natural Gas

"That's a big government overreach."– Portland Non-Customer

"Cost is a factor. If people are forced into super expensive, all-electric, that might push people out of the neighborhood." – Portland Customer

"If you want a change to renewable energy, sometimes you have to push people to do it. "– Portland Non-Customer

"Given that climate change may be at a tipping point, I don't know that I object as much to government stepping in."– Portland Customer

"Banning Renewable Natural Gas would be ridiculous, but banning what we have now, I'm OK with."– Portland Customer

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Detailed Findings:
Concepts and Messaging

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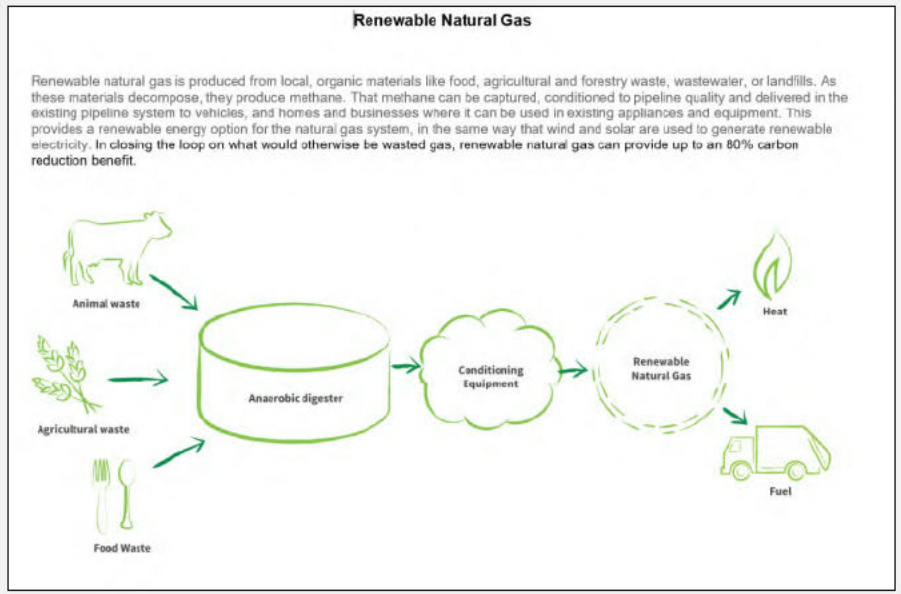
Perceptions of Renewable Natural Gas

RNG receives enthusiastic support as a more environmentally sound energy source than conventional natural gas



Strengths

- Has tremendous appeal because it turns waste into something of use (i.e., “recycles” methane gases for productive use)
- Also is attractive because it avoids the environmental issues related to fracking
- Consumers also love that the existing natural gas infrastructure can be utilized and doesn’t need to be replaced
- Unlike conventional natural gas, Renewable Natural Gas is sustainable as there will always be steady supply of organic waste to tap into

Weaknesses/Questions

- Consumers don’t understand or necessarily believe the claim of an “80% carbon reduction benefit” and would like a clearer sense of all of the environment impacts of this approach (e.g., what happens to the remaining material)
- Some would like to understand what new infrastructure would be required and how the production of Renewable Natural Gas will impact monthly bills
- Others worry that the utility would try to locate the associated processing plant in a disadvantaged community

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Response to Renewable Natural Gas

"Absolutely fantastic!. I mean we could turn it into something that would help us and stop other things that are killing us." – Portland Customer

"It's a source that's natural, it's already here, and we need to take advantage of it. It's called 'recycling' and Oregon is good at recycling." – Portland Non-Customer

"An 80% reduction sounds a little too good to true." – Portland Mixed

"I love it. It's renewable and would eliminate the need for fracking." – Portland Customer

"It would be more of a baseline energy source than solar or wind." – Portland Mixed

"Close to a home run!" – Portland Customer

"It probably wouldn't produce as much gas as we're burning from Northwest Natural. But it would definitely put a dent in it, I'd love to see it implemented." - Eugene Customer Group

"If I knew that this was what was coming out of my pipeline, I would switch to Renewable Natural Gas tomorrow." – Eugene Non-Customer

"We've got a lot of Tillamook cows around so we should be taking advantage of them." – Portland Non-Customer

"I'm just wondering what is happening to the leftovers – so you're getting the gas, but what is happening to the other sludge? Is it compost? Is there anything toxic? What are going to do with – in this anaerobic digester, what is coming out of it besides the gas that we want? And what do we do with it?" – Eugene Non-Customer

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Impact of RNG on Utility Perceptions

Utilities offering Renewable Natural Gas would benefit from positive public opinion and be seen as responsible corporate citizens

- Utilities offering Renewable Natural Gas would be perceived as progressive organizations who are doing their part for the environment
- Consumers characterize such an RNG utility as “innovative,” “responsible,” “forward thinker,” “risk-taking,” “doing the right thing,” “earth friendly,” “green,” and “environmentally friendly”

“If they're making a serious investment in the infrastructure and not just window dressing or public relations, I would totally love it. It would change the image of the company.” – Eugene Customer

“It shows they are innovating and addressing the contributors to climate change.” – Portland Mixed

Perceptions of Renewable Power-to-Gas

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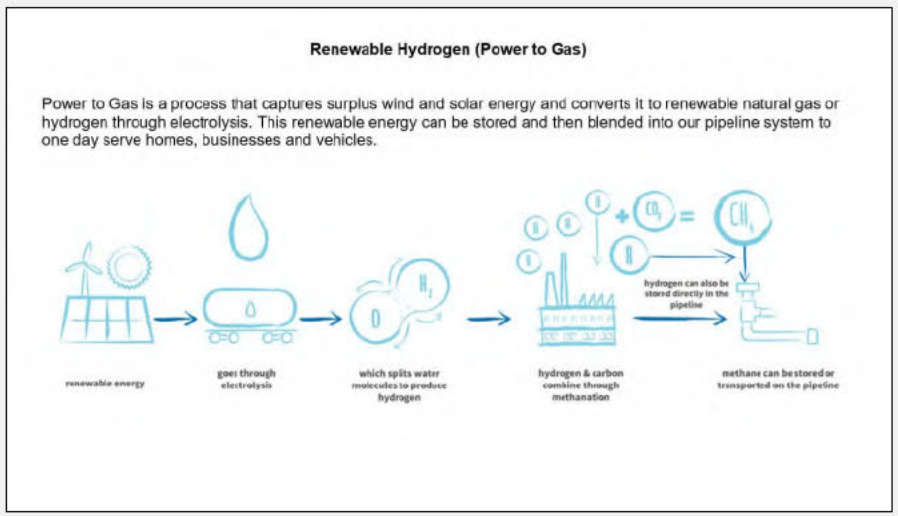
Enthusiasm is limited due to questions about its process and the conversion of clean energy to methane



Strengths

- Potential for having less of an environmental impact than conventional natural gas
- A few recognize that this concept is a form of battery that takes energy that would otherwise be lost and converts it into energy that could be stored for long periods
- Hydrogen is a clean energy source that is already being used in some vehicle design with zero emissions

Weaknesses/Questions

- Doesn't address how and when there would ever be "surplus wind and solar" energy
- Many do not find it appealing to take clean, renewable energy and convert it into methane gas
- Also seems like an overly complicated means of storing energy as opposed to developing battery technologies that could directly store any surplus wind and solar energy
- Chemistry is not clear to most and creates more questions than answers (e.g., expense, cost effectiveness/efficiency, safety of electrolysis and hydrogen, source of CO_2, etc.)
- Concept mixes the production of hydrogen (perceived more positively) with the production of methane (perceived more negatively)

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Response to Renewable Power-to-Gas

"I don't know enough about this process to combine through methanization in order to make a judgement call." - Portland Customer

"This seems like a lot of work, it seems like it'd be more efficient to put your money into figuring out how just to store the energy straight up." – Eugene Customer

"I'm wondering where are they getting the water from? And then, hydrogen's really explosive, so that's a safety concern." – Eugene Non-Customer

"What would be the point of taking clean energy and creating something that's not really as clean?" – Portland Non-Customer

"I personally think this is a fantastic idea because it's an incredible way to store a bunch of energy." – Eugene Non-Customer

"It doesn't sound cost effective." – Eugene Non-Customer

"It's like an alternative to a battery. Just storing the excess power in a battery or putting it into a different form that you can then keep around." – Portland Non-Customer

"What are the side effects of all these processes, what are the other reactants, what else is going into that? I feel like this has been simplified and I don't feel like it's telling me the whole story." – Eugene Customer

"It takes quite a bit of energy to split the atoms or the molecules, so that's a negative." – Eugene Customer

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Most Compelling Messages

Clear Favorite:

"All forms of cleaner energy—hydro, wind, solar and Renewable Natural Gas—are needed in a balanced, low-carbon future"

Feedback

- Is future-focused and establishes low-carbon emissions as the key objective
- Is a realistic recognition that there is no one "perfect" energy source that can or should be relied upon
- "Balanced" approach also recognizes that multiple energy sources are needed to meet future energy needs
- Favorably positions Renewable Natural Gas in the same category as the other renewable energy sources

"There's not a perfect solution so having all of those as part of the solution makes more sense." Eugene Non-Customer

"It's broad-based. It's not just focused on natural gas." – Eugene Customer

"It sounds positive, encouraging, and hopeful. – Eugene Customer

Runner Up (by significant margin):

"The existing natural gas network can be used to deliver Renewable Natural Gas and dramatically reduce greenhouse gas emissions as a result."

Feedback

- Like the Renewable Natural Gas concept because it is recycling waste gases and limiting environmental impact
- Appealing that existing gas network can be used, wouldn't go to waste, and wouldn't require significant new investment
- Claim describes a positive outcome (lower greenhouse gas emissions) while also seeming feasible/believable

"I like it because you don't have to build new ways to deliver the energy." – Portland Non-Customer

"I like it because it gives people who already have a home setup to use gas a more clean option without having to switch over to electric and changing all their appliances." – Portland Mixed

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Least Compelling Messages

Least Popular:

"Natural gas bans will allow utilities to continue using gas to generate electricity, but it will prevent individuals and businesses from choosing the energy source that best meets their needs"

Feedback

- Proved confusing to consumers as many agreed with message, but didn't see it as a compelling argument for natural gas
- Comes across as an adversarial pitch

"Sounds like we're choosing sides right off the bat there." – Eugene Customer

"That's just pretty much a dog whistle there, isn't it? 'Don't tread on me. Don't stop me from doing something, even if we're killing the planet'" – Eugene Customer

Runner Ups

"Natural gas is a uniquely attractive energy source because of its affordability, reliability, and cooking and heating performance"

Feedback

- Description seems like a bland and generic advertisement
- Doesn't speak to any environmental benefits
- For those without gas lines and plumbing, statement doesn't provide a rationale for incurring the installation expense

"It didn't really address anything going on as far as reliability or renewable energy or the environment. It was just kinda cutesy." – Eugene Non-Customer

"It just sounds like a commercial. It doesn't sound sincere" – Portland Mixed

"Natural gas is a vital part of a reliable energy strategy because alternative energy sources like wind, solar, and hydropower are not able to meet all of the state's energy needs"

Feedback

- Sounds as if renewables won't ever be able to meet all energy needs
- Feel the statement should be modified to indicate that renewables aren't able to meet all needs in the "short term"

"I think that there IS potential for wind, solar, and stuff like that to provide all the energy that we would need." – Eugene Customer

I could agree with it more if they finished the sentence with something like, 'in the short term'" – Eugene Customer

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Appendix

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Renewable Natural Gas Stimulus

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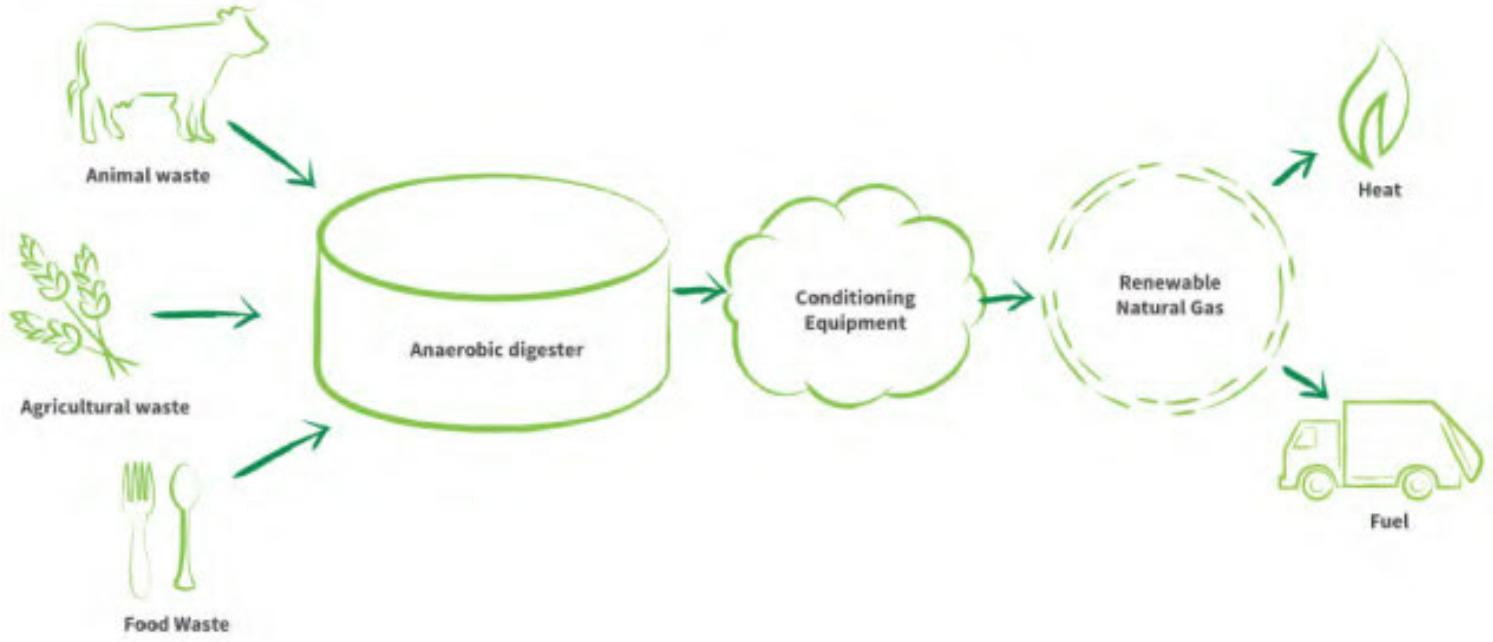
Renewable Natural Gas

Renewable natural gas is produced from local, organic materials like food, agricultural and forestry waste, wastewater, or landfills. As these materials decompose, they produce methane. That methane can be captured, conditioned to pipeline quality and delivered in the existing pipeline system to vehicles, and homes and businesses where it can be used in existing appliances and equipment. This provides a renewable energy option for the natural gas system, in the same way that wind and solar are used to generate renewable electricity. In closing the loop on what would otherwise be wasted gas, renewable natural gas can provide up to an 80% carbon reduction benefit.



Renewable Hydrogen Stimulus

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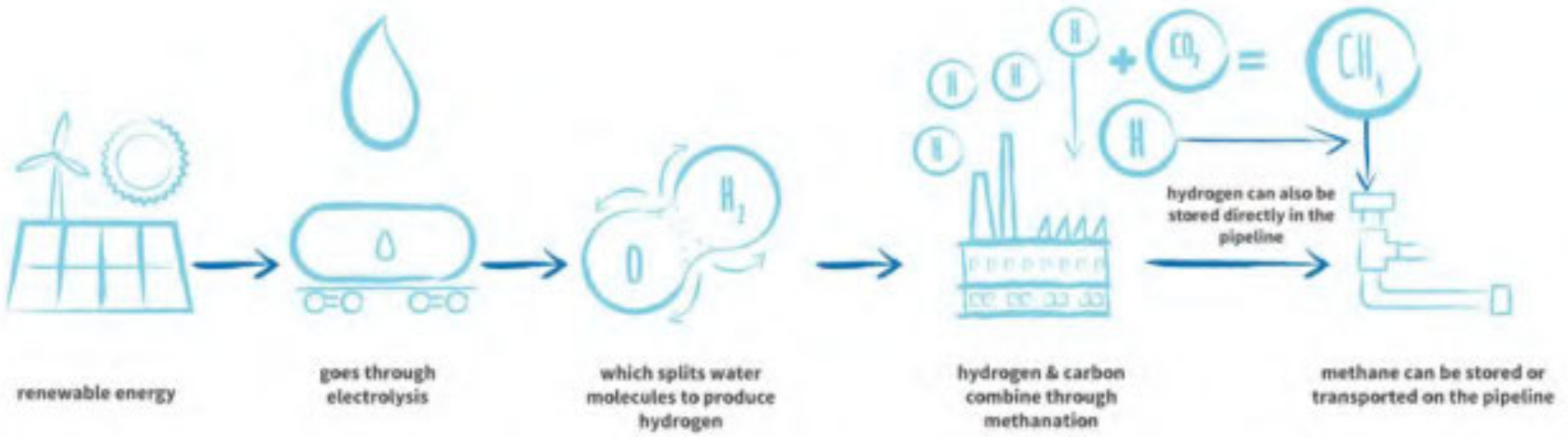
Renewable Hydrogen (Power to Gas)

Power to Gas is a process that captures surplus wind and solar energy and converts it to renewable natural gas or hydrogen through electrolysis. This renewable energy can be stored and then blended into our pipeline system to one day serve homes, businesses and vehicles.



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Natural Gas Messaging

Natural Gas Messaging

Please review the following statements and choose what you consider to be:

- The most compelling statement and mark it with a √
- The least compelling statement and mark it with an X

_____ P. Natural gas is a vital part of a reliable energy strategy because alternative energy sources like wind, solar, and hydropower are not able to meet all of the state's energy needs.

_____ Q. All forms of cleaner energy—hydro, wind, solar and renewable natural gas—are needed in a balanced, low-carbon future.

_____ S. Natural gas bans will allow utilities to continue using gas to generate electricity, but it will prevent individuals and businesses from choosing the energy source that best meets their needs.

_____ T. The existing natural gas network can be used to deliver renewable natural gas and dramatically reduce greenhouse gas emissions as a result.

_____ U. Natural gas is a uniquely attractive energy source because of its affordability, reliability, and cooking and heating performance.

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Thank you!

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Please note that quotations included within this document are sometimes paraphrases rather than precise transcriptions of respondent input.

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NW Natural

Natural Gas
2019 Product Positioning Survey

Conducted by

cfm strategic communications, inc.
research | marketing public relations | public affairs | federal lobbying | state lobbying
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Methodology

- A survey among 630 residents in NW Natural's Portland, Salem, Eugene and Vancouver service areas
- Interviews conducted February 19-22, 2019
  - 320 telephone interviews using random sample
  - 310 online surveys using third party panel
- Stratified sample:

	Phone N=320	Online N=310
Multnomah County	100	100
Clackamas County	50	50
Washington County	50	50
Lane County	40	30
Marion County	30	20
Clark County	50	50

- Sample quotas used for NW Natural customers by area
  - Portland: 50% customers/50% non-customers
  - Vancouver: 45% customers/55% non-customers
  - Eugene: 40% customers/60% non-customers
- 35% telephone interviews completed on cell phones
- Totals may not equal 100% because of rounding or exclusion of not sure responses

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CORPORATE REPUTATION

Corporate Reputation

In your opinion, would you rate the overall reputation of the following companies as excellent, very good, only fair or very poor?

	Total excellent/ very good	Excellent	Very good	Very poor/ fair	Not sure/ not aware
NW Natural	58%	20%	38%	13%	29%
PGE	57%	19%	38%	19%	23%
Pacific Power	25%	6%	19%	15%	60%

Roughly six in ten give excellent/very good ratings for NW Natural and PGE

Six in ten don't have an opinion about Pacific Power

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Corporate Reputation

In your opinion, would you rate the overall reputation of the following companies as excellent, very good, only fair or very poor?

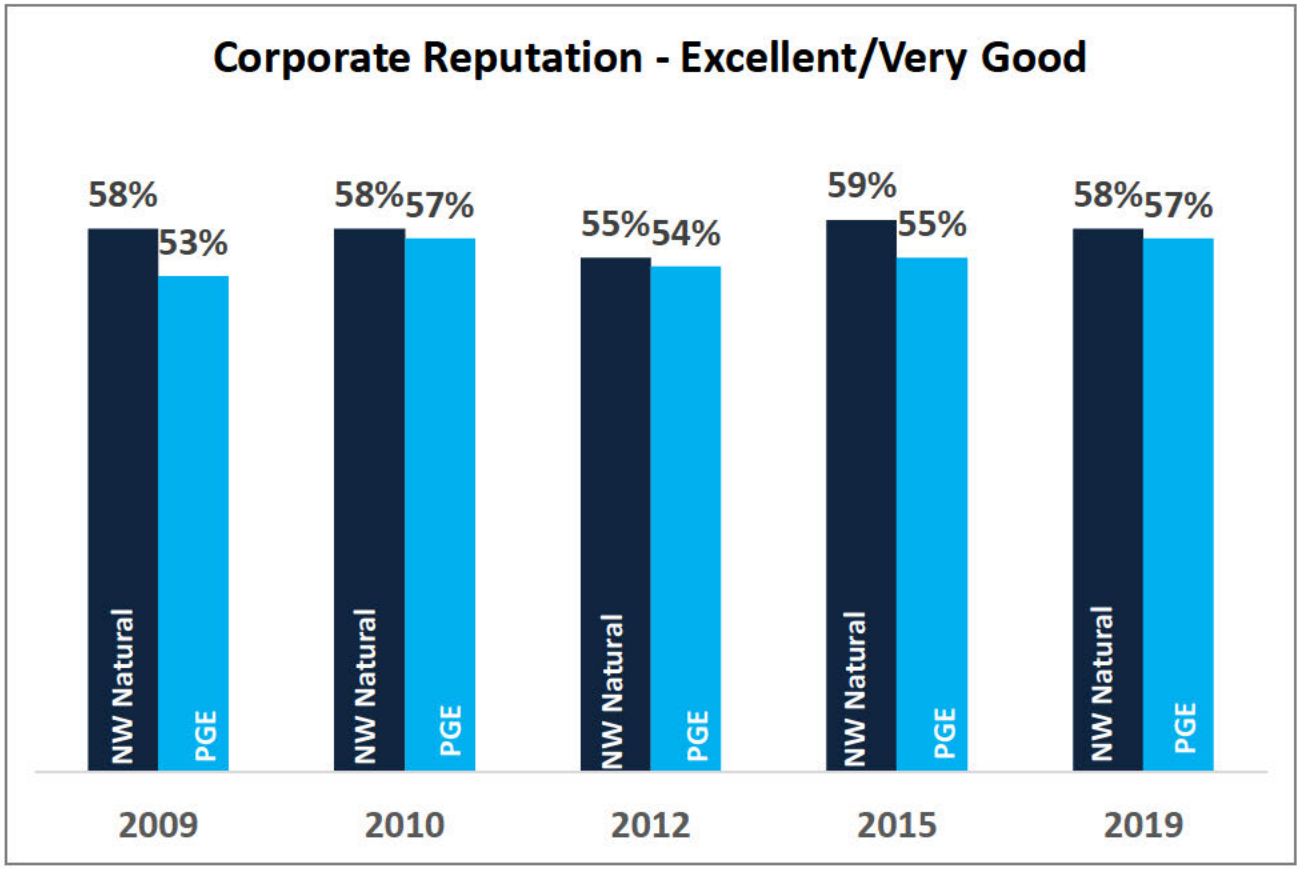
2019	Total excellent/ very good	Very poor/ fair
NW Natural	82%	18%
PGE	75%	25%
Pacific Power	63%	37%

Calculating reputation only among those with opinions finds:

- **More than three in four have favorable opinions of NW Natural and PGE**
- **Pacific Power's reputation is good but a large share of residents have unfavorable opinions**

Reputation: Trends

How would you rate the overall reputation of the following companies?
Among all respondents



Opinions about NW Natural and PGE are statistically unchanged during the past 10 years

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2019, 2015 and 2012 data based on results from Portland, Salem, Eugene and Vancouver markets only. 2009 and 2010 results based on data from all NW Natural markets.

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Jenks/7

NW NATURAL'S REPUTATION AMONG CUSTOMERS

NW Natural's Reputation

Opinions about NW Natural are favorable among all demographic groups

NW Natural's reputation is strongest among:

- Its customers (83%)
- Anyone with experience using natural gas (71%)
- Those who heat homes with natural gas (78%)
- Those with incomes $75K+ (68%)
- Clackamas (68%) and Washington (66%) County residents

Those more likely to have no impression of NW Natural are:

- Non-customers (49%)
- No experience with natural gas (63%)
- Earn less than $35K (42%)
- Renters (42%)

NW Natural has an opportunity to improve its reputation among these groups

NW Natural's Reputation

NW Natural Customers

	Excellent/ very good	Fair/ very poor	Not sure/ not aware
2019	**83%**	**11%**	**7%**
2015	85%	10%	5%
2012	84%	10%	6%
2010	83%	11%	6%
2009	85%	3%	12%

NW Natural's reputation among its customers has not changed during the past 10 years

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Opinions of NW Natural

NW Natural 2019 Product Positioning Survey

	Excellent / very good	Fair/ poor	No impression		Excellent/ very good	Fair/ poor	No impression
18-34 yrs	41%	21%	38%	<$35K	41%	17%	42%
35-54 yrs	59%	15%	27%	$35k - $49.9k	51%	15%	33%
55-64 yrs	67%	12%	21%	$50K - $74.9k	61%	15%	24%
65 yrs +	60%	10%	30%	$75K+	68%	10%	22%
Male	58%	15%	27%	Portland	63%	13%	24%
Female	59%	11%	30%	Eugene	49%	17%	35%
NW Natural customer	83%	11%	7%	Vancouver	50%	13%	27%
Not NW Natural customer	37%	14%	49%	Salem	52%	11%	37%
Heat w/ gas	78%	12%	10%	Own	65%	12%	24%
Heat w/ electricity	37%	15%	48%	Rent	41%	17%	42%

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PERCEPTIONS ABOUT ENERGY SOURCES

Opinions about Energy Sources

What is your opinion of the following energy sources available for home use in Oregon?

		Very/somewhat positive	Very/somewhat negative	No opinion
Natural gas	2019	81%	10%	9%
	2015	85%	7%	9%
	2012	77%	13%	10%
	2010	81%	11%	8%
	2009	83%	9%	8%
Electricity	2019	87%	8%	5%
	2015	82%	14%	3%
	2012	75%	17%	8%
	2010	84%	14%	2%
	2009	84%	14%	2%

Favorable opinions about natural gas are down four points since 2015 but still similar to previous surveys

Most favorable opinions about natural gas are among NW Natural customers (94%), those who heat with natural gas (94%), have used natural gas (88%), those earning $75+ (88%) and Washington County residents (88%)

Favorable opinions about electricity are up 12 points since 2012

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Preferred Home Heating Source

If you could choose any source of energy to heat your home, would it be?

Natural gas	47%
Electricity	25%
Other	22%
Not sure	6%

Nearly half would prefer natural gas for home heating

Those most likely to prefer natural gas are NW Natural customers, those who have used natural gas and those who already heat homes with natural gas

The only groups to prefer electricity are those ages 18 to 34, non-NW Natural customers, those who have never used natural gas, renters and those with incomes less than $35K

Top-of-Mind Product Attributes

Why would you choose (natural gas/electricity) as the energy source to heat your home?

Natural gas (n= 293)	2019
Less expensive	50%
More efficient	37%
Cleaner	27%
Heats faster	23%
Reliable	21%
Easy to use	20%
Better for cooking	20%
Better for heating	20%
Available	15%

Electricity (n=159)	2019
Cleaner	31%
Safer	31%
Convenient	23%
Positive experience	22%
Less expensive	21%
Familiarity	21%
Reliable	18%
Efficient	17%
Available	14%

People prefer natural gas because of its lower cost and high performance

People prefer electricity based on safety, convenience and personal experience

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Preferred Home Cooking Source

If you could choose any source of energy to heat your home, what would it be?

Natural gas	54%
Electricity	36%
Neither	6%
Not sure	4%

People prefer cooking with natural gas over electricity

People who have experience cooking with natural gas are among those most likely to prefer it over electricity

The only groups to prefer electricity are ages 18 to 34, those with incomes <$35K and those who have no experience with natural gas

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Product Attributes

Which energy source best matches the following performance features?

	Natural gas	Electricity	Other/ neither
Energy efficient	49%	27%	9%
Most reliable	47%	35%	6%
Environmentally friendly	30%	39%	16%
Negative environmental impact	27%	28%	25%
Safest	14%	63%	9%
Highest cost	13%	64%	5%

Product attributes associated with:

Natural gas: energy efficient, reliable,

Electricity: Safer, expensive, environmentally friendly

2019 is the first time electricity is considered more environmentally friendly than natural gas

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Product Attributes: Trends

	Natural gas				
	2012	2015	2019	Trend	Change '15 to '09
Energy efficient	54%	54%	48%	↓	-6
Most reliable	44%	44%	47%	↑	+3
Environmentally friendly	41%	42%	30%	↓	-12
Safest	24%	25%	14%	↓	-11
Highest cost	7%	7%	13%	↓	-6
Negative environmental impact	4%	6%	27%	↓	-21

Product attributes associated with natural gas have declined since 2015 for all features except reliability

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Customer Perceptions

	NW Natural customer			
	2015	2019	Trend	Change
Energy efficient	73%	65%	↓	-8
Most reliable	68%	65%	↓	-3
Environmentally friendly	56%	39%	↓	-17
Safest	37%	22%	↓	-15
Highest cost	5%	12%	↓	-7
Negative environmental impact	3%	20%	↓	-17

Among NW Natural customers, opinions about specific natural gas product features have declined

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Reasons for Environmental Impact

Why do you say natural gas has the most negative impact on the environment?

Greenhouse gas/carbon emissions	22%
It is bad for the environment	20%
Dangerous/hazardous	8%
Oil drilling/fracking	7%
Causes pollution	5%
Harmful to wildlife/plants	4%

Why do you say electricity has the most negative impact on the environment?

Using dams	15%
Causes pollution	13%
Greenhouse gas/carbon emissions	13%
It is bad for the environment	12%
Expensive	10%
It is not renewable	7%

People are more certain why natural gas has a negative impact on the environment than they are with electricity

CUB/108
Jenks/20

PRODUCT PREFERENCES

Most Important Attributes

Which one of the following attributes is the most important to you when selecting the type of energy that heats your home?

	All	NW Natural customer	Not a NW Natural customer
Cost to operate	27%	29%	26%
Energy efficient	16%	18%	15%
Comfort/warmth	14%	12%	15%
Reliability	13%	15%	12%
Safe to operate	11%	9%	15%
Environmental impact	10%	10%	9%

Cost, efficiency and performance are the most important factors people consider when selecting a home heating energy source

The ranking for attributes are similar across all groups

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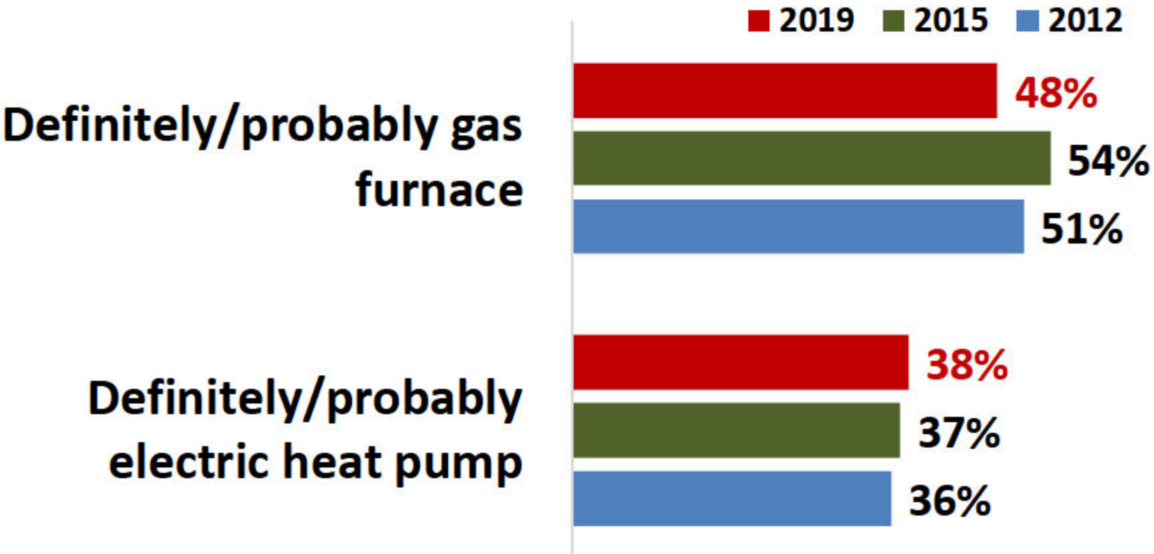
Preferred New Heating System

If you needed to buy a new heating system for your home, would you choose a gas furnace or an electric heat pump?



	NW Natural customer	Not NW Natural customer
2019	**71%**	**25%**
2015	**81%**	**31%**
2012	**79%**	**26%**
2019	**17%**	**58%**
2015	**12%**	**59%**
2012	**12%**	**59%**

People still prefer a natural gas furnace over a heat pump but preference for gas furnaces has declined six points since 2015, including 10 points among NW Natural customers

The only groups to prefer heat pumps to gas furnace are those age 18 to 34, renters, incomes <$35K, Lane and Clark County, those with no experience with natural gas and those who heat homes with electricity

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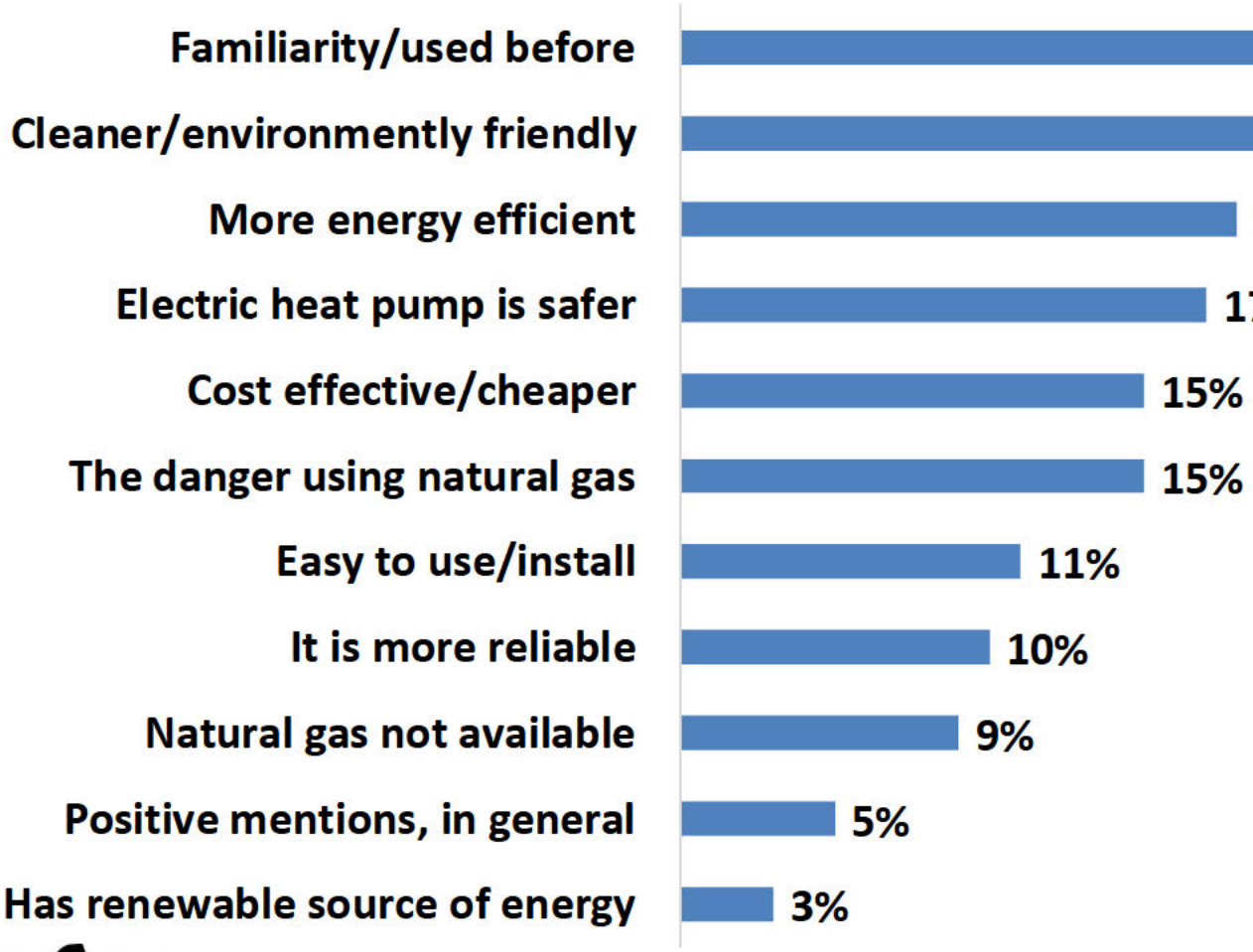
Preference for Heat Pumps

IF DEFINITELY/PROBABLY PREFER HEAT PUMP: What are the primary reasons you would prefer an electric heat pump over a natural gas furnace? (Multiple responses accepted)



Familiarity, product features and safety are top reasons people prefer a heat pump to a gas furnace

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Preference for Heat Pumps

Phone vs. web responses

Multiple responses accepted

	Phone Volunteered	Web Listed choice
More energy efficient	12%	27%
Cleaner/environmently friendly	12%	28%
Cost effective/cheaper	11%	20%
The danger using natural gas	7%	25%
Electric heat pump is safer	7%	29%
Familiarity/used before	7%	34%
Natural gas not available	6%	13%
Easy to use/install	3%	20%
Has renewable source of energy	2%	4%
It is more reliable	2%	18%

Familiarity, performance and concerns about natural gas are reasons people prefer heat pumps over gas furnaces

Overall, the rank order for heat preference are similar between phone and web interviews

People interviewed by phone volunteered answers and were less likely to give multiple reasons

Those who completed web surveys had a list of options and were more likely to make multiple selections

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Important Information

NW Natural 2019
Product Positioning Survey

As you consider natural gas, how important would the following information be to you?	Total important	Very important	Somewhat important	Not important
NW Natural customers are paying less for their natural gas today than they did 15 years ago	77%	44%	33%	13%
Renewable natural gas dramatically reduces greenhouse gas emissions that contribute to climate change	73%	44%	29%	16%
A natural gas furnace provides warmer heat at the register than an electric heat pump	72%	39%	33%	16%
NW Natural has one of the most modern pipeline systems in the U.S.	74%	38%	36%	17%
NW Natural delivers more energy than any other utility in Oregon, yet use of natural gas in customer homes and businesses accounts for only 5% of the state's emissions	72%	34%	38%	18%
Renewable natural gas solves a local waste issue	70%	33%	37%	17%
Having natural gas appliances in your home increases its value	63%	27%	36%	27%

Six of the seven statements would be effective in promoting and positioning natural gas

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Renewable Natural Gas

How important would the following information be to you regarding Renewable Natural Gas?

	Total important	Very important	Somewhat important	Not to important
Renewable natural gas dramatically reduces greenhouse gas emissions that contribute to climate change.	81%	52%	29%	14%
Renewable natural gas has a similar climate benefit to wind and solar energy.	81%	50%	31%	12%

Information tested about renewable natural gas is equally important to residents

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CUB/108
Jenks/27

POLICY ISSUES

Buzz about Fracking

How much, if anything, have you heard about the drilling method called hydraulic fracturing or "fracking"?

	2012	2015	2019
Total heard a lot/ little about fracking	72%	77%	86%
Heard a lot	34%	41%	41%
Heard a little	38%	36%	45%
Heard nothing	28%	22%	11%
Don't know	--	1%	3%

- Nearly nine in ten have heard something about fracking, up nine points since 2015
- At least 70% in all demographic groups have heard something about fracking
- Almost everyone in NW Natural's service area is aware of fracking

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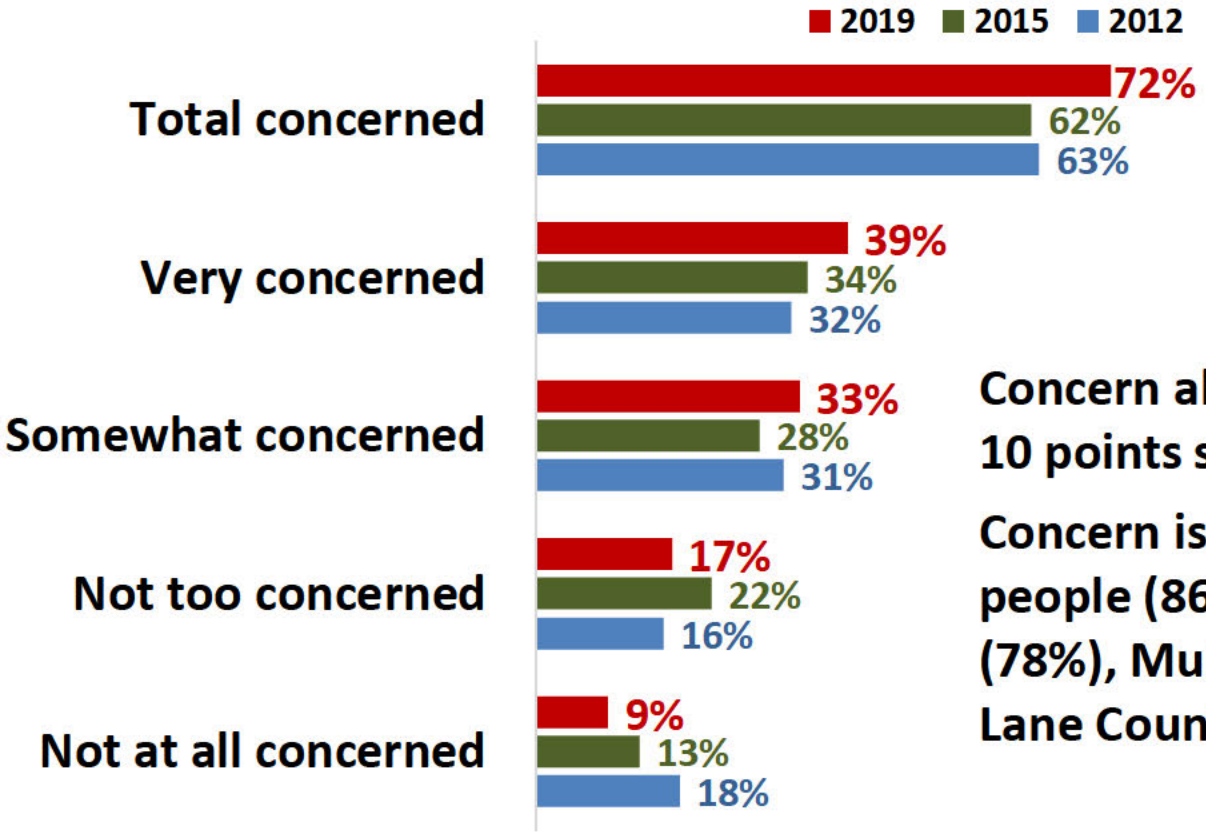
Concern about Fracking

IF HEARD A LOT OR A LITTLE: From what you've read and heard, would you say you are concerned with using hydraulic fracturing or fracking to extract natural gas from underground rock formations?



Concern about fracking has increased 10 points since 2015

Concern is highest among younger people (86%), renters (78%), women (78%), Multnomah County (78%) and Lane County (79%) residents

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Climate Change

In your opinion, how serious of a problem is climate change?

	2009	2012	2015	2019
Serious	64%	70%	75%	77%
Not serious	34%	25%	23%	19%
Not sure	2%	5%	2%	3%

Concerns about climate change continue to increase

Concerns about climate change are high across all demographic groups, ranging from a high in Multnomah County (84%) to a low in Marion County (67%)

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Greenhouse Gas Emission

In your opinion, what is the single largest source of greenhouse gas emission?

	First choice	Second choice
Transportation	30%	26%
Industrial production	19%	26%
Agriculture, forestry and other land use	10%	10%
Electricity generation	4%	6%
Residential and commercial heating	2%	4%
Other	15%	13%

People say transportation and industrial pollution are the leading sources of greenhouse gas emission

Opinions about the leading sources of emissions are similar across all demographic groups

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CUB/108
Jenks/32

KEY FINDINGS

Key Findings

Corporate Reputation

- NW Natural's corporate reputation remains strong.
  - Positive opinions of NW Natural are strongest among its customers.
  - Overall, opinions of NW Natural are unchanged since 2009. This is impressive considering skepticism about corporations and concerns about fossil fuels have increased during the past decade.
  - Trust in NW Natural makes it a credible source for information.

Product Attributes and Preference

- **Opinions about natural gas remain strong but some problems may be emerging.**
  - Perceptions of natural gas product attributes have slipped since 2015, particularly among NW Natural customers.
  - Changing opinions of natural gas are the result of environmental concerns and safety issues.
  - Concerns about natural gas are impacting product choices. Preference for a natural gas furnace over a heat pump have dropped six points overall and ten points among NW Natural customers since 2015.

Impacting opinions

- **NW Natural can use its positive position in the market to impact opinions.**
  - Increased communications about NW Natural and natural gas will be effective in maintaining and improving opinions about the company and its product.
  - Messages that focus on value, product attributes, environmental impact will be most effective.
  - Use focus groups to refine and sharpen messages to improve the impact on target audiences.

CUB/108
Jenks/36

ADDENDUM

People with No Opinion of Natural Gas

What is your opinion of the following energy sources available for home use in Oregon?

	% No Opinion		% No Opinion
Age		**Area**	
18-34	20%	Multnomah Co.	16%
35 - 54	18%	Clackamas Co.	12%
55 - 64	13%	Washington Co.	13%
65+	22%	Lane Co.	26%
Income		Marion Co.	26%
<$35k	31%	Clark Co.	28%
$35k to $49.9k	18%	**Residence**	
$50k to $74.9k	16%	Own	16%
$75k +	13%	Rent	27%

The easiest path to improve opinions of natural gas is to target those groups who have no opinion

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CUB/108
Jenks/38

NW Natural 2018 Product Positioning

Hello, this is _____ of CFM Research, a public opinion research company. Have I reached (# from list)? IF NO: TERMINATE.

We are conducting a survey among Oregonians/Washingtonians about energy issues. May I please speak with a member of the household who is age 18 years or older? IF NOT AVAILABLE: THANK AND TERMINATE.

1. First, what is your home Zip Code?_____

2. And, what type of fuel do you normally use to heat your home? Is it:

1.	Natural gas	GO TO Q 3 then Q4
2.	Electricity	GO TO Q 4, EXCEPT CLARK CO.
3.	Other	GO TO Q 4, EXCEPT CLARK CO.
4.	(DON'T READ) Not sure/none	GO TO Q 4, EXCEPT CLARK CO.
5.	(DON'T READ) Refused	GO TO Q 4, EXCEPT CLARK CO.

3. And which company provides the natural gas service to your home?

1. NW Natural
2. Other (specify)
3. Not sure

4. **CLARK COUNTY GO TO Q5: (ANY ZIP CODE BEGINNING WITH A 98XXX) ALL OTHER AREAS ASK** Q5**:** Which organization provides electricity to your home? Is it:

1. Portland General Electric or PGE
2. Pacific Power
3. A local public utility district
4. (DON'T READ) None/Not sure

CUB/108
Jenks/39

In your opinion, would you rate the overall reputation of the following companies as excellent, very good, only fair or very poor? If you aren't aware of the company, just say so. (READ AND RANDOMIZE)

		Excellent	Very Good	Fair	Very Poor	Not sure	Not aware
5.	NW Natural	1	2	3	4	5	6
6.	Portland General Electric or PGE	1	2	3	4	5	6
7.	Pacific Power	1	2	3	4	5	6

8. If you could choose any source of energy to heat your home, what would it be? (READ AND RANDOMIZE R1-4)

1. Electricity GO TO 10
2. Natural gas GO TO 11
3. Something else/other GO TO 9
4. (DON'T READ) Not sure GO TO 13

9. Why would you choose <u>electricity</u> over other energy sources? (DON'T READ) (ACCEPT MULTIPLE RESPONSES

1. Cleaner/clean/doesn't stink
2. Convenient/comfortable/easy/controllable/less hassle
3. Cheaper/economical/cost/others are expensive
4. Safe/safer/less scary
5. Been using it/it's what I have/know
6. Like it/my preference/the best for me/satisfied
7. More efficient/efficient
8. Reliable
9. Availability/abundance
10. Have never used other energy sources
11. Environment friendly/less pollution/natural
12. Heats faster
13. Never had problems with it
14. Renewable
15. Warmer
16. Positive comments (cool, good)
17. Others
18. Not sure

CUB/108
Jenks/40

10. Why would you choose natural gas over other energy sources? (DON'T READ) (ACCEPT MULTIPLE RESPONSES

1.	Cheaper/economical/cost/others are expensive	
2.	Cleaner/clean/doesn't stink	
3.	Convenient/comfortable/easy/controllable/less hassle	
4.	More efficient/efficient	
5.	Heats faster	
6.	Like it/my preference/the best for me/satisfied	
7.	Been using it/it's what I have/know	
8.	Availability/abundance	
9.	Reliable	
10.	Environment friendly/less pollution/natural	
11.	Warmer	
12.	Produced better heat/heats well	
13.	Reasonable (general)	
14.	Never had problems with it	
15.	Better than other energy sources (general)	
16.	Have never used other energy sources	
17.	Can be used even when power is out	
18.	Heat lasts longer	
19.	Positive comments (cool, good)	
20.	Other	
21.	Not sure	

11. If you could choose any source of energy for cooking at your home, what would it be? (READ AND RANDOMIZE R1-3)

1. Electricity
2. Natural gas
3. Something else/other

(DON'T READ) Not sure

CUB/108
Jenks/41

Overall, what is your opinion of the following energy sources available for home use in Oregon? Just say if your opinion is very positive, somewhat positive, somewhat negative or very negative. (READ AND ROTATE Q13/14)

	Very positive	Somewhat positive	Somewhat negative	Very negative	Not sure/no opinion
12. Electricity	1	2	3	4	5
13. Natural gas	1	2	3	4	5

I would like to get your opinion about performance features for some energy sources available for your home. (RAMDOMIZE Q 15 to Q 20)

14. In your opinion, which of the following energy sources costs the homeowner the most to operate in their home? (Randomize)

    1. Electricity
    2. Natural gas
    3. (DON'T READ) None
    4. (DON'T READ) Not sure

15. Which of the following would you say is the most efficient energy source for home use? (Randomize)

    1. Electricity
    2. Natural gas
    3. (DON'T READ) None
    4. (DON'T READ) Not sure

16. Which energy source would you say is the most reliable for home use?

1. Electricity
2. Natural gas
3. (DON'T READ) None
4. (DON'T READ) Not sure

17. Which energy source would you say is the safest for home use?

1. Electricity
2. Natural gas
3. (DON'T READ) None
4. (DON'T READ) Not sure

18. Which energy source would you say is the most environmentally friendly?

1. Electricity
2. Natural gas
3. (DON'T READ) None
4. (DON'T READ) Not sure

19. Which energy source would you say has the most negative impact on the environment?

1. Electricity
2. Natural gas
3. (DON'T READ) None
4. (DON'T READ) Not sure

20. Which one of the following attributes is the most important to you when selecting the type of energy that heats your home? Is it…(RANDOMIZE) ACCEPT ONE

1. Comfort/warm heat
2. Cost to operate
3. Energy efficiency
4. Environmental impact
5. Reliability
6. Safe to operate
7. (DON'T READ) None
8. (DON'T READ) Not sure

Why do you say (RESPONSE FROM Q20 ELECTRICITY/ NATURAL) has the most negative impact on the environment? (PROBE FOR SPECIFICS. ACCEPT MULTIPLE RESPONSEES)

	Electricity	Natural gas
Has pollutants/causes pollution (air/water/ environment)		
Effects of oil and oil spill		
Produces smoke/ residue		
Produces greenhouse gas/carbon emissions/methane emissions		
It is not clean/it is dirty		
Oil drilling/fracking		
Unclean burning		
Cost/expense		
Transporting the oil		
Harmful to wildlife/animals/ plants		
The processing it has to take		
Only has a limited amount compared to other sources		
Dangerous/hazardous to health		
It is not efficient		
It is not renewable		
Can cause fire/burns homes		
It has bad/negative impact		
I don't like it		
Using dams		
Others		
Don't know		

21. If you needed to buy a new heating system for your home would you choose a gas furnace or electric heat pump? IF GAS OR ELECTRIC: Is that definitely gas/electric or probably gas/electric?

1.	Definitely gas	GO TO Q25
2.	Probably gas	GO TO Q25
3.	Probably electric	GO TO Q24
4.	Definitely electric	GO TO Q24
5.	(DON'T READ) Other	GO TO Q25
6.	(DON'T READ) Not sure	GO TO Q25

22. **IF Q 24, R3/R4**: What are the primary reason you would prefer an electric heat pump over a natural gas furnace? (PROBE FOR SPECIFICS. ACCEPT MULTIPLE RESPONSES)

_____

23. On a different subject, we'd like to ask some question regarding greenhouse gas emission. In your opinion, what is the single largest source of greenhouse gas emission? [DON'T READ, RECORD TOP OF MIND]
    1. Electricity generation
    2. Residential and commercial heating
    3. Agriculture, forestry and other land use
    4. Transportation
    5. Industrial production
    6. Others, please specify___

24. What else? [DON'T READ]
    1. Electricity generation
    2. Residential and commercial heating
    3. Agriculture, forestry and other land use
    4. Transportation
    5. Industrial production
    6. Others, please specify___

CUB/108
Jenks/46

As you consider natural gas, how important would the following information be to you? Say if the information would be very important, somewhat important, not too important or not at all important.

	Very important	Somewhat important	Not to important	Not at all important	Not sure
25. NW Natural customers are paying less for their natural gas today than they did 15 years ago.	1	2	3	4	5
26. Having natural gas appliances in your home increases its value.					
27. A natural gas furnace provides warmer heat at the register than an electric heat pump.					
28. Renewable natural gas dramatically reduces greenhouse gas emissions that contribute to climate change.					
29. Renewable natural gas solves a local waste issue.					

30. In your opinion how serious a problem is climate change? Would you say it is: (READ 1-4, 4-1)

1. Not at all serious
2. Not too serious
3. Somewhat serious
4. Very serious
5. (DON"T READ) Not sure

CUB/108
Jenks/47

31. How much, if anything, have you heard about the drilling method called hydraulic fracturing or "fracking"? It's the method used to extract natural gas from underground rock formations. Would you say you have heard:

1.	A lot	GO TO Q26
2.	A little	GO TO Q26
3.	Nothing at all	GO TO Q28
4.	(DON'T READ) Don't know/Refused	GO TO Q28

32. IF HEARD A LOT OR A LITTLE Q25: From what you've read and heard, would you say you are (ROTATE: very concerned, somewhat concerned, not too concerned/not concerned at all or not concerned at all, not too concerned, somewhat concerned or very concerned) with using hydraulic fracturing or fracking to extract natural gas from underground rock formations? Would you way you are: (READ 1-4, 4-1)

1.	Very concerned	GO TO Q27
2.	Somewhat concerned	GO TO Q27
3.	Not too concerned	GO TO Q28
4.	Not concerned at all	GO TO Q28
5.	(DON'T READ) Don't know/Refused	GO TO Q28

CUB/108
Jenks/48

The following information is for statistical purposes only.

33. (For non-gas customers only) Did you have previous experience using natural gas in either your home or work?
    1. Yes
    2. No

34. What is your age?

    1. 18 to 34
    2. 35 to 44
    3. 45 to 54
    4. 55 to 64
    5. 65 +
    6. (DON'T READ) Refused

35. Do you own or rent your home

    1. Own
    2. Rent

36. Which of the following general categories best describes your total combined household income last year?

    1. Under $12,500
    2. $12,500 to $19,999
    3. $20,000 to $34,999
    4. $35,000 to $49,999
    5. $50,000 to $74,999
    6. $75,000 and over
    7. (DON'T READ) Refused

37. Gender (By observation)

    1. Male
    2. Female

38. Zip code

39. County

    1. Clackamas (OR)
    2. Clark (WA)
    3. Lane (OR)
    4. Marion
    5. Multnomah (OR)
    6. Washington (OR)

Views

What is the most important issue that you would like local elected officials to do something about?

Which statement comes closest to your point of view?

- Not enough is being done to reduce carbon emissions in Oregon. This needs to be a higher priority.
- The right amount of effort is spent to reduce carbon emissions in Oregon.
- Too much effort is spent to reduce carbon emissions in Oregon. There are other higher priorities for the government.

If you were looking for a new home, how important would it be to you that the new home have natural

Natural Gas Choice Survey

NW Natural Customer Insight Panel Study

September 2019

Background

Field time: September, 2019

# of Customer Respondents: 680

Objective:

- Gauge customers' opinion on climate-related topics
- Evaluate communication talking points/messages

Key Findings

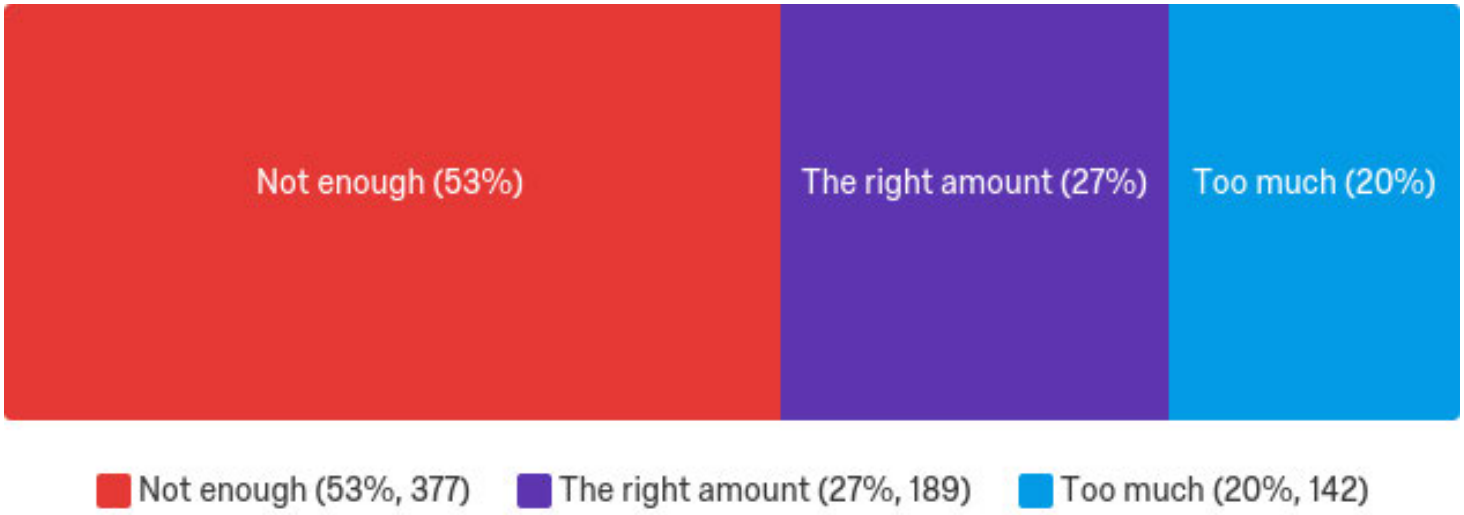
- Homeless and climate change are the top two concerns among respondents.
- More than half of respondents said that not enough has been done to address the climate change issue.
  - Multnomah has the highest percentage - 63%
  - Clark has the lowest – 37%
- 70% of all respondents said the natural gas is either extremely or very important for their next home purchase.
- 59% of all respondents strongly believe that they should have the option to choose their energy source, but less than half in Multnomah (44.1%) and Lane County (47.7%) respondents believe so.
- 81% of all respondents said that natural gas ban is not reasonable
  - 61% said that it is extremely unreasonable, the highest came from Marion county (71.7%), lowest from Multnomah (46.3%) and Lane (54.5%)

Policy and Energy Choice

Most important issue

- Homeless is top most important issue
- Climate change is the second one

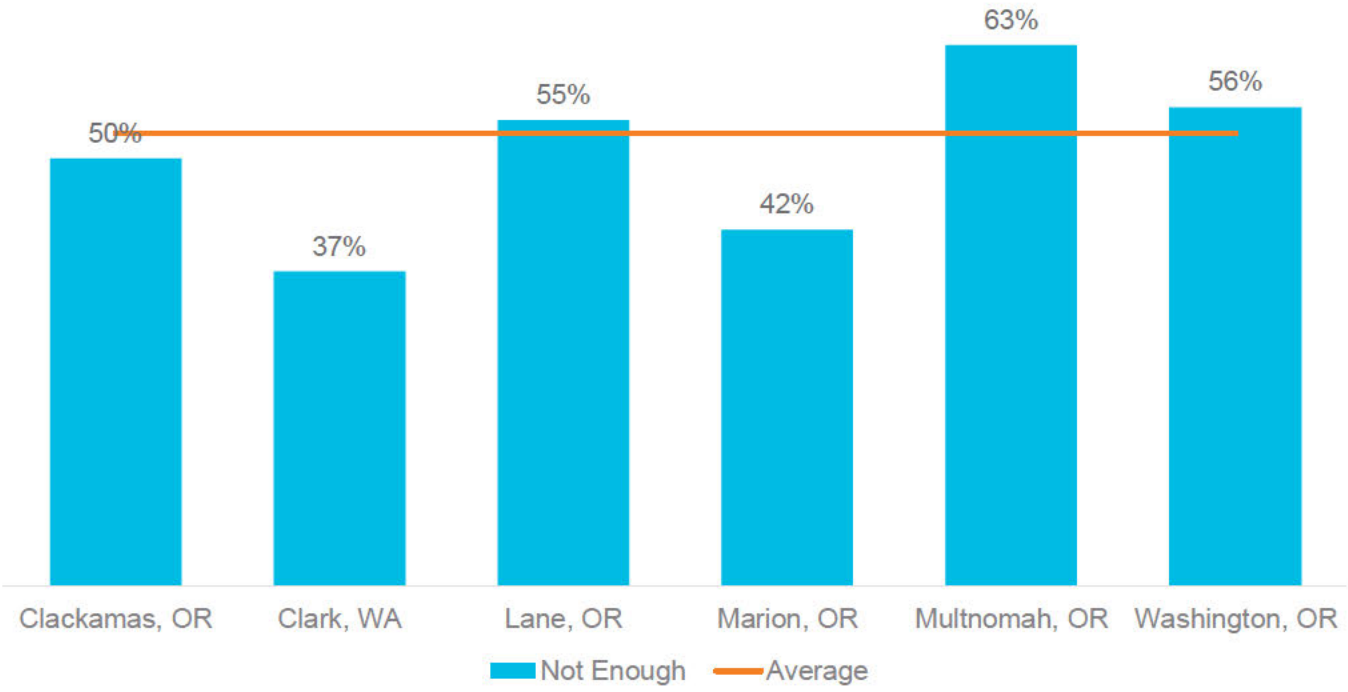
Amount of effort to reduce carbon emission



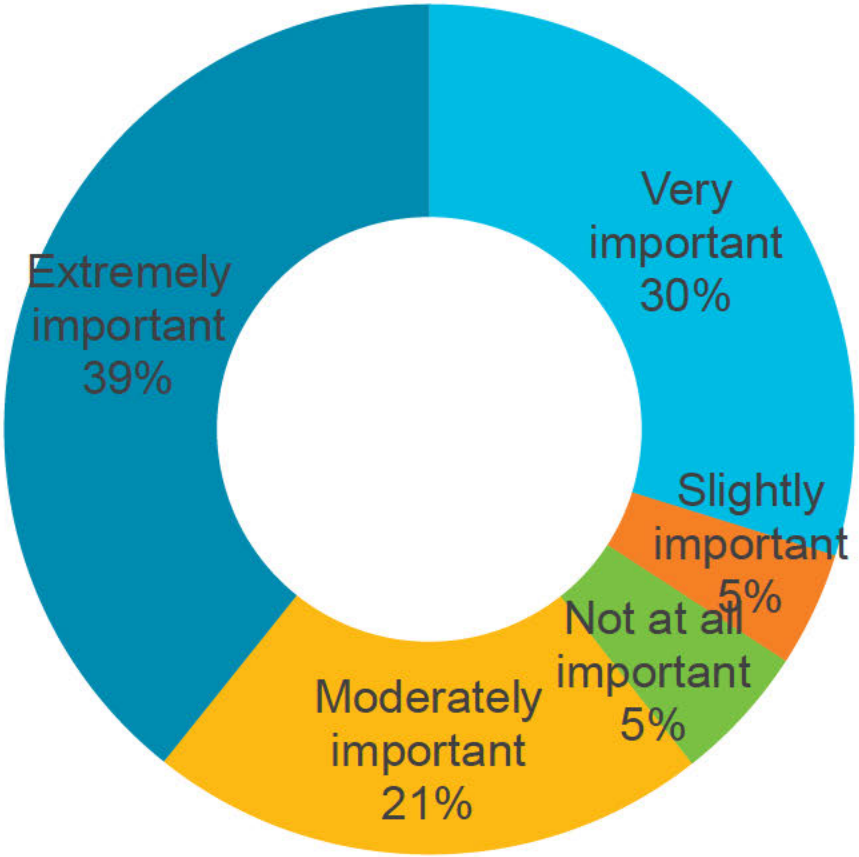
- More than half of the respondents believe that not enough is being done to reduce carbon emissions in Oregon. This needs to be a higher priority.
- One fifth of the respondents said that too much effort is spent to reduce carbon emissions in Oregon. There are other higher priorities for the government.

CUB/109
Jenks/8

Not enough effort to reduce carbon emission by county



Importance of Natural Gas



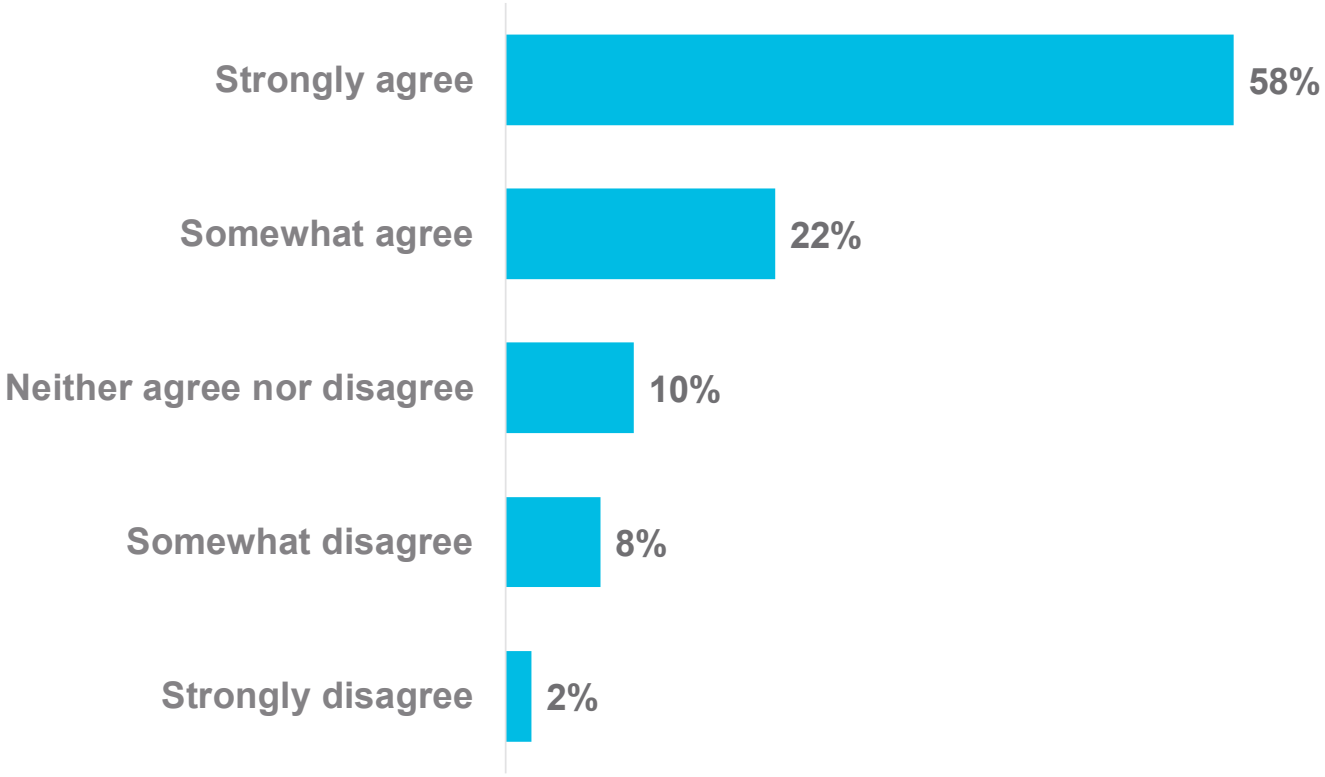
CUB/109
Jenks/10

Importance of Natural Gas

	Tenure		Gender	
	Own	Rent	Female	Male
Extremely important	41%	27%	36%	43%
Very important	30%	27%	30%	30%
Moderately important	20%	31%	25%	16%
Slightly important	4%	4%	3%	6%
Not at all important	5%	10%	6%	4%

CUB/109
Jenks/11

Energy Choice



Energy Choice by county

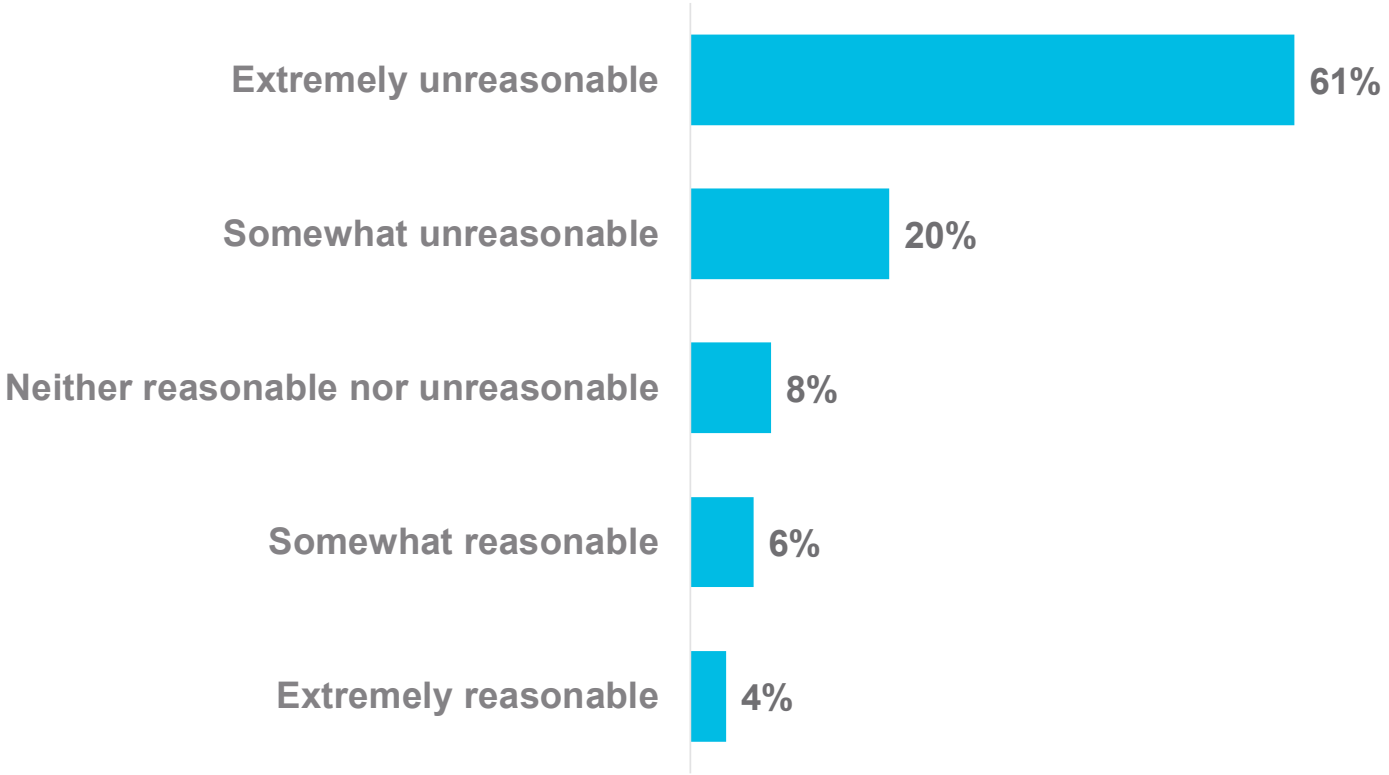
	Total	Clackamas, OR	Clark, WA	Lane, OR	Marion, OR	Multnomah, OR	Washington, OR
Strongly agree	58.5%	68.9%	66.2%	47.7%	68.3%	44.1%	62.3%
Somewhat agree	21.6%	20.3%	17.6%	34.1%	20.0%	23.4%	17.7%
Neither agree nor disagree	10.3%	6.8%	8.8%	11.4%	5.0%	16.0%	9.1%
Somewhat disagree	7.6%	1.4%	4.4%	4.5%	6.7%	14.4%	8.0%
Strongly disagree	2.0%	2.7%	2.9%	2.3%	0.0%	2.1%	2.9%

Energy Choice by Age Group

	Total	35 or less	35 - 45	45 - 65	65+
Strongly agree	58.5%	40.0%	45.3%	59.4%	66.1%
Somewhat agree	21.6%	33.3%	34.9%	19.9%	16.5%
Neither agree nor disagree	10.3%	11.1%	9.4%	12.5%	8.3%
Somewhat disagree	7.6%	11.1%	8.5%	5.9%	6.9%
Strongly disagree	2.0%	4.4%	1.9%	2.2%	2.3%

CUB/109
Jenks/14

Natural Gas Ban



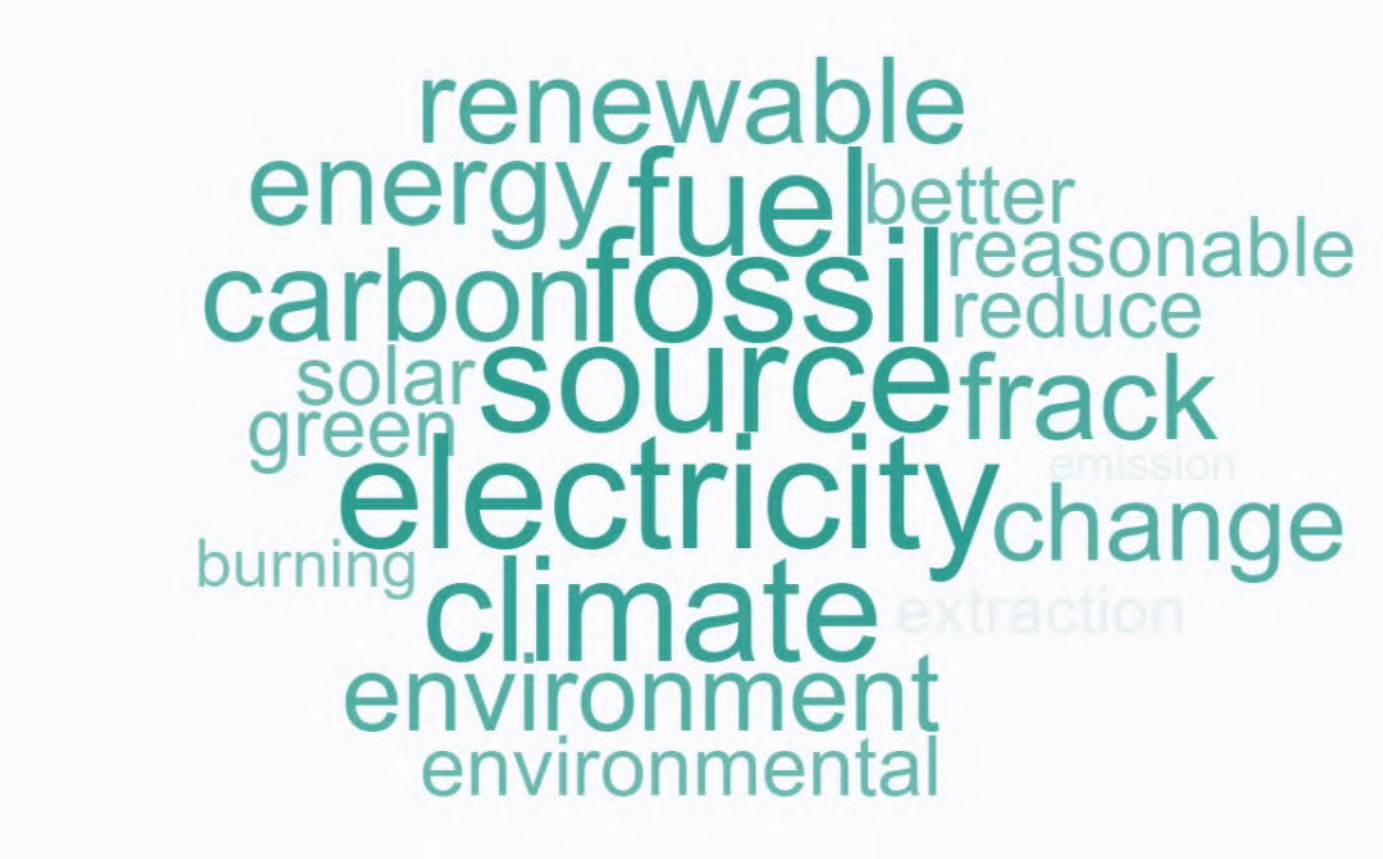
Gas ban by county

	Total	Clackamas, OR	Clark, WA	Lane, OR	Marion, OR	Multnomah, OR	Washington, OR
Extremely unreasonable	61.2%	66.2%	64.2%	54.5%	71.7%	46.3%	63.4%
Somewhat unreasonable	20.6%	16.2%	14.9%	34.1%	16.7%	27.1%	18.6%
Neither	8.2%	5.4%	7.5%	9.1%	5.0%	12.2%	9.3%
Somewhat reasonable	6.6%	8.1%	10.4%	2.3%	1.7%	9.0%	6.4%
Extremely reasonable	3.5%	4.1%	3.0%	0.0%	5.0%	5.3%	2.3%

Gas ban by age group

	Total	35 or less	35 - 45	45 - 65	65+
Extremely unreasonable	61.2%	46.7%	48.6%	64.4%	66.7%
Somewhat unreasonable	20.6%	22.2%	30.5%	18.9%	19.9%
Neither	8.2%	15.6%	11.4%	5.6%	7.4%
Somewhat reasonable	6.6%	11.1%	5.7%	8.1%	3.7%
Extremely reasonable	3.5%	4.4%	3.8%	3.0%	2.3%

Why gas ban is reasonable



Why gas ban is reasonable

Reasons
Because electricity has the potential to be carbon neutral and with solar panel prices going down will get there eventually
Because electricity production is more environmentally sustainable.
Because fossil natural gas is a non-renewable energy source.
Climate change is a massive threat and we need to do absolutely everything we can to reduce our carbon emissions.
Climate crisis is real, and if electricity is a better option, we need to do it.
If electric is now more sustainable because of wind power then we should use that. If it takes a ban to get people to use the most renewable option, then so be it.
if the electricity source is greener than natural gas I would approve
If we're going to tackle climate change, we may need to have some sacrifices. If a collective deems that a part of the plan, we need to respect that plan. We're not going to fight climate change if everyone just burns fossil fuels all day and night.
The extraction and use of fossil fuels is destructive to the environment
The plant is nearing irreversible damage due to burning of fossils fuels. That includes natural gas
We need to take steps at address the amount of greenhouse gases in the environment and one way is to reduce the burning of fossil fuels
We wasted the time we would have had for gentle conversions to non fossil fuels.
You know already

Message Testing

CUB/109
Jenks/20

Gas ban counter-arguments

	Strongly agree	Somewhat agree	Neither	Somewhat disagree	Strongly disagree
Cities should not ban natural gas in homes where there is no clear environmental benefit.	64.3%	17.5%	11.6%	4.4%	2.2%
All forms of cleaner energy are needed in a balanced, low-carbon future.	64.0%	23.1%	6.6%	3.4%	2.9%
People are concerned about climate and cost, so taking away clean and affordable natural gas doesn't make sense.	58.0%	22.3%	10.5%	6.0%	3.2%
The existing natural gas system can be used to deliver Renewable Natural Gas that dramatically reduces greenhouse gas emissions. Which is one reason banning new hookups does not make sense.	52.9%	24.9%	15.4%	5.2%	1.6%
Natural gas is used in homes and businesses but it's also used to generate electricity by the power companies. So even with a ban, Seattle would still be using natural gas, just more in power plants instead of in furnaces, cooktops and fireplaces.	42.8%	26.3%	25.7%	2.9%	2.3%

CUB/109
Jenks/21

General natural gas messages

	Strongly agree	Somewhat agree	Neither	Somewhat disagree	Strongly disagree
Studies show natural gas is needed to reach our climate goals affordably. So it shouldn't be eliminated as part of the climate solution.	58.3%	24.8%	11.8%	3.2%	1.9%
Studies also show renewable natural gas can help us lower greenhouse gas emissions. A bill just passed to allow NW Natural to buy renewable natural gas for our customers. We should focus on developing renewable natural gas.	56.4%	29.6%	9.8%	2.0%	2.2%
Of all the energy emissions in Oregon, only 5% come from NW Natural's customers' residential and commercial use. We should look elsewhere to have a greater impact.	53.8%	26.7%	11.8%	4.7%	3.1%

gas appliances?

- Extremely important
- Very important
- Moderately important
- Slightly important
- Not at all important

Do you agree that families and businesses should have a choice of energy options to meet their needs, and not have their choices mandated by a city?

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

Seattle

In Seattle, the city council is considering a ban on new natural gas hookups, and could try to eventually ban natural gas altogether – forcing homeowners to switch to electricity.

How would you feel if such a ban was proposed in your city?

- ○ Extremely unreasonable
- ○ Somewhat unreasonable
- ○ Neither reasonable nor unreasonable
- ○ Somewhat reasonable
- ○ Extremely reasonable

Could you please help us understand why such a natural gas ban is reasonable?

Given the proposed natural gas ban in Seattle, how do you feel about the following statements in the next few pages?

Seattle 2

Natural gas is used in homes and businesses but it's also used to generate electricity by the power companies. So even with a ban, Seattle would still be using natural gas, just more in power plants instead of in furnaces, cooktops and fireplaces.

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

People are concerned about climate and cost, so taking away clean and affordable natural gas doesn't make sense.

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

The existing natural gas system can be used to deliver Renewable Natural Gas that dramatically reduces greenhouse gas emissions. Which is one reason banning new hookups does not make sense.

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

All forms of cleaner energy are needed in a balanced, low-carbon future.

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

Cities should not ban natural gas in homes where there is no clear environmental benefit.

- Strongly agree

- ○ Somewhat agree
- ○ Neither agree nor disagree
- ○ Somewhat disagree
- ○ Strongly disagree

Messages

NW Natural delivers more energy than any other utility in Oregon yet has significantly fewer greenhouse gas emissions than the two large electric companies.

Please tell me how you feel about these general company messages:

Of all the energy emissions in Oregon, only 5% come from NW Natural's customers' residential and commercial use. We should look elsewhere to have a greater impact.

- ○ Strongly agree
- ○ Somewhat agree
- ○ Neither agree nor disagree
- ○ Somewhat disagree
- ○ Strongly disagree

Studies show natural gas is needed to reach our climate goals affordably. So it shouldn't be eliminated as part of the climate solution.

- ○ Strongly agree
- ○ Somewhat agree
- ○ Neither agree nor disagree
- ○ Somewhat disagree
- ○ Strongly disagree

Studies also show renewable natural gas can help us lower greenhouse gas emissions. A bill just passed to allow NW Natural to buy renewable natural gas for our customers. We should focus on developing renewable natural gas.

- ○ Strongly agree
- ○ Somewhat agree
- ○ Neither agree nor disagree
- ○ Somewhat disagree
- ○ Strongly disagree

CUB/110
Jenks/1

Safety TV Commercial 2019

NW Natural Customer Insight Panel Study

DRAFT

September 2019

CUB/110
Jenks/2

CUSTOMER INSIGHT PANEL

Safety

As a natural gas customer, do you feel safe around natural gas?

- Definitely yes
- Probably yes
- Might or might not
- Probably not
- Definitely not

What made you feel safe around natural gas? (optional)

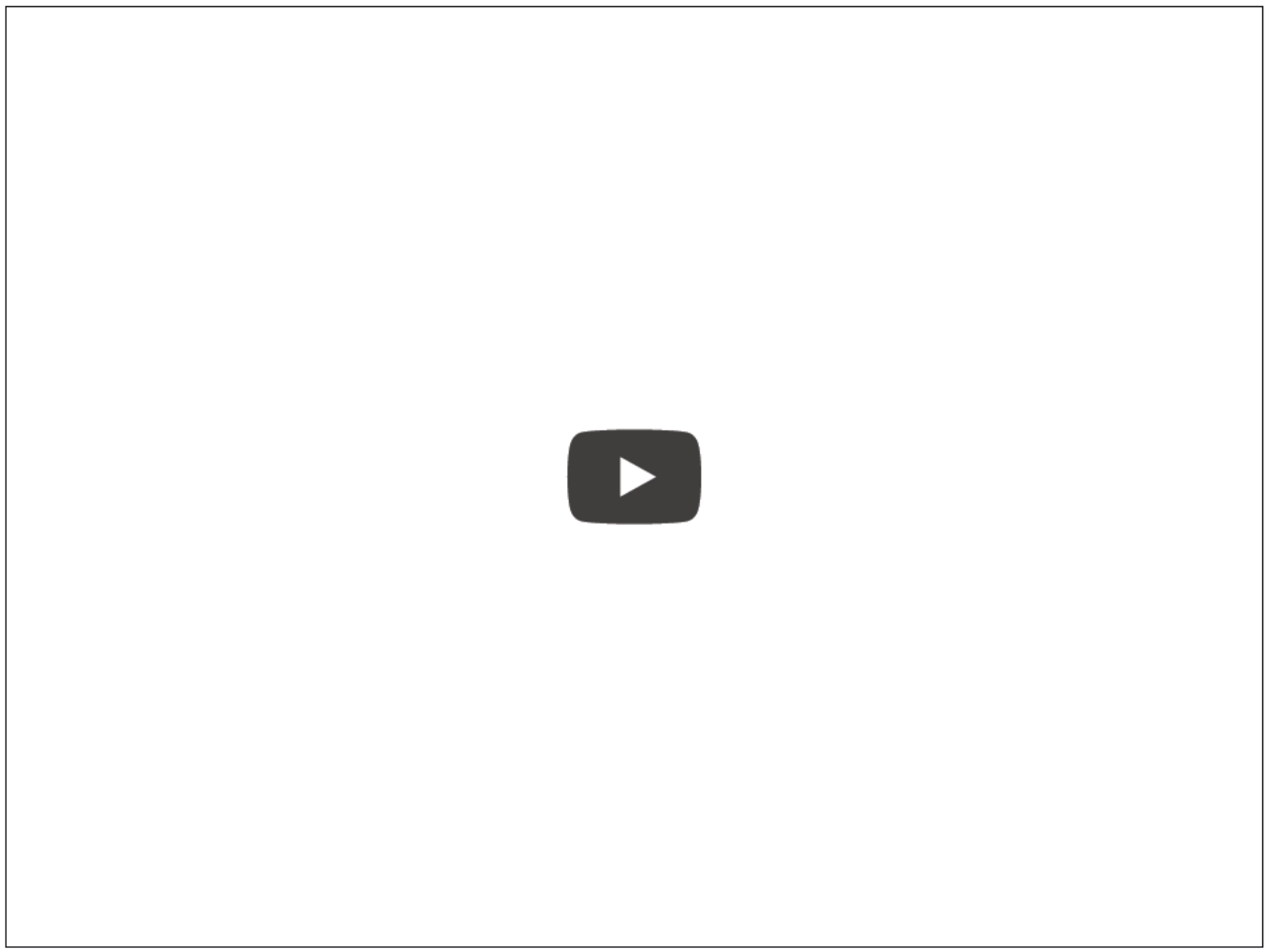
What made you feel unsafe around natural gas?

CUB/110
Jenks/3

TV

At NW Natural, safety is our top priority. We're creating a TV commercial about how we respond—and how you can respond—to a potential natural gas leak, and would like your input.

Please review the following video clip in full before proceeding to the next question.



CUB/110
Jenks/4

What should you do if you smell an unusual odor in your home that seems like it could be natural gas ?

Please rate the following regarding the commercial you just saw...

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Informative	○	○	○	○	○
Easy to Understand	○	○	○	○	○
Helpful	○	○	○	○	○
Sincere	○	○	○	○	○
Memorable	○	○	○	○	○

Do you feel confident that NW Natural will respond quickly and resolve an issue if there is one?

- ○ Definitely yes
- ○ Probably yes
- ○ Might or might not
- ○ Probably not

○ Definitely not

What made you feel confident that NW Natural will respond quickly and resolve the issue? (optional)

What made you feel doubtful that NW Natural will respond quickly or resolve the issue?

Do you have any other comments about the commercial? (optional)

Next, please review the following statements about the safety of our system, and drag and rank them in terms of importance to you:

NW Natural's pipeline system has an outstanding safety record and we not only meet federal and state regulations, we exceed them.

Natural gas pipelines are one of the safest forms of energy delivery in the U.S., serving more than 175 million Americans every day.

NW Natural serves two million people safely every day and has been a part of our communities in the Northwest for 160 years.

NW Natural was one of the first utilities in the U.S. to remove all old pipes from our system and replace them with modern materials.

Please review the following statements about the safety features of our system and product, and drag and rank them in terms of importance to you:

We add an odorant to natural gas to make it smell like rotten eggs so it can be quickly detected.

Natural gas can only ignite when three specific conditions are met, which is extremely rare and why it can be safely used every day.

NW Natural monitors its system 24-7, and has emergency response crews located throughout our service area to respond when needed.

Natural gas is lighter than air so if a pipe is damaged and gas escapes, it will dissipate as it rises.

In NW Natural's system, customers' homes and businesses are protected by equipment on their meter which prevents a surge of gas

gas.

CUB/110
Jenks/7

CUB/110
Jenks/8

Background

Field time: September, 2019

# of Customer Respondents: 858

Objective:

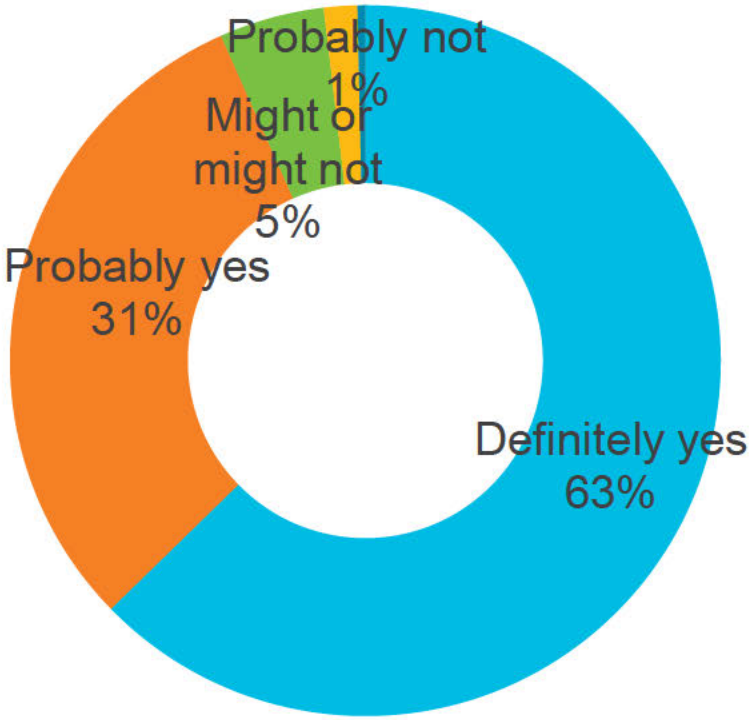
- Gauge customers' perception about natural gas safety
- Evaluate safety TV commercial
- Test safety messages

CUB/110
Jenks/9

Natural Gas Safety Perception

CUB/110
Jenks/10

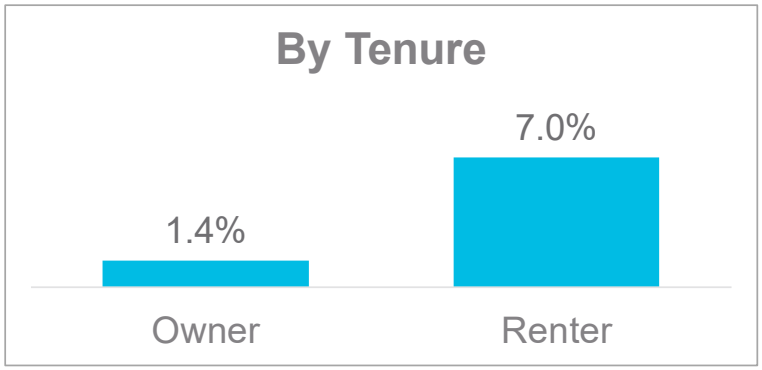
Do you feel safe around natural gas?

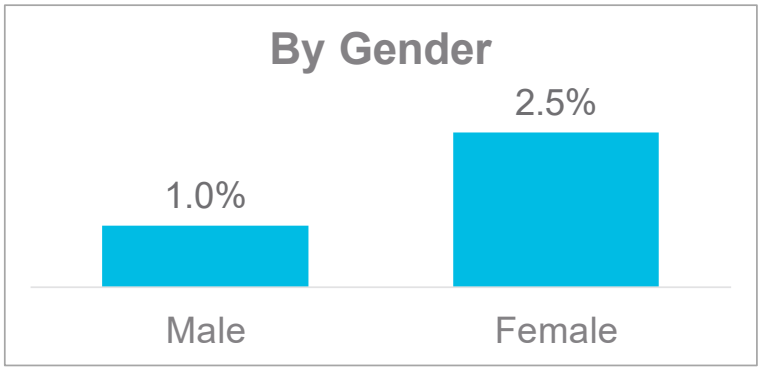


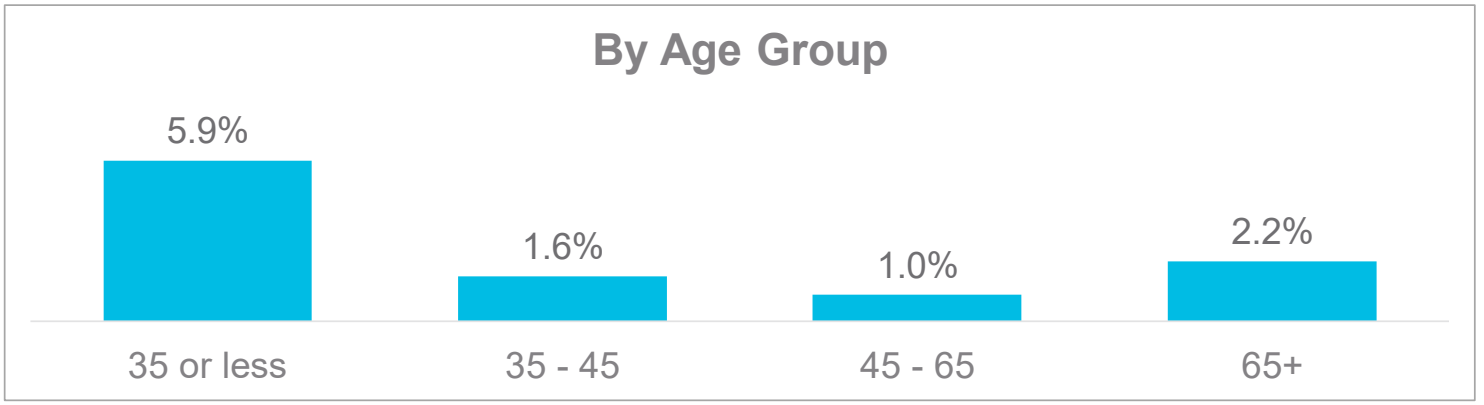
- Majority of respondents (94%) feel safe around natural gas.
- 5% of them have no opinion.
- Only 2% of feel somewhat unsafe around natural gas.

CUB/110
Jenks/11

% feel unsafe by demographic group

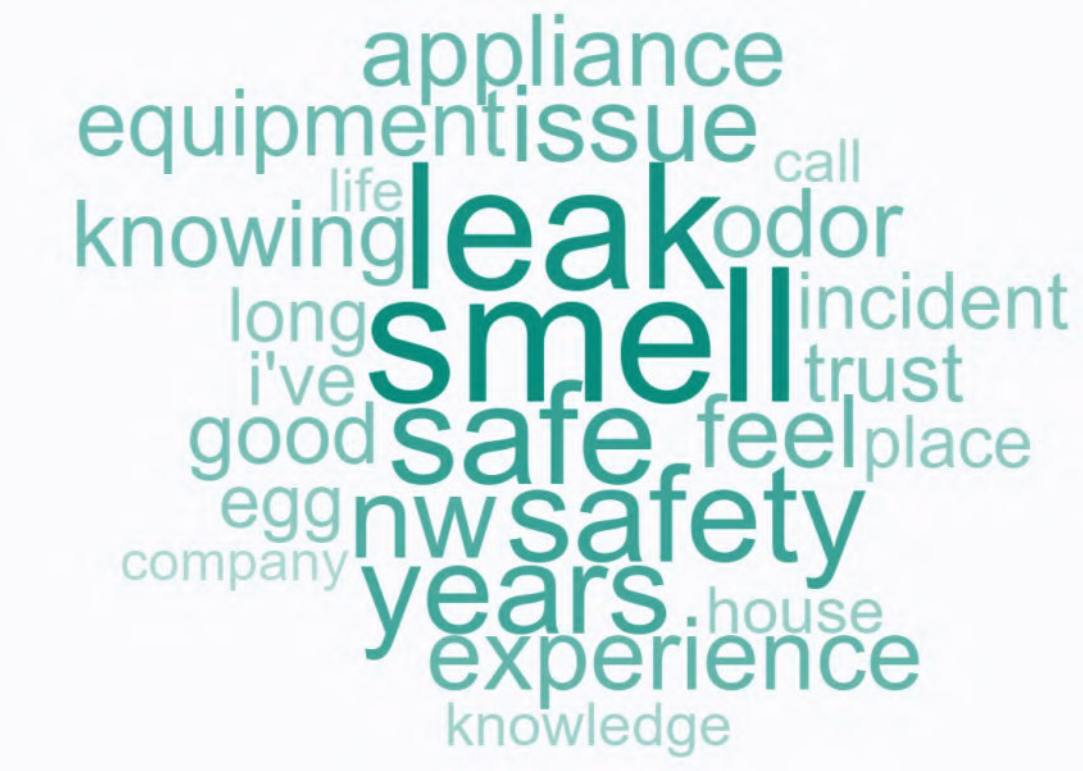






CUB/110
Jenks/12

Why feel safe



- Added smell that could be easily detected.
- Long experience with natural gas.

CUB/110
Jenks/13

Why feel unsafe

CUB/110
Jenks/14

Why feel unsafe

Unfamiliar
the toxic smell of burnt gas
My greatest concern should an earthquake occur is for there to be a gas rupture.
Explosion
Unfamiliarity with it.
That building that exploded on nw 23rd
Previous experience with a gas leak in another city
It is a dangerous substance that one must be cautious about.
Hearing about natural gas explosions on the news
Terrified of a leak or explosion
Potential for explosion; because of methane emissions in production, not planet-friendly; opposed to fracking
Earthquake explosions.
It is explosive and in my house
Just the idea of open flames especially with my heater
It's scary and can cause a leak
I do not trust that the infrastructure is safe that is piping the gas to my house.

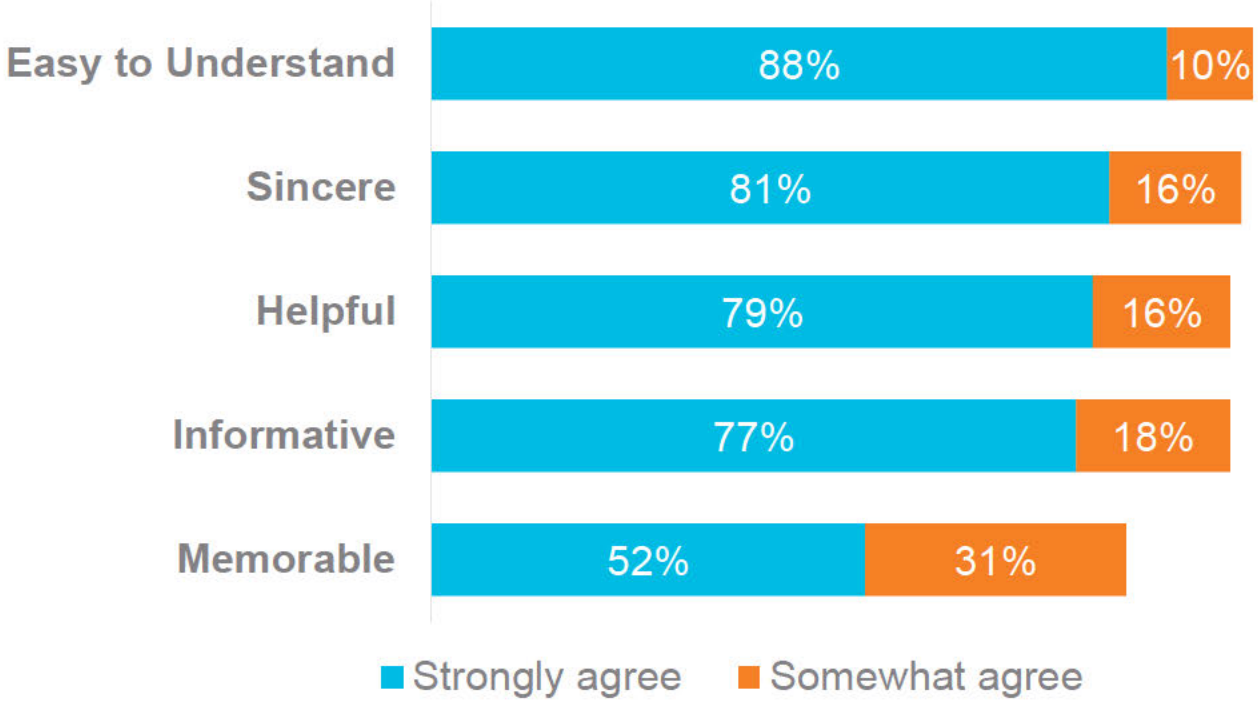
Safety TV Commercial

CUB/110
Jenks/16

Safety steps

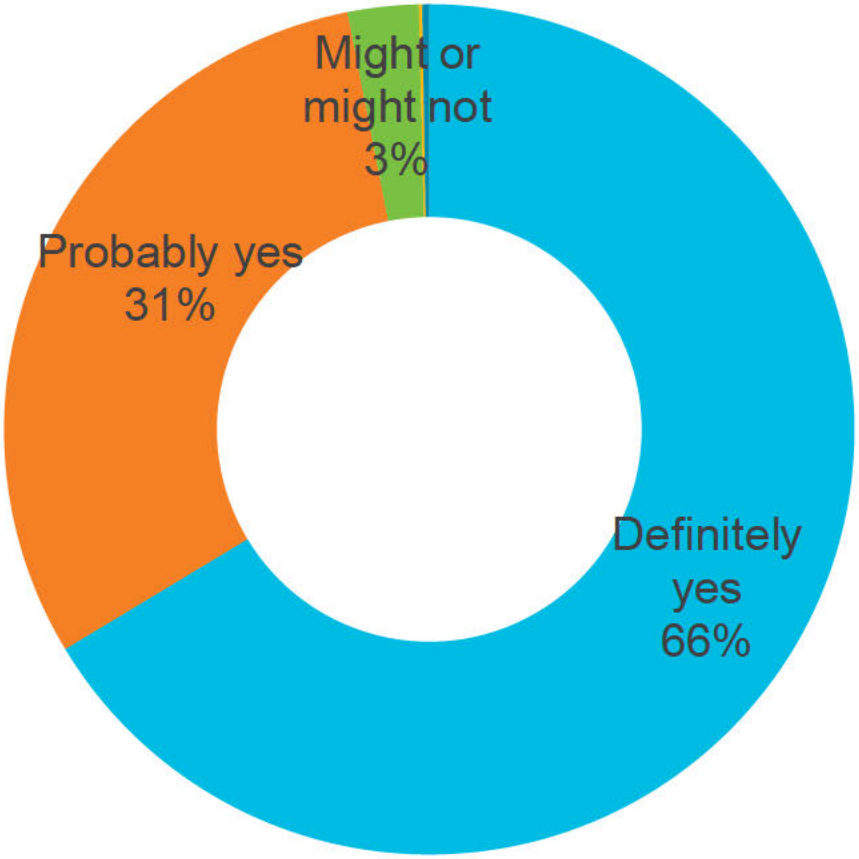
CUB/110
Jenks/17

TV commercial evaluations



CUB/110
Jenks/18

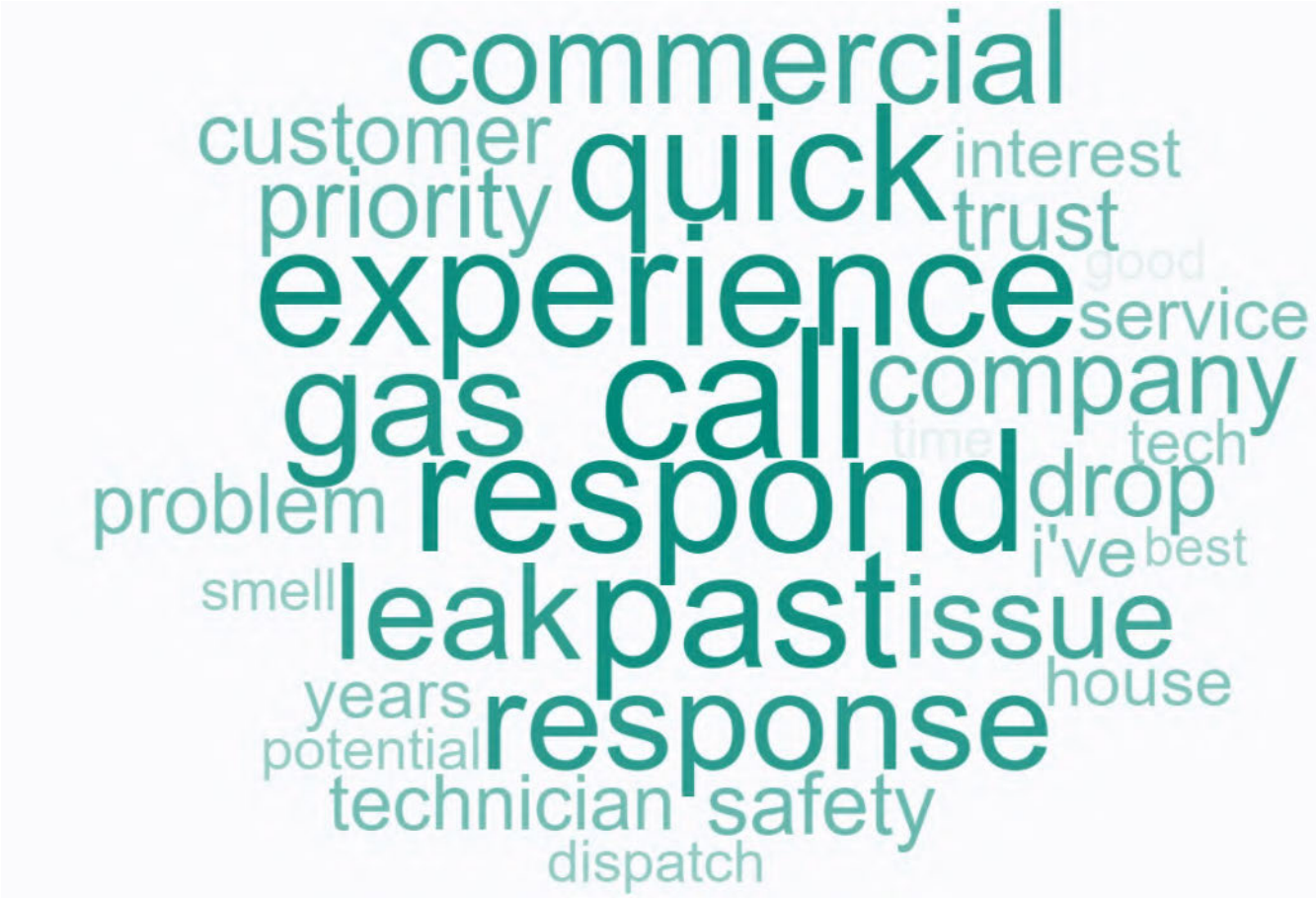
NW Natural competency



Do you feel confident that NW Natural will respond quickly and resolve an issue if there is one?

CUB/110
Jenks/19

Why confident



CUB/110
Jenks/20

Other comments regarding the commercial

Safety Messages

CUB/110
Jenks/22

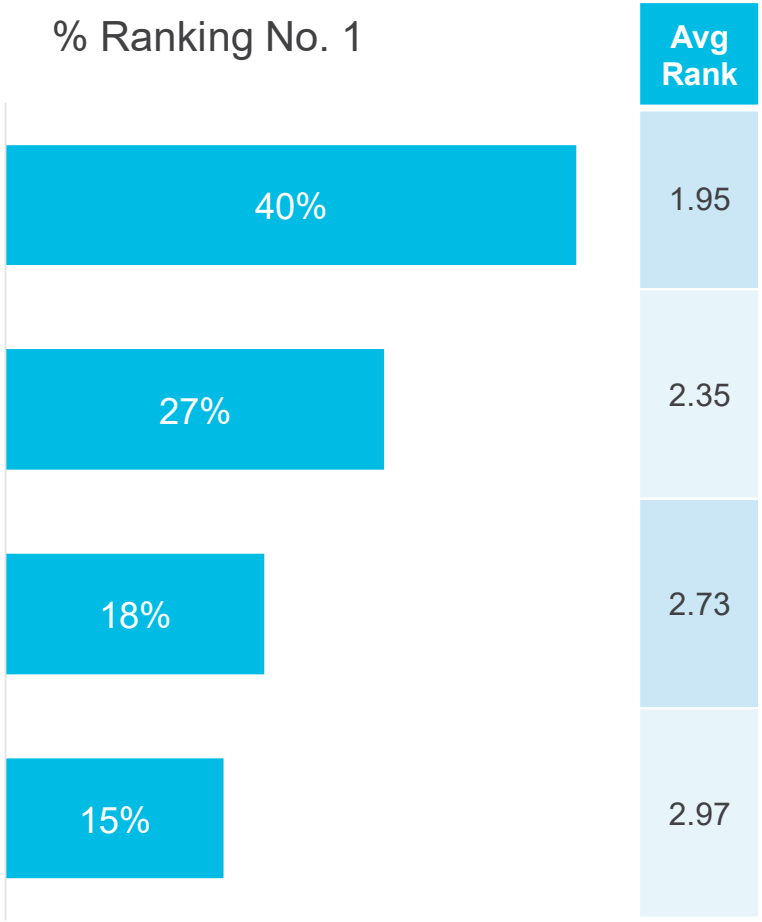
TV commercial evaluations – 1st set

NW Natural's pipeline system has an outstanding safety record and we not only meet federal and state regulations, we exceed them.

NW Natural was one of the first utilities in the U.S. to remove all old pipes from our system and replace them with modern materials.

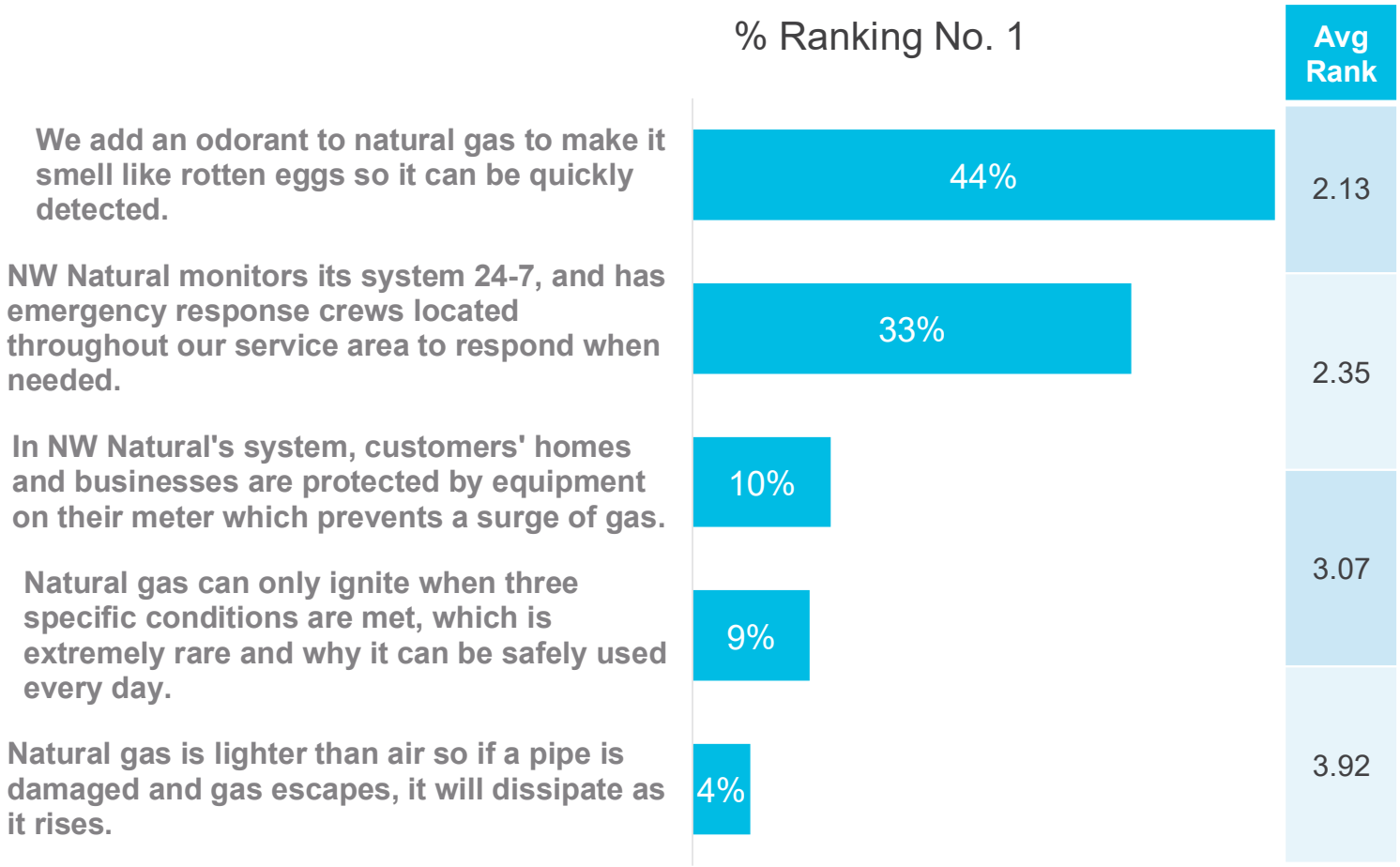
Natural gas pipelines are one of the safest forms of energy delivery in the U.S., serving more than 175 million Americans every day.

NW Natural serves two million people safely every day and has been a part of our communities in the Northwest for 160 years.



CUB/110
Jenks/23

TV commercial evaluations - 2nd set



CUB/111
Jenks/1

NW Natural Renter Fuel Preference: Questionnaire (online)

Study objectives	▪ Measure renters' preference among different gas/electric equipment: furnace, cooktop/stove, fireplace, etc. ▪ Measure price sensitivity between apartments with different fuel/equipment options	
Qualified respondent	Is currently renting a duplex, triplex, a unit in an apartment building, a unit in a condominium, a rowhouse or a townhouse	S0=2 & S3=2–5
	Lives in NW Natural's service territory (Portland, Salem, ~~and Eugene~~, Oregon and Vancouver, WA)	S2
	Head or co-head of household with responsibility for home rental decision	S1=1
	18+ years of age	S1A>17
Sample size	N=800	
Incidence	70% (estimated)	
Length	18 minutes (estimated)	
Sample source(s)	Online panels: Research Now, SSI, Usamp, Critical Mix	
Front-end sample move-ins	SAMPLE_SOURCE	
Back-end sample move-ins	None	
Logo?	No	
Previous button?	Yes	
Collect contact info?	No	

Quotas	**Description**	**Goal: n=**	**Get: n=**	**Definition**
				<Definition>
				<Definition>
				<Definition>

Tracking variables	**Description**	**Definition**
	None	

NOTE: Sample disposition code key

101–199: Screen out questions	101	R not a renter (S0=1)
	102	R does make/share responsibility for home rental decisions (S1=2)
	103	R does not live NW Natural Service Territory (S2)
	104	R is not currently living in a duplex, triplex, a unit in an apartment building, a unit in a condominium, a rowhouse or a townhouse (S3=1,6,7)
	105	R is less than 18 years old (S1A=0-17)
201–299: Over quotas	201	Over quota
301–399: Codes for refusals	301	R did not answer a question required for screening purposes
	302	R attempt to take survey on mobile phone (MOB_HIST=2)

NOTE: Front-end sample move-ins

DESIGN: SET VARIABLE

SAMPLE_SOURCE. Sample source.

1 Research Now
2 SSI
3 Usamp
4 Critical Mix

_____break_____

NOTE: Preventing smartphone survey takers from doing the survey

DESIGN: SET VARIABLE

MOB_HIST. What is the nature of R's mobile interaction/history?

1 {SET IF MOBILE1=1 & MOBILE2=SYSMIS} Initial contact mobile
2 {SET IF MOBILE1=1 & MOBILE2=1} Initial and subsequent contact mobile
3 {SET IF MOBILE1=2 & MOBILE2=1} Initial contact PC/tablet, subsequent contact mobile
4 {SET IF ELSE} None of the above

{IF MOB_HIST=2, TERMINATE: 302}

_____break_____

{IF MOB_HIST=1–3, ASK WARNING; OTHERWISE GO TO OPENING SCREEN}
PROG. NOTE: STOP SCREEN

WARNING. {SHOW IF MOB_HIST=1: It appears that you've started this survey on a smartphone. Unfortunately, there are elements of this survey that are incompatible with smartphones, so we ask that you take the survey on a tablet (such as an iPad or Kindle Fire) or on a desktop/laptop computer instead.}

{SHOW IF MOB_HIST=2: You appear to be taking this survey on a smartphone. Unfortunately, there are elements of this survey that are incompatible with smartphones, so we ask that you take the survey on a tablet (such as an iPad or Kindle Fire) or on a desktop/laptop computer instead.}

{SHOW IF MOB_HIST=3: Although you began taking this survey on a computer or tablet, we noticed that you've since switched to a smartphone. Unfortunately, there are elements of this survey that are incompatible with smartphones, so we ask that you take the survey on a tablet (such as an iPad or Kindle Fire) or on a desktop/laptop computer instead.}

Please close your browser and click on the survey link in your invitation once you've switched over to a tablet or on a desktop/laptop computer to complete this survey.

_____break_____

NOTE: Opening screen

Thank you for agreeing to take this important survey about energy usage in your home; it should take about 18 minutes to complete.

Your participation in this survey is anonymous and voluntary. Your individual answers will remain confidential and you will not be identified individually in our report.

Click the "Next" arrow to begin your survey.
_____break_____

NOTE: Screening questions

S0. Do you own or rent your primary residence?

1 Own or buying
2 Rent or lease
REF

{IF S0=1, TERMINATE: 101}
{IF S0=REF, TERMINATE: 301}
_____break_____

S1. Are you the head or co-head of your household with responsibility for home rental decisions?

1 Yes
2 No
REF

{IF S1=2, TERMINATE: 102}
{IF S1=REF, TERMINATE: 301}
_____break_____

S1A. What is your age, please?
(Enter your response as a whole number in the box below.)

Age (in years): [RECORD NUMBER 0–99]
REF Prefer not to answer

{IF S1A=0-17, TERMINATE: 105}
{IF S1A=REF, TERMINATE: 301}
_____break_____

DESIGN: SET VARIABLE

AGE. Age.

1 {SET IF D1=18–24} 18–24
2 {SET IF D1=25–34} 25–34
3 {SET IF D1=35–44} 35–44
4 {SET IF D1=45–54} 45–54
5 {SET IF D1=55–59} 55–59

6 {SET IF D1=60–64} 60–64
7 {SET IF D1=65–99} 65+
DK {SET IF D1=DK} Don't know
REF {SET IF D1=REF} Refused

break

PROG. NOTE: IF R ENTERS FEWER THAN 5 DIGITS DISPLAY ERROR MESSAGE: PLEASE REVIEW THE ZIP CODE ENTERED. YOUR ZIP CODE SHOULD HAVE 5 DIGITS.

S2. What is the ZIP code of your primary residence?
(Enter that 5-digit ZIP code in the box below.)

ZIP code: [RECORD NUMBER 00000–99999]
REF

Commented [j1]: Per meeting on 6-19-14; take out Eugene Zip codes (not primary market for multi-family, skews toward electric, not area going to be marketing much).

{IF S2 NOT INCLUDED IN CLIENT LIST OF ZIP CODES, TERMINATE: 103}

break

S3. Are you currently renting…?

1 A single family detached house (on a separate lot) not connected to other living units
2 A duplex or triplex
3 A unit in an apartment building
4 A unit in a condominium
5 A rowhouse or townhouse (with adjacent walls to another residence, but no units above or below)
6 A mobile home or house trailer
7 Another type of residence; describe here: [OTHER: M]

{IF S3=1, 6–7, TERMINATE: 104}

break

S4. What is the current monthly rent for this residence—in total, not just the portion for which you might be responsible?

(Enter your response as a whole number in the box below.)

$: [RECORD NUMBER 0–9999]
DK
REF

{IF S4=DK, REF, TERMINATE: 301}

break

S5. You said your monthly rent is $(RESTORE: S4). Is this correct?

1 Yes
2 No
DK
REF

{IF S5=DK, REF, TERMINATE: 301}

break

{IF S5=2, ASK S6; OTHERWISE GO TO Q1}

S6. What is the current monthly rent for this residence—in total, not just the portion for which you might be responsible?

(Enter your response as a whole number in the box below.)

$: [RECORD NUMBER 0–9999]
DK
REF

{IF S6=DK, REF, TERMINATE: 301}

NOTE: Questionnaire

Q1. The questions we have are about your current primary residence.

How many bedrooms does it have?

1 Studio
2 1 bedroom
3 2 bedrooms
4 3 bedrooms
5 4+ bedrooms
DK
REF

_____break_____

Q2. How many bathrooms does it have?

1 1
2 1 ½
3 2
4 2 ½
5 3
6 More than 3
DK
REF

_____break_____

Q3. What is the square footage of the living space of your home? Your best guess is fine.

Commented [j2]: Confirm min and max square footage to list

Exclude space in any of the following from your response:
- an unheated garage
- an attic
- an unfinished basement

1 600 square feet or less
2 601–800 square feet
3 801–1,000 square feet
4 1,001–1,200 square feet
5 1,201–1,400 square feet
6 1,401–1,600 square feet
7 1,601–1,800 square feet
8 1,801–2,000 square feet
9 2,001–2,200 square feet
10 2,201–2,500 square feet
11 2,501–3,000 square feet
12 3,001–3,500 square feet
13 More than 3,500 square feet
DK
REF

break

DESIGN: MULTI BINARY, RANDOMIZE CODES 1–5
PROG. NOTE: MAKE CODE 6 EXCLUSIVE

Q4. Which of the following utilities do you pay for directly? Do not include utilities that are included in your rent.
(Select all that apply.)

1 Electricity
2 Natural gas
3 Water
4 Cable/satellite TV
5 Broadband internet
6 None of the above
DK
REF

break

NOTE: Cooling

Q6. What is the main cooling system for your current residence?

1 Central A/C
2 Window A/C
3 Portable A/C
4 Through the wall A/C unit
5 Electric heat pump
6 Electric ductless heat pump
7 Another type of cooling system; describe here: [OTHER: M]
8 Not applicable—there is no cooling system in my home
DK
REF

_____break_____

NOTE: Heating

Q7. Is your heating system…?

1 Communal/shared with other units in my building
2 An individual heating system
3 Not applicable—there is no heating system in my home
DK
REF

_____break_____

{IF Q7=1–2, ASK Q8; OTHERWISE GO TO Q10}

Q8. Is your main heating system fueled by…?

1 Electricity
2 Natural gas
3 Another type of fuel; record here: [OTHER: M]
DK
REF

_____break_____

{IF Q8=1–3, ASK Q9; OTHERWISE GO TO Q10}

Q9. What is the main heating system type in your home?

1 Electric base boards
2 Electric wall heaters
3 Electric forced air furnace
4 Electric radiant (in floors or walls)
5 Electric heat pump
6 Electric ductless heat pump
7 Gas forced air furnace
8 Gas radiant (hydronic)
9 Gas heat-rated fireplace (provides zonal heat)
10 Some other heating system; describe here: [OTHER: M]
DK
REF

_____break_____

NOTE: Water heater

Q10. Does your residence…?

1 Have its own water heater
2 Share water heating with other residents
DK
REF

_____break_____

{IF Q10=1-2, ASK Q11; OTHERWISE GO TO Q13_1}

Q11. Is most or all of your home's water heated by…?

1 Electricity
2 Natural gas
3 Another type of fuel; record here: [OTHER: S]
DK
REF

_____break_____

{IF Q11=1-3, ASK Q12; OTHERWISE GO TO Q13_1}

Q12. What type of water heating system do you have?

1 Gas tank water heater
2 Electric tank water heater
3 Tankless water heater
4 Heat pump water heater
5 Another type; describe here: [OTHER: S]
DK
REF

_____break_____

NOTE: Type of Oven/Stove Top/Clothes Dryer/Fireplace

DESIGN: MULTI BINARY, RANDOMIZE CODES 1–4
PROG. NOTE: MAKE CODE 5 EXCLUSIVE

Q13_1. Which—if any—of the following do you have in your home?
(Select all that apply.)

1 Oven
2 Stove top
3 Clothes dryer
4 Fireplace
5 None of the above

_____break_____

{IF Q13_1=1–4, ASK BLOCK_A; OTHERWISE GO TO Q17}
DESIGN: ATTRIBUTES

BLOCK_A. Items to evaluate in Q13.

1 {SHOW IF Q13_1=1} Oven
2 {SHOW IF Q13_1=2} Stove top
3 {SHOW IF Q13_1=3} Clothes dryer
4 {SHOW IF Q13_1=4} Fireplace

_____break_____

X=BLOCK_A
DESIGN: LOOP=Q13_[X]

Q13_[X]. What type of fuel does your home's (RESTORE: BLOCK_A=[X]) use?

1 Electricity
2 Natural gas
3 Another type of fuel; record here: [OTHER: S]

_____break_____

NOTE: Rental Details

Q17. In what year was your current residence built? Your best guess is fine.

1 Before 1970
2 1970–1979
3 1980–1989
4 1990–1999
5 2000–2009
6 2010
7 2011
8 2012
9 2013
10 2014
DK

_____break_____

{IF S3=3–4, ASK Q18A. OTHERWISE GO TO Q18B}

Q18A. How many levels or stories are there in your building?

1 1 story
2 2 stories
3 3 stories
4 4–12 stories
5 13 or more stories
DK
REF

_____break_____

Q18B. About how many residential units are there in your building? Your best guess is fine.

1 Less than 5
2 5–9
3 10–24
4 25–49
5 50–99
6 100 or more
DK
REF

_____break_____

Q19. Is your residence considered to be “energy efficient?”

1 Yes
2 No
DK
REF

_____break_____

Q20. About how long have you lived in your current residence? Your best guess is fine.

1 Less than 1 year
2 1 year to less than 2 years
3 2–3 years
4 4–5 years
5 6–7 years
6 8–10 years
7 More than 10 years
DK
REF

_____break_____

Q21. Overall, how satisfied are you with your current residence?
(Select the rating scale point that best describes how you feel.)

[RECORD NUMBER 0–10]
0=Extremely dissatisfied
10=Extremely satisfied
DK
REF

_____break_____

Q22. What is the likelihood you will move from your current residence within the next 2 years?

1 Very likely
2 Somewhat likely
3 Neither likely nor unlikely
4 Somewhat unlikely
5 Very unlikely
DK
REF

_____break_____

{IF Q22=1–2, ASK Q23; OTHERWISE GO TO CHOICE EXERCISE}

Q23. If you were to move within the next 2 years, what is the likelihood you rent again in the same area?

1 Very likely
2 Somewhat likely
3 Neither likely nor unlikely
4 Somewhat unlikely
5 Very unlikely
DK
REF

_____break_____

NOTE: Choice Exercise

In this next part of the survey, we want to understand the choices you'd make if you were looking for a new apartment to rent in your area.

Here's how this section will work:

- Assume you are looking for a new apartment, and that you very much want to make your decision today.
- You'll see a series of 8 scenario screens. Each will show a pair of options you can choose from.
- On each screen, you'll select the apartment you'd realistically choose based on the information provided to you.
- Although each of the offerings may be similar, the features will change from screen to screen, so be sure to review each of the offerings on each screen carefully before you make your choice.
- Unless otherwise indicated, assume each of the apartments you'll be choosing from are in the same location and have comparable amenities beyond those specifically listed in each scenario.

break

For each screen, your task is to indicate which of 2 apartments you would choose. Here is an example of what each screen will look like.

EXAMPLE CHOICE EXERCISE	**APARTMENT A** 2 BR / 2 BA 1050 square feet	**APARTMENT B** 2 BR / 2 BA 1050 square feet
Heating	Natural gas heat	Electric heat
Cooling	Air conditioning	No air conditioning
Fireplace	Natural gas fireplace	No fireplace
Water Heating	Natural gas water heater	Electric water heater
Stove/Cooktop	Natural gas stove	Electric stove
Clothes dryer	Natural gas clothes dryer	Electric clothes dryer
Environmental impact	Energy efficient apartment	No mention of energy efficiency
Monthly Rent	$1,400 per month	$1,300 per month
Length of Lease	12 month lease	6 month lease
CHOOSE ONE	⊙	○

Commented [nrewheise3]: I think we will need to specify that Monthly Rent does not include electricity, gas, cable/satellite TV, phone, or Internet.

break

PROG. NOTE: SHOW THIS TEXT AT THE TOP OF THE SCREEN SHOWING THE 1ST SCENARIO R SEES

Here's the first "screen" we want you to evaluate.

If you had to choose between these 2 apartments today, which would you pick?
_____break_____

PROG. NOTE: SHOW THIS TEXT AT THE TOP OF THE SCREEN SHOWING THE 2ND SCENARIO R SEES

This is a different screen. Treat this as an entirely new decision.

If you had to choose between these 2 apartments today, which would you pick?
_____break_____

PROG. NOTE: SHOW THIS TEXT AT THE TOP OF THE SCREEN SHOWING THE 3RD & SUBSEQUENT SCENARIOS R SEES

If you had to choose between these 2 apartments today, which would you pick?
_____break_____

NOTE: DCM Setup

DESIGN: SET VARIABLE
PROG. NOTE: DISABLE THE PREVIOUS BUTTON HERE

DC_START. Time stamp for time DCM Exercise started.

[OPEN END: S]
_____break_____

DESIGN: SET VARIABLE
PROG. NOTE: ASSIGN LEAST-FILLED CELL

DCM1_VER. DCM version assigned.

1 Version 1
2 Version 2
3 Version 3
4 Version 4
5 Version 5
6 Version 6
7 Version 7
8 Version 8
9 Version 9
10 Version 10

_____break_____

DESIGN: SET VARIABLE
PROG. NOTE: RANDOMIZE & RECORD TASK ORDER
PROG. NOTE: SEE DESIGN WORKSHEET IN THE DESIGN FILE TO DETERMINE WHAT SET OF CARD NUMBERS CORRESPONDS TO THE VERSION ASSIGNMENT MADE ABOVE, RANDOMLY ASSIGN THE CARDS R WILL SEE ACROSS THE SEEN_X VARIABLES AND RECORD THE CARD

NUMBERS THE RESPONDENT RATES IN THE ORDER THAT THE RESPONDENT ACTUALLY EVALUATED EACH CARD

x=1 to 8

SEEN_[x]. Card seen.

[RECORD NUMBER 1–80]

{SET (SEEN_[x])}

_____break_____

DESIGN: SET VARIABLE
PROG. NOTE: FOR EACH CARD THE R SEES, WE NEED TO RECORD THE VALUE OF THE RENT DISPLAYED ON THE CARD SEEN IN THE DATASET, BASED ON THE VALUE OF THE RENT VARIABLE IN THE DESIGN WORKSHEET. THIS IS THAT VALUE FOR THE MEMBER OF THE PAIR BEING CONSIDERED THAT IS ON THE LEFT SIDE OF THE SCENARIO

x=1 to 8

RENTL_[x]. Value of rent shown on the left option.

[RECORD NUMBER 1–9999]

{SET (RENTL_[x])}

_____break_____

DESIGN: SET VARIABLE
PROG. NOTE: SAME HERE. THIS IS THAT VALUE FOR THE MEMBER OF THE PAIR BEING CONSIDERED THAT IS ON THE RIGHT SIDE OF THE SCENARIO

x=1 to 8

RENTR_[x]. Value of rent shown on the right option.

[RECORD NUMBER 1–9999]

{SET (RENTR_[x])}

_____break_____

x=1 to 8
DESIGN: LOOP=DCM_[X]

DCM1_SEEN_[x]. What choice did R make in this scenario? (Screen order.)

1 Column #1 chosen in the choice scenario (that is, feature block in the design file)
2 Column #2

_____break_____

x=1 to 8
DESIGN: LOOP=DCM_[X]

DCM1_[x]. What choice did R make in this scenario? (Design order.)

1 Column #1 chosen in the choice scenario
2 Column #2

_____break_____

DESIGN: SET VARIABLE

DC_FINISH. Time stamp for time DCM exercise ended.

[OPEN END: S]
_____break_____

DESIGN: SET VARIABLE

DC_TIME. Elapsed time spent on DCM exercise.

[OPEN END: S]
_____break_____

NOTE: Attitudes and Preferences: Natural Gas vs. Electric

DESIGN: SAME SCREEN Q24–Q25
DESIGN: RANDOMIZE CODES 1–2

Q24. If you were looking for a new apartment to rent, would you prefer one with…?

1 Natural gas service
2 All electric heating and appliances
3 No preference
DK
REF

_____question separator_____

Q25. Why?
(Enter your response in the space below. Please be as specific as possible.)

[OPEN END: L]
_____break_____

{IF Q24=1, ASK Q26; OTHERWISE GO TO Q27}

Q26. How much more in rent per month—if anything—would you be willing to pay for an apartment with natural gas heating and appliances (versus one with all electric heating and appliances)?
(Enter your response as a whole number in the box below. Your best guess is fine.)

$: [RECORD NUMBER 0–9999]
_____break_____

DESIGN: SAME SCREEN Q27–Q28
DESIGN: RANDOMIZE CODES 1–4

Q27. What type of heating would you prefer to have in a new apartment?

1 Natural gas heating
2 Electric heating
3 Radiant heat (hydronic system)
4 Gas fireplace (provides zonal heating)
5 No preference
DK
REF

_____question separator_____

Q28. Why?
(Enter your response in the space below. Please be as specific as possible.)

[OPEN END: L]

_____break_____

DESIGN: SAME SCREEN Q29—Q30
PROG. NOTE: SHOW CODES IN THE SAME ORDER USED IN Q27

Q29. What type of water heating would you prefer to have in a new apartment?

1 Electric
2 Natural gas
3 No preference
DK
REF

_____question separator_____

Q30. Why?
(Enter your response in the space below. Please be as specific as possible.)

[OPEN END: L]

_____break_____

PROG. NOTE: SHOW CODES IN THE SAME ORDER USED IN Q27

Q31. What type of cooktop/stove would you prefer to have in a new apartment?

1 Electric
2 Natural gas
3 No preference
DK
REF

_____break_____

PROG. NOTE: SHOW CODES 1–2 IN THE SAME ORDER USED IN Q27

Q32. What type of fireplace would you prefer to have in a new apartment?

1 Electric
2 Natural gas
3 Wood burning
4 No preference
5 Would prefer NOT to have a fireplace
DK
REF

_____break_____

PROG. NOTE: SHOW CODES 1–2 IN THE SAME ORDER USED IN Q27

Q33. What type of clothes dryer would you prefer in a new apartment?

1 Electric
2 Natural gas
3 No preference
4 Would prefer NOT to have a clothes dryer
DK
REF

_____break_____

NOTE: Key Factors when Considering Electricity versus Natural Gas

DESIGN: GRID, RANDOMIZE QUESTIONS Q34–Q39

Please rank up to 3 of the items below in order of importance when considering your preference between natural gas and electricity for heating and appliances.
(Enter the numbers 1 to 6—using each number just once—in each of the boxes below. Assign a rank of 1 to the most important reason behind your preference for one over the other, a rank of 2 to the one that's second most important and so on.)

[RECORD NUMBER 1–6]

Q34. Lowest operating cost
Q35. Safest to use
Q36. Most reliable
Q37. Most convenient to use
Q38. Most environmentally friendly / Lowest carbon footprint
Q39. Provides the best performance for heating/cooking

_____break_____

NOTE: Previous Experience with Natural Gas

{IF Q8=1,3, ASK Q40; OTHERWISE GO TO D1}

Q40. Have you previously had natural gas service at a prior home or residence?

1 Yes
2 No

_____break_____

NOTE: Demographics

DESIGN: SAME SCREEN D1–D2

D1. Thank you for your participation so far. There are just a few additional questions for classification purposes.

Are you…?

1 Male
2 Female

_____question separator_____

D2. What is the highest level of education you've completed?

1 Grade school
2 Some high school
3 Completed high school degree or GED
4 Some college or technical college
5 Completed technical college
6 Completed 4 year college
7 Post-graduate work or degree
REF

_____break_____

D3. Including yourself, how many people live in your home?
(Enter your response as a whole number in the box below.)

living in your household: [RECORD NUMBER 1–99]
REF

_____break_____

{IF D3=1, SET D4=2}
{IF D3=2–99, ASK D4; OTHERWISE GO TO D6}

D4. Does your household include any children under the age of 18?

1 Yes
2 No
REF

_____break_____

{IF D4=1, ASK D5; OTHERWISE GO TO D6}

D5. How many children under the age of 18 live in your household?
(Enter your response as a whole number in the box below.)

# of children living in your household: [RECORD NUMBER 1–99]
REF

_____break_____

DESIGN: SAME SCREEN D6–D7

D6. Into which of these categories does your household's total annual income fall?

Be sure to include all sources of taxable and non-taxable income in your response including wages, pensions, social security, public assistance, etc.

1 $9,999 or less
2 $10,000–$14,999
3 $15,000–$19,999
4 $20,000–$24,999
5 $25,000–$34,999
6 $35,000–$49,999
7 $50,000–$74,999
8 $75,000–$99,999
9 $100,000–$124,999
10 $125,000–$149,999
11 $150,000 or more
REF

_____question separator_____

D7. Are you currently…?
(Select one. If more than one answer applies, select the one closest to the top of the list.)

1 Employed full time
2 Employed part time
3 Self-employed/freelancer
4 Retired
5 Student
6 Homemaker
7 Not currently employed/unable to work
REF Prefer not to say

_____break_____

D8. Do you consider yourself…?

1 Asian or Pacific Islander
2 Black
3 Hispanic or Latin American
4 Caucasian
5 Something else; describe here: [OTHER: S]
DK
REF

_____break_____

NOTE: Survey close

Those are all the questions we have for you today. Thank you very much for your participation in this research study.

_____break_____

CUB/112
Jenks/1

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NW Natural Residential Customer Satisfaction Report

DECEMBER 2020

Table of Contents

Research Objectives

NW Natural's customer satisfaction study provides the company with a gauge of its relationship with its Residential customers, and the opportunity to assess how company actions, programs, communications, and policies are affecting customer perceptions of the company.

The current study is designed to address the following objectives:

- Assess customer satisfaction and customer evaluations of NW Natural's performance
- Establish baseline measures for future comparison of performance
- Provide actionable guidance to help NW Natural plan programs and initiatives that will be effective in strengthening customer relationships and improving customer perceptions, and prioritize alternative initiatives
- Give NW Natural employees access to specific feedback that can be used to identify customer preferences and concerns, plan responses, and monitor performance and progress over time
- Develop a Customer Satisfaction Model to identify priorities for company actions and investments in operations, training, communications, products and services
- Provide industry benchmarking comparisons to understand performance relative to Gas Only/Combination companies and a select peer group

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Jenks/4

Research Methodology

- The 2020 CSAT survey was conducted from October 15 to October 19, 2020.
- Qualified Respondent:
  - NW Natural Residential customer
  - 18 years of age or older
  - Head or co-head of household
  - Familiar with the services NW Natural provides to their home
  - Not employed by a utility, an energy company, the media, or a market research or advertising firm
- Survey was conducted online using sample provided by NW Natural containing all customers with email addresses.
  - A random sample of customers across all 9 districts were sent an invitation to participate in an online survey. **The chart on the right shows the number of completed surveys in each district.**
  - For reporting, smaller districts were combined together for a more robust sample.
- Overall company results in this report are weighted by age, gender, Hispanic/Latino, Ethnicity, and Region at an overall NW Natural Territory level to insure the results are representative of all customers across NW Natural's service area. Regional results are not weighted demographically.

All Regions	
Region	**Completes**
Portland	962
Salem	317
Albany	111
Vancouver	276
Eugene	326
Astoria	96
Lincoln City	130
Coos Bay	29
The Dalles*	170
Total	2,417

Combined Regions for Reporting	
Region	**Completes**
Portland	962
Salem/Albany	428
Vancouver	276
Eugene	326
Astoria/Lincoln City/Coos Bay	255
The Dalles*	170
Total	2,417

- While included in the overall results, The Dalles was not broken out in this report for regional analysis.
- Results for all individual districts are available in a separate banner

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Key Findings

General Feelings and Perceptions of NW Natural

NW Natural customers show high satisfaction ratings across all aspects of the business.

Nearly all (98%) say they are satisfied with NW Natural as their natural gas provider. Additionally, 9 in 10 say they would be likely to recommend the utility and that NW Natural has earned their loyalty as a customer.

In general, areas where NW Natural receives relatively lower positive ratings are generally due to a higher proportion of respondents who don't know how to answer the question rather than negative perceptions towards the utility.

- Overall, positive perceptions are shared across all district groupings. Satisfaction, likelihood to recommend, earned loyalty, and other Outcome measures are given positive ratings by roughly 9 in 10 regardless of region. In general, across performance areas, customers in Salem/Albany were among the most positive in their perceptions of NW Natural, and Portland customers, while still generally positive, were least so.
  - Of note, when observed, lower ratings by Portland customers appear to be more driven by a larger proportion of customers indicating they are "neutral" or don't know about a specific topical area as opposed to providing negative ratings. Related, relative to other districts, Portland customers tend to fall more into the 'somewhat positive" than "delighted" camp for many performance areas.
- Positive perceptions are also shared among various demographic groups based on gender, age, ethnicity, education and household income, indicating strong positive perceptions among all types of customers across NW Natural's service territory.
- Of note, customers who have had interaction with a NW Natural Field Employee are equally as satisfied as those who have not (98% each, %6-10).

While NW Natural has strong positive perceptions across their customer base, it's important to recognize that **while still favorable, they also have a group of customers that are not "delighted" in that they do not provide the highest ratings possible (top 2-box).** In general, there is a consistent group (around 20%-40%) who provide "somewhat positive" rather than "very positive" ratings.

- This is a sub-group that NW Natural may want to focus on recognizing that the group may find different aspects of the business important compared to all NW Natural customers as a whole.

Key Findings

General Feelings and Perceptions of NW Natural (*continued)*

When compared to other gas only and combination utilities in Escalent's National Utility Residential Benchmarking, **NW Natural shows top quartile rankings for a majority of measures, including a top 5 ranking for 16 measures:**

- Value of Natural Gas Product Delivered
- Earned Loyalty
- Likelihood to Recommend
- Overall Satisfaction
- Overall Favorability
- Being A Company You Can Trust
- Providing Reliable Service
- Satisfaction with Most Recent Call
- Being Focused On Customer Service
- Being Easy To Do Business With
- Being Easy To Reach
- Being Responsive To Customer Needs
- Having Bills That Are Easy To Understand
- Providing Accurate Bills
- Helping Customers Use Energy Safely
- Information to Help Save Money by Using Less Energy

However, some areas lag behind other utilities in benchmarking. This is not necessarily an indicator of poor performance for NW Natural. Generally these are measures that receive higher proportion of "don't know" responses, indicating potential opportunity for education/messaging.

- Being Well-Managed
- Being a Good Corporate Citizen in the Communities Served
- Protecting the Environment
- Following Through On Promises
- Promptly Fixing Customer Problems

Key Findings

Communications and Messaging Opportunities

Customer perceptions towards NW Natural are positive across all regions. However, when one region does show lower ratings, this is typically a result of customers not knowing about a particular aspect of the business. This leads to an opportunity to inform and educate customers should NW Natural choose to do so. Specific areas where educational opportunities may be present include:

- Corporate Citizenship and Community Involvement
- Programs and information that help customers save money
- Providing payment assistance plans and Offering programs to help customers with financial difficulties
- Programs that help customers use energy efficiently and that meet their individual needs
- Protecting the environment
- Planning for future gas needs
- Information about natural gas pipeline safety and Responding quickly to NG emergencies

Also related to Communications, **only 3 in 10 customers have seen any type of advertising from NW Natural**. However, this is twice the amount that have seen, read, or heard news coverage, the latter which is typically externally controlled.

- Most customers have a more favorable or unchanged opinion of NW Natural when exposed to news coverage and/or advertising.

When a series of statements were evaluated through a paired comparison exercise ***clean energy*** and ***climate change management*** along with ***managing costs*** and ***helping customers save money*** resonated the most with customers. These are the issues they consider most important and are to which they are most likely to respond. Depending on the region, different issues were viewed as most important.

- *Addressing climate change and investing in technology and programs to produce clean energy* resonated more with Portland and Eugene customers
- *Costs* and *saving money* resonated the most with Salem/Albany and Vancouver customers

NW Natural Customer Satisfaction

Outcome Measures

Outcome Measures

Overall satisfaction is the highest score among the outcome measures at 98% total satisfied. *Overall favorability, Earned loyalty,* and *Likelihood to recommend* see have high ratings as well, with around nine out of ten customers (89% to 93%) providing positive ratings (%6-10). *Meeting expectations,* as is typically the case, is the lowest rated among the outcome measures at 83% total positive.

Value of natural gas is the only outcome measure to use a 1 to 5 point scale, with 90% of respondents feel they receive a good value.

RECOM.	Thinking about your experiences with NW Natural as your natural gas utility, how likely would you be to recommend NW Natural products or services to a friend or relative?
EARNLOY.	To what extent has NW Natural earned your loyalty as a customer?
OVSAT.	First, based on your overall experience, how satisfied are you with NW Natural as your natural gas provider?
EXPECT.	In terms of what you expect from your energy utility, to what extent has NW Natural fallen short of your expectations or exceeded your expectations as your natural gas provider?
FAVOR.	Please rate your overall feelings toward NW Natural in general.
VALUEG.	How would you rate the value you receive from NW Natural in terms of the actual product they deliver, that is—natural gas?

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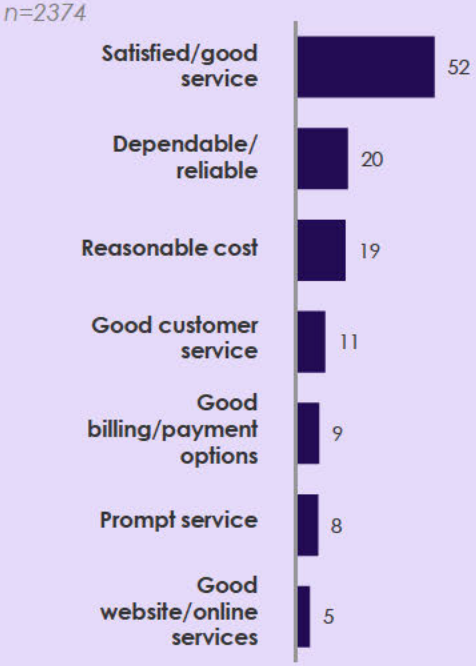
Jenks/10

Reasons for Positive Satisfaction Rating (6-10)

At 98% total satisfied (6-10 ratings) and 73% very satisfied (9-10 ratings), nearly all customers have a positive view of NW Natural. The most frequently mentioned reasons for satisfaction include *satisfied/good service* (52%), *dependable/reliable* (20%), and *reasonable cost* (19%).

%Why did you give NW Natural a 6-10 rating on overall satisfaction
n=2374



	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Satisfied/good service	50	57 AD	53	47	51
Dependable/ reliable	21	18	18	20	23
Reasonable cost	18	19	20	24 A	21
Good customer service	10	12	14	12	11
Good billing/payment options	8 E	8	10 E	8 E	4
Prompt service	9	7	9	7	9
Good website/online services	5	4	4	4	4
	n=940	425	272	318	253

"When service request made, response was immediate. NW Natural's service and supply to residence is excellent."

Overall Satisfaction: 10
District: Lincoln City

"Very cost effective, we have a natural gas hot water heater, and gas range. Natural gas is extremely efficient and clean, billing and payment is efficient and they have a great reputation in the community."

Overall Satisfaction: 10

District: Eugene

"Their website is easy to navigate. I like the automatic bill pay. I've never had issues with my service. I like how they supply energy efficiency tips."

Overall Satisfaction: 10
District: Vancouver

"The personnel that installed my gas line from the street to my house was very professional and courteous. I am on auto pay and have had no problems with my billings, including the adjustments for the average monthly amount for each year."

Overall Satisfaction: 10
District: Salem

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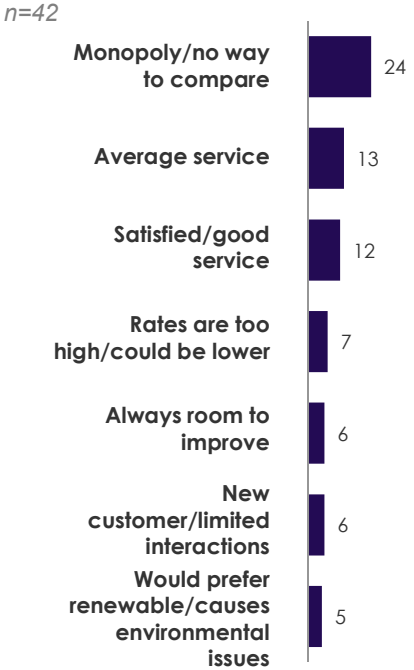
SATOE. Why did you give NW Natural a <OVSAT> rating on overall satisfaction?

Reasons for Negative/Neutral Satisfaction Rating (0-5)

Of the 2% of customers who did not provide a positive satisfaction rating (0-5 ratings), most mentioned NW Natural being a *monopoly/no way to compare* (24%) or providing *average service* (13%) as the main reason for their lack of satisfaction.

%Why did you give NW Natural a 0-5 rating on overall satisfaction

n=42



"The insistence on expanding fossil gas infrastructure when we need a managed decline of gas use to address climate change."

Overall Satisfaction: 0
District: The Dalles

"No complaints with NWN as a service provider, but we need to get off of fossil fuels as quickly as possible, and by continuing to encourage new customers to switch to gas, NWN is making the economic problem of climate change much worse."

Overall Satisfaction: 3

District: Portland

"I'm neutral. I don't have anything to compare it to and I rarely interact with NW Natural."

Overall Satisfaction: 5
District: Portland

"I'm not excited nor dissatisfied with the service provided. It's just fine. Annoying to get bills every month when we're not even using the furnace."

Overall Satisfaction: 5
District: Portland

"They are the only one available, how do I know if they are better or worse than another provider."

Overall Satisfaction: 5
District: Albany

"I'm neither satisfied nor dissatisfied. I am a customer of NW Natural as a matter of necessity, not choice."

Overall Satisfaction: 5
District: Vancouver

SATOE. Why did you give NW Natural a <OVSAT> rating on overall satisfaction?

Outcome Measures

While each district provides highly positive ratings in regards to the Outcome Measures, Salem/Albany and the Coastal areas (Astoria/Lincoln City/Coos Bay) generally provide the highest ratings in comparison to Portland, Vancouver, and Eugene.

Portland customers, while positive overall, generally provide the lowest ratings.

%Positive Ratings	Total 2020	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Behavioral Outcomes						
Recommend						
Likelihood to recommend	91	90	94 A	93	94	96 A
Loyalty						
Earned loyalty	89	88	92	93 A	92 A	93 A
Summary Outcomes						
Value						
Value of natural gas	90	89	95 AD	93 A	91	93
Satisfaction						
Overall satisfaction	98	98	99 AD	99	98	99
Meeting Expectations	83	83	86	87	83	85
Favorability						
Favorability	93	92	96 A	96 A	94	97 A
	n=2417	*962*	*428*	*276*	*326*	*255*

NW Natural Customer Satisfaction

Key Drivers

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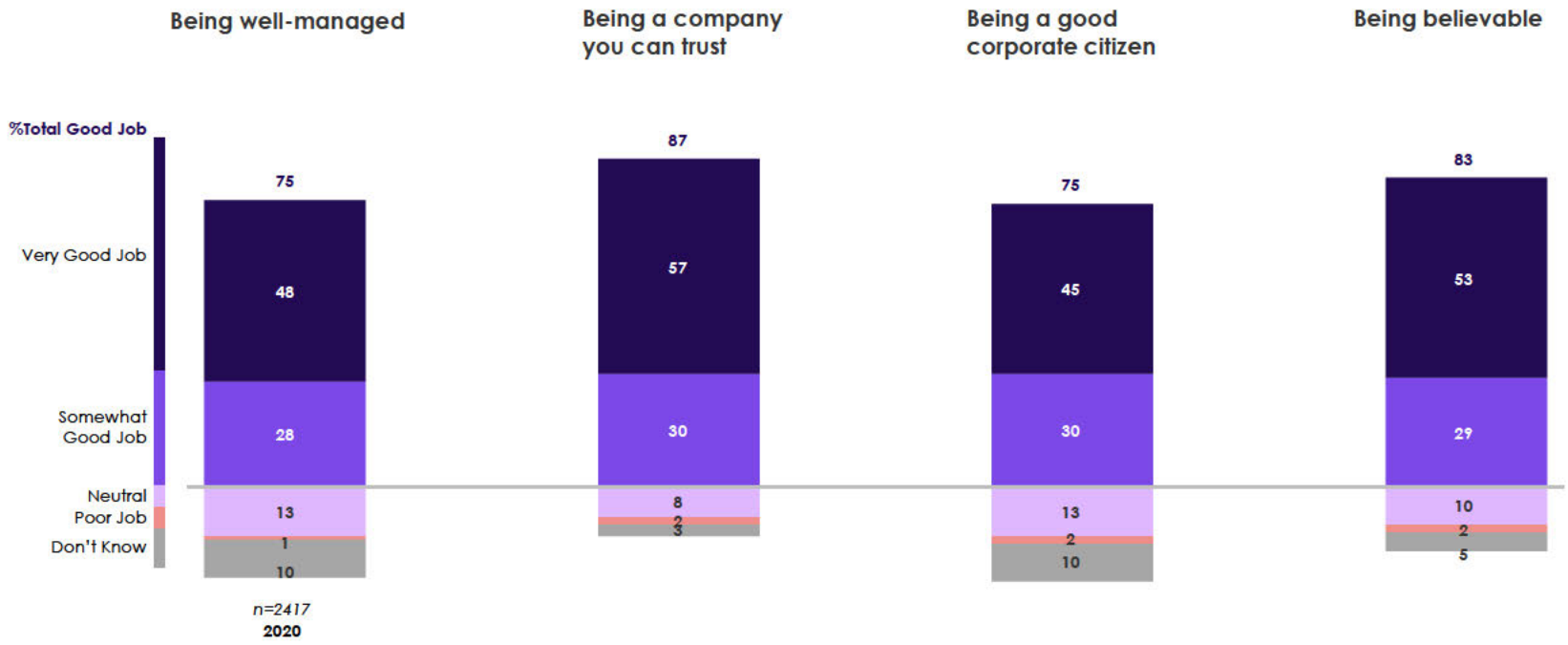
Management

The measures composing the Management Key Driver are split into two camps – *Being well-managed* and *Being a good corporate citizen* see nearly identical ratings with 75% feeling that NW Natural does a good job and a notable number of respondents indicating they don't know (10% each) or provide a neutral rating (13% each) to each metric.

However, *Being a company you can trust* and *Being believable* appear to be more tangible to respondents which is observed through the higher positive job ratings (87% and 83%, respectively), lower neutral (8%-10%), and lower don't know ratings (3%-5%).



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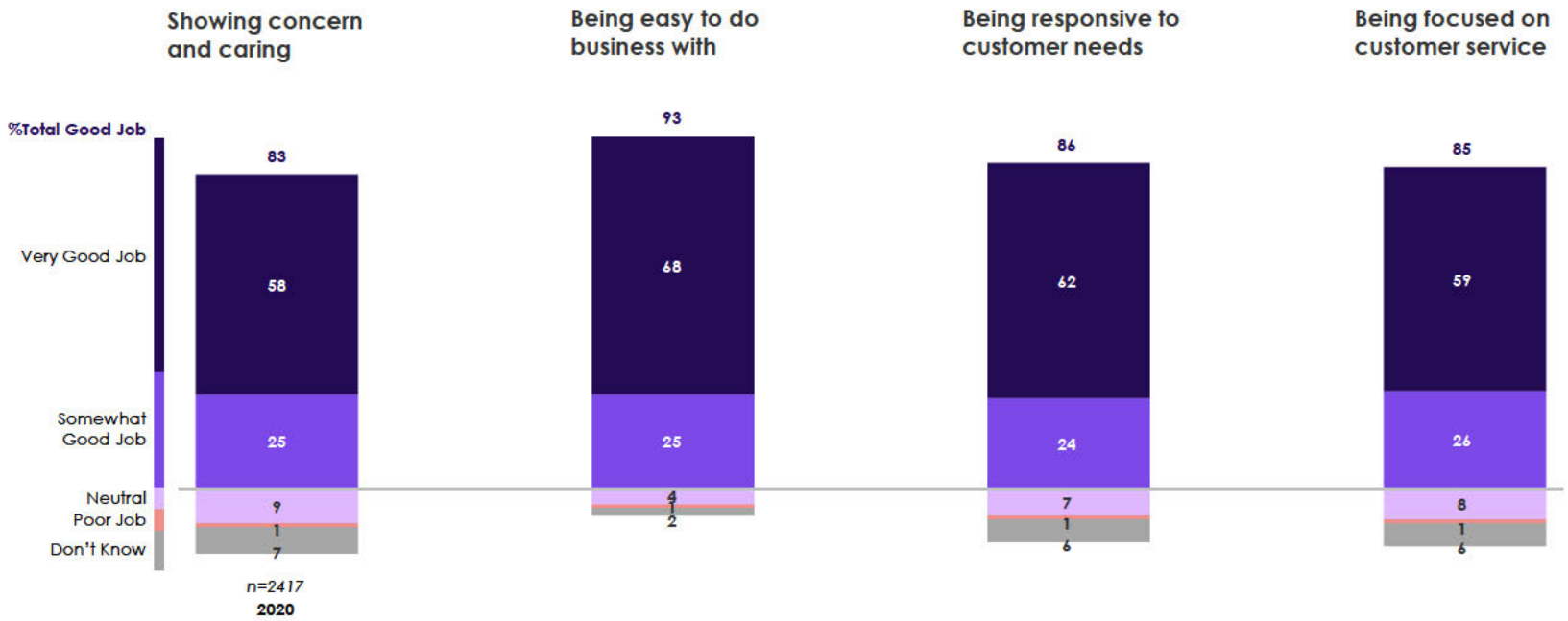
MANAGE. Being well-managed
TRUST. Being a company you can trust
CORPCIT. Being a good corporate citizen in the communities it serves
BELIEVE. Being believable

CUB/112
Jenks/15

Service Reputation

Being easy to do business with is highly rated among the Service Reputation measures, with 93% of all customers saying NW Natural is doing a "good job."

Showing concern and caring, Being responsive to customer needs, and *Being focused on customer service* are relatively lower with 83% to 86% positive ratings – however, ratings for all three measures are still quite high.



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CONCERN. Showing concern and caring toward customers
EASYBUS. Being easy to do business with
RESPONSE. Being responsive to customer needs
CUSTSVC. Being focused on customer service

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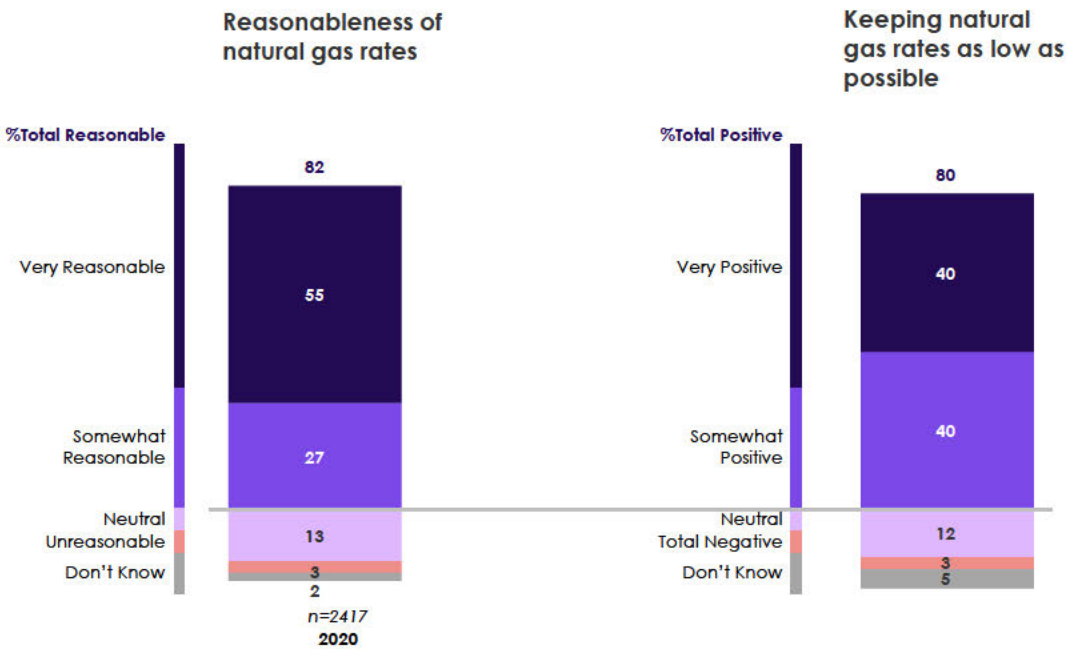
Jenks/16

Rates

In general, utility customers tend to provide lower ratings of metrics related to the rates they pay for the service they receive.

Keeping this in mind, eight out of ten customers rate *Reasonableness of natural gas rates* (82%) and *Keeping natural gas rates as low as possible (80%)* positively. This suggests that customers are pleased with the natural gas rates offered by NW Natural.



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RATESG. In general, would you describe NW Natural's natural gas rates as being…?
RATELOWG. How would you rate NW Natural on keeping natural gas rates as low as possible?

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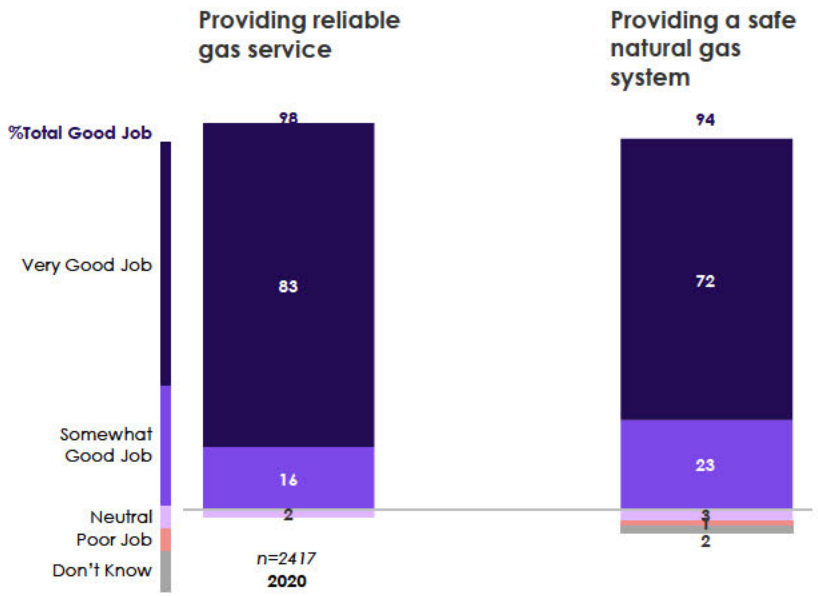
Jenks/17

Product Delivery

The two Product Delivery metrics see very high positive ratings with *Providing reliable gas service* at 98% positive and *Providing a safe natural gas system* at 94%.



escalent

RELIAG. Providing reliable gas service
SAFEG. Providing a safe natural gas system

Key Drivers

Salem/Albany consistently show the highest or near highest ratings for the individual Key Driver metrics when compared to the other districts.

Portland customer ratings, while good overall, are among the lowest for perceptions of Management and Rates.

%Positive Ratings	Total 2020	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Key Drivers						
Management						
Being well-managed	75	73	82 AD	81 A	75	79
Being a company you can trust	87	86	90 A	91 A	89	89
Being a good corporate citizen	75	74	81 A	77	76	75
Being believable	83	82	86	86	84	85
Service Reputation						
Showing concern and caring	83	84	84	82	80	83
Being easy to do business with	93	92	94	94	94	93
Being responsive to customer needs	85	85	86	84	85	87
Being focused on customer service	86	86	88	85	85	88
Rates						
Reasonableness of natural gas rates	82	80	85 A	85	83	86 A
Keeping natural gas rates as low as possible	80	79	85 A	85 A	83	82
Product Delivery						
Providing reliable gas service	98	98	99	99	98	99
Providing a safe natural gas system	94	94	96	95	94	94
	n=2417	*962*	*428*	*276*	*326*	*255*

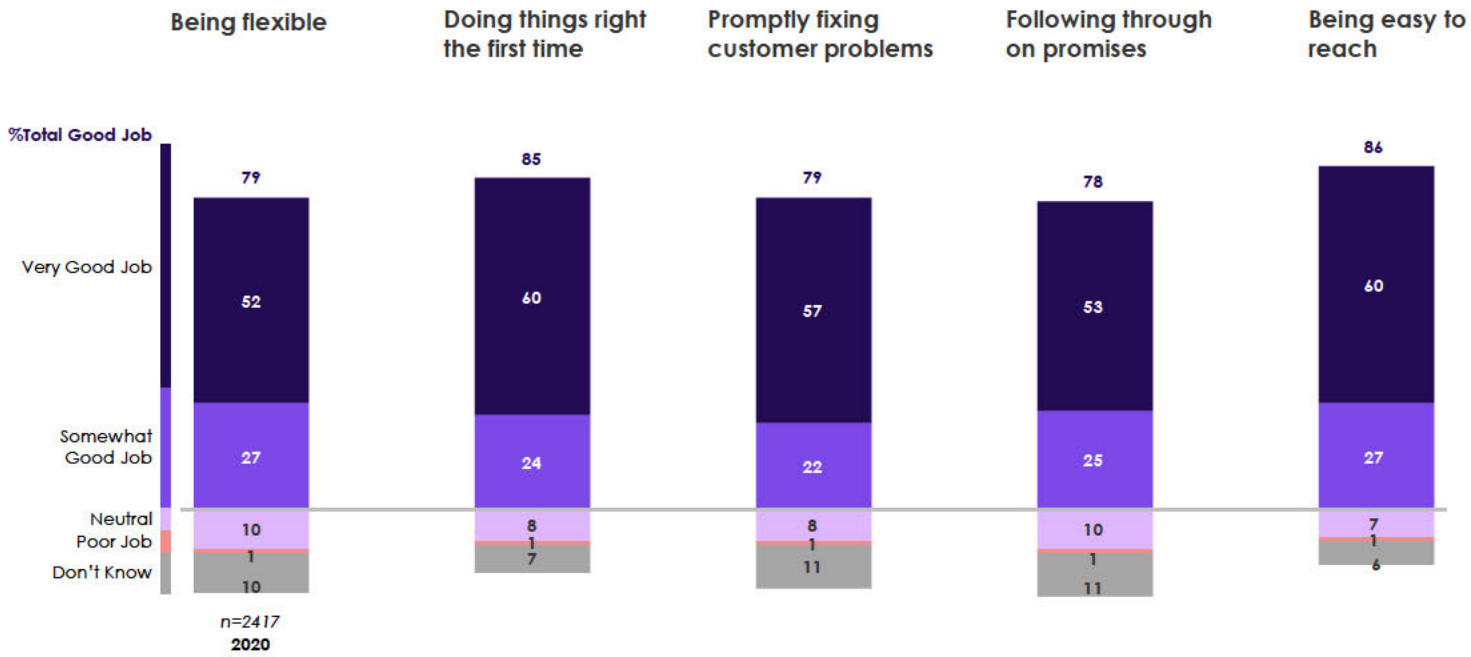
NW Natural Customer Satisfaction

Support Drivers

CUB/112
Jenks/20

Customer Solutions

Among the five Customer Solutions metrics, *Doing things right the first time* and *Being easy to reach* have similar ratings, with 85% and 86% of customers saying NW Natural does a good job. Slightly lower positive ratings are seen for *Being flexible* (79%), *Promptly fixing customer problems* (79%), and *Following through on promises* (78%) – however, these relatively low ratings are most likely reflective of the lack of negative experiences customers have had as suggested through the higher neutral and don't know ratings. Across all five metrics, no more than 1% of customers feel that NW Natural has done a poor job.



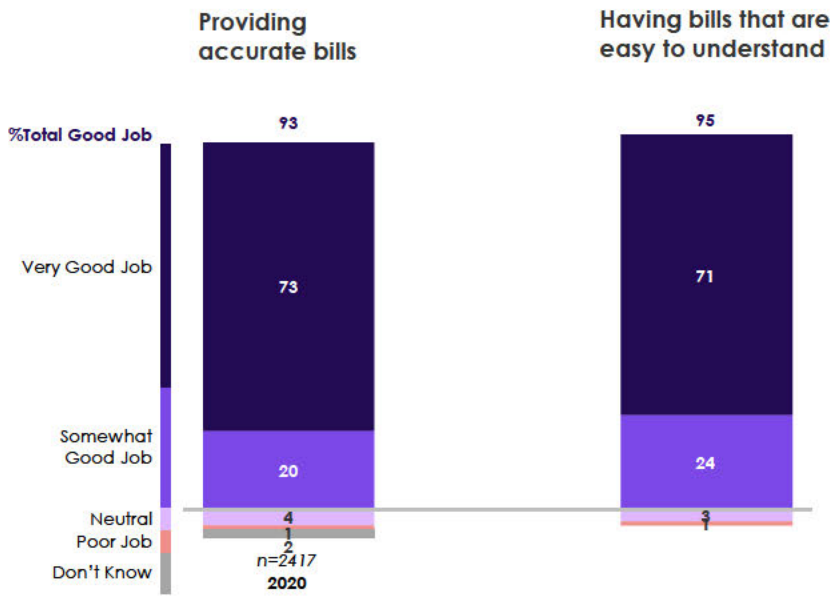
FLEX.	Being flexible in meeting customers' needs
RIGHTFT.	Doing things right the first time
FIXPROB.	Promptly fixing customer problems
PROMISES.	Following through on promises
EASYRCH.	Being easy to reach

escalent

CUB/112
Jenks/21

Billing and Payment

Providing accurate bills and *Having bills that are easy to understand* both receive very high ratings, with 93% and 95% of all customers saying NW Natural does a good job in these areas.



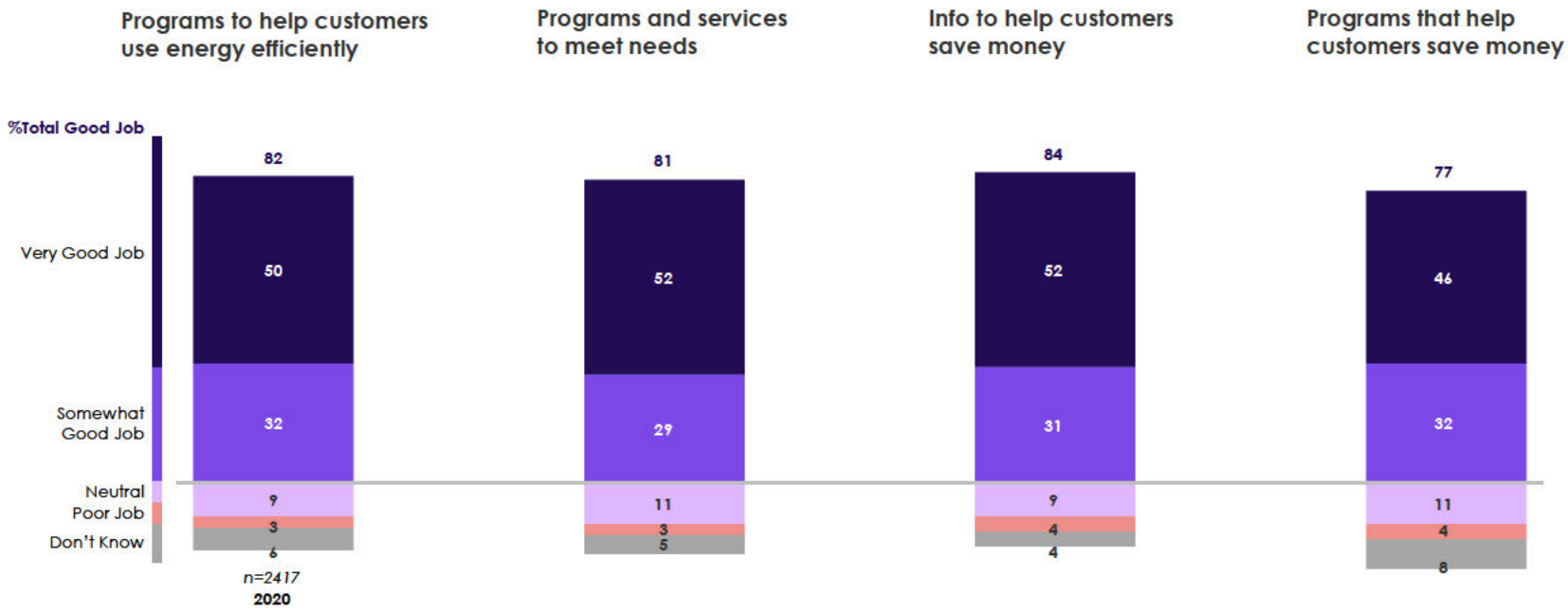
escalent

BILLACC. Providing accurate bills
BILLUND. Having bills that are easy to understand

CUB/112
Jenks/22

Energy Efficiency/Savings

Among the Energy Efficiency/Savings metrics, *Programs to help customers use energy efficiently*, *Programs and services to meet needs*, and *Info to help customers save money* see similarly positive ratings at 82%, 81%, and 84% (total good job), respectively. *Programs that help customers save money* is relatively lower in comparison to the other measures – however, this is likely driven by a lack of knowledge among customers as observed through the highest neutral (11%) and don't know (8%) ratings of all four measures. This suggests an opportunity to better educate customers of NW Natural's offerings in regards to saving money.

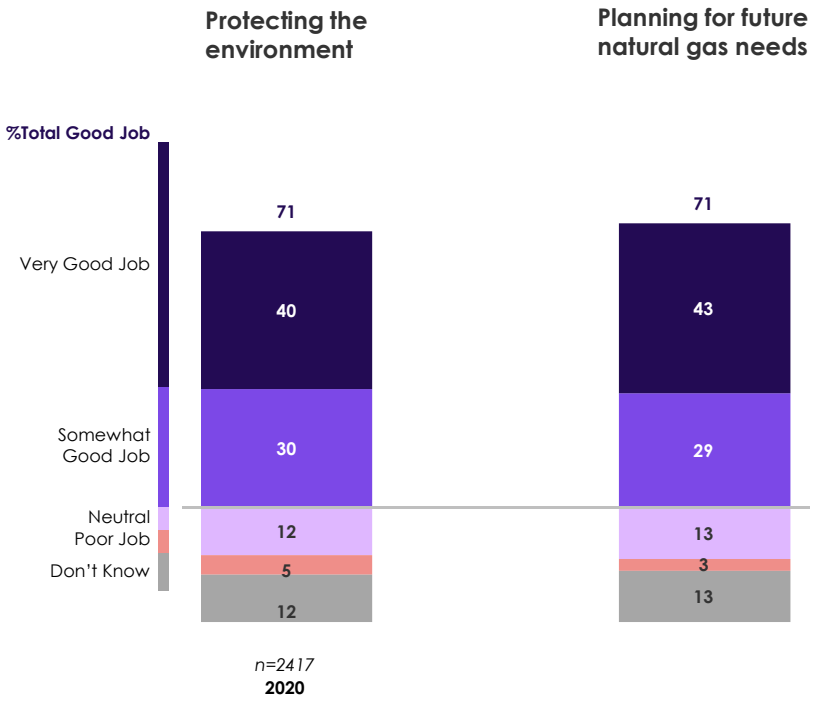


escalent

SAVENRGY. Having programs to help customers use energy more efficiently
NEEDSH. Offering programs and services to meet the needs of your household
CONTCOST. Providing information to help customers save money by using less energy
SAVEM. Having programs that help customers save money on their bills

Environment

Protecting the environment and *Planning for future natural gas needs* see seven out of ten (71%) customers feeling that NW Natural does a good job. The high neutral ratings (12% to 13%) and high don't know usage (12% to 13%) suggests room for improvement if NW Natural can better educate their customers on the environmental impact of natural gas while reassuring them that the company is focused on the future.

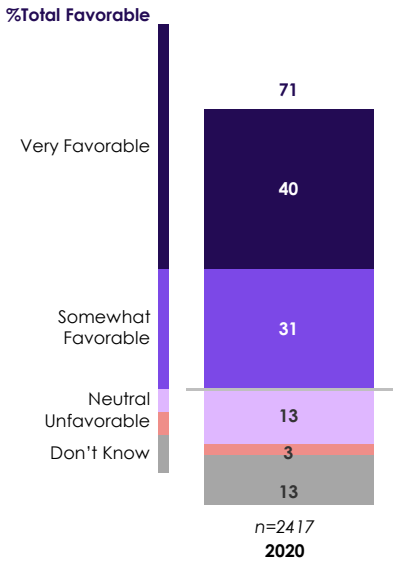


PROTENV. Protecting the environment
PLANFUT. Planning for future natural gas needs

Community Involvement

Similar to other Support Driver measures, *Being involved in local community activities* has very high neutral and don't know (13% each) usage which likely contributes to a lower total favorable rating at 71%. This suggests an increase of publicity around community involvement or an increase in frequency of community involvement could improve results.

Being involved in local community activities



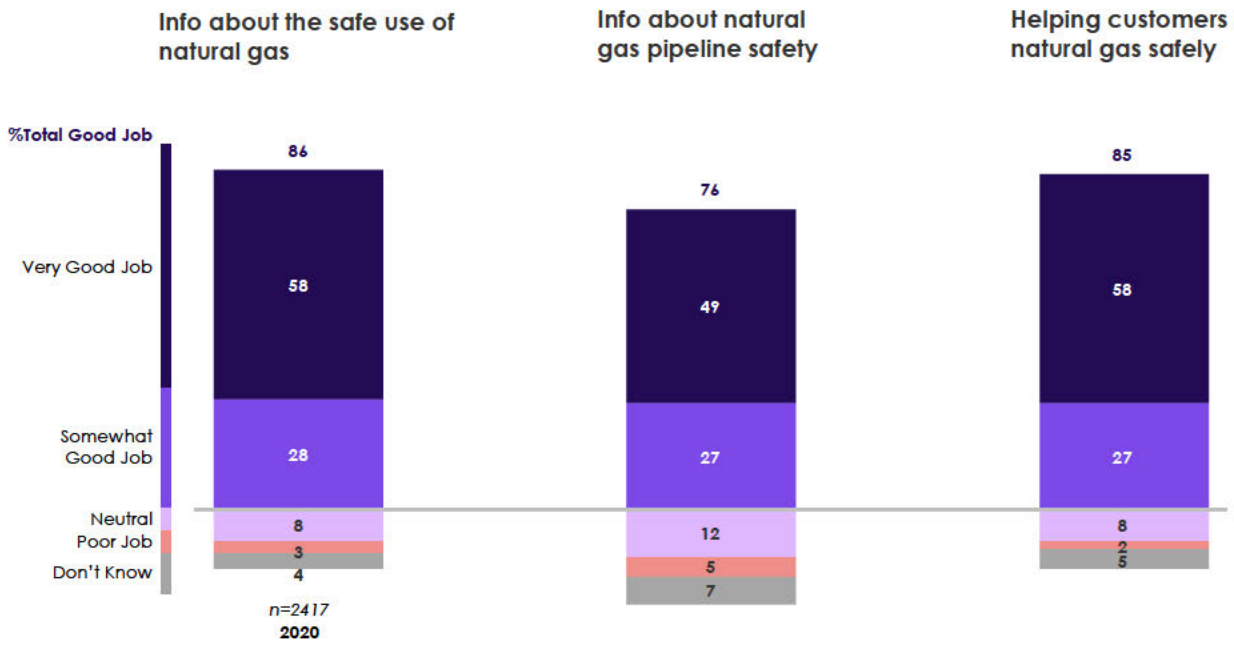
COMMINV. Regarding NW Natural's role in the community, how would you rate NW Natural on being involved in local community activities?

CUB/112
Jenks/25

Safety Information

Natural gas safety at the user level, measured through *Info about the safe use of natural gas* and *Helping customers use natural gas safely,* sees high ratings with customers indicating that NW Natural does a good job (86% and 85%, respectively).

However, knowledge of natural gas outside of the home through the metric *Info about natural gas pipeline safety* (at 76% total good job), suggests an opportunity to better educate the community and customers about the topic.

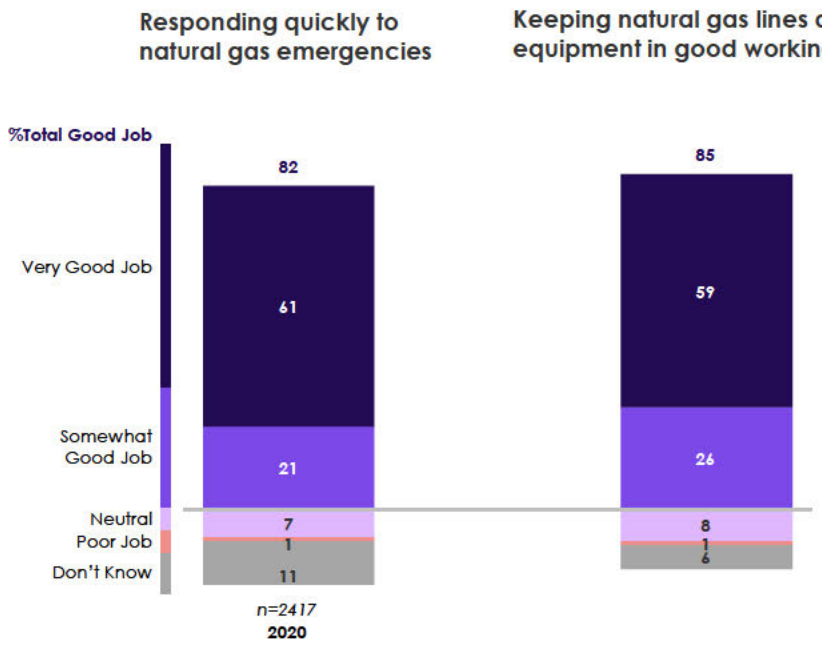


escalent

SAFEINF. Providing information about the safe use of natural gas
SAFEPIP. Providing information about natural gas pipeline safety
SAFEUSE. Helping customers use natural gas (energy) safely

Gas Safety

Responding quickly to natural gas emergencies and *Keeping natural gas lines and equipment in good working order* see more than eight out of ten customers indicate that NW Natural does a good job (82% and 85%, respectively). The high proportion of don't know (11%) usage for *Responding quickly to natural gas emergencies* likely reflects the lack of experience customers have with an emergency.



escalent

QUICKR. Responding quickly to natural gas emergencies
SYSMNT. Keeping the natural gas lines and equipment in good working order

Support Drivers

As with the Outcome Measures and Key Drivers, customers in Salem/Albany tend to provide the highest ratings across the Support Driver metrics in comparison to the other districts. Other districts generally have similar ratings across attributes (few significant differences), although customers in Eugene provide slightly lower ratings than customers in the other districts on *Responding quickly to natural gas emergencies.* This is due in part to a higher proportion of "don't know" responses, suggesting a lack of experience with gas emergencies.

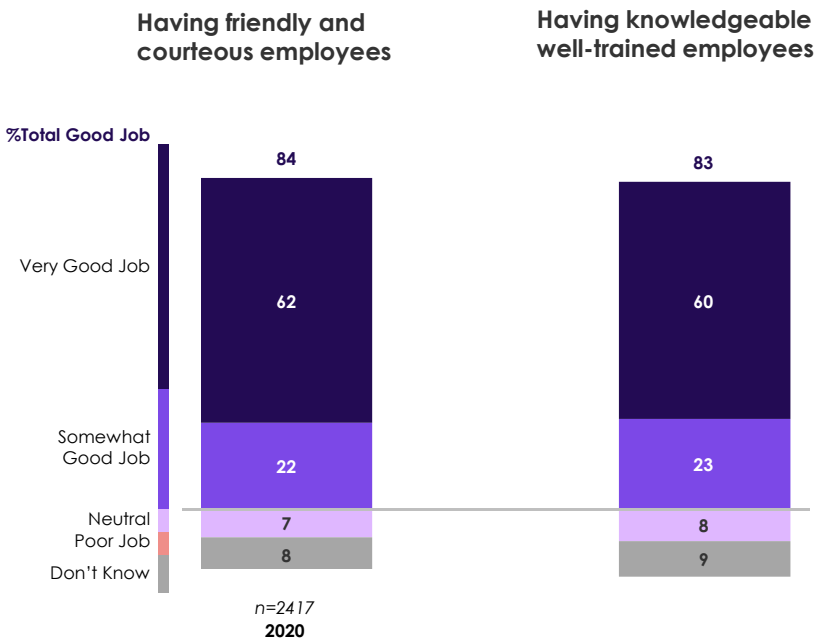
%Positive Ratings	Total 2020	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Support Drivers						
Customer Solutions						
Being flexible	79	79	81	78	77	80
Doing things right the first time	85	84	87	84	84	84
Promptly fixing customer problems	79	79	83	78	79	80
Following through on promises	78	78	83 ACD	76	76	80
Being easy to reach	86	86	88	87	87	87
Billing and Payment						
Providing accurate bills	93	92	95	94	93	93
Having bills that are easy to understand	95	95	96	95	95	96
Energy Efficiency/Savings						
Programs to help customers use energy efficiently	82	82	85 D	83	79	85
Programs and services to meet needs	81	81	84	83	79	82
Info to help customers save money	84	83	86	83	81	86
Programs that help customers save money	77	77	78	78	74	77
Environment						
Protecting the environment	71	71	75	69	71	71
Planning for future natural gas needs	71	71	74	71	71	68
Community Involvement						
Being involved in local community activities	71	72	73	73	71	67
Safety						
Info about the safe use of natural gas	86	86	89	86	87	86
Info about natural gas pipeline safety	76	75	79	78	78	73
Helping customers use natural gas safely	85	86	87	86	85	85
Gas Safety						
Responding quickly to natural gas emergencies	82	83 D	84 D	80	77	85 D
Keeping natural gas lines and equipment in good working order	85	84	88 C	82	87	89 AC
	n=2417	*962*	*428*	*276*	*326*	*255*

NW Natural Customer Satisfaction

Sub-Drivers

General Employee Characteristics

NW Natural employees are well received with over eight in ten customers feeling that they are *friendly and courteous* (84% total good job) and *knowledgeable and well-trained* (83% total good job). While both of these measures have high usage of neutral (7% to 8%) and don't know (8% to 9%) responses, less than one percent of customers feel that NW Natural employees do a poor job on either metric.

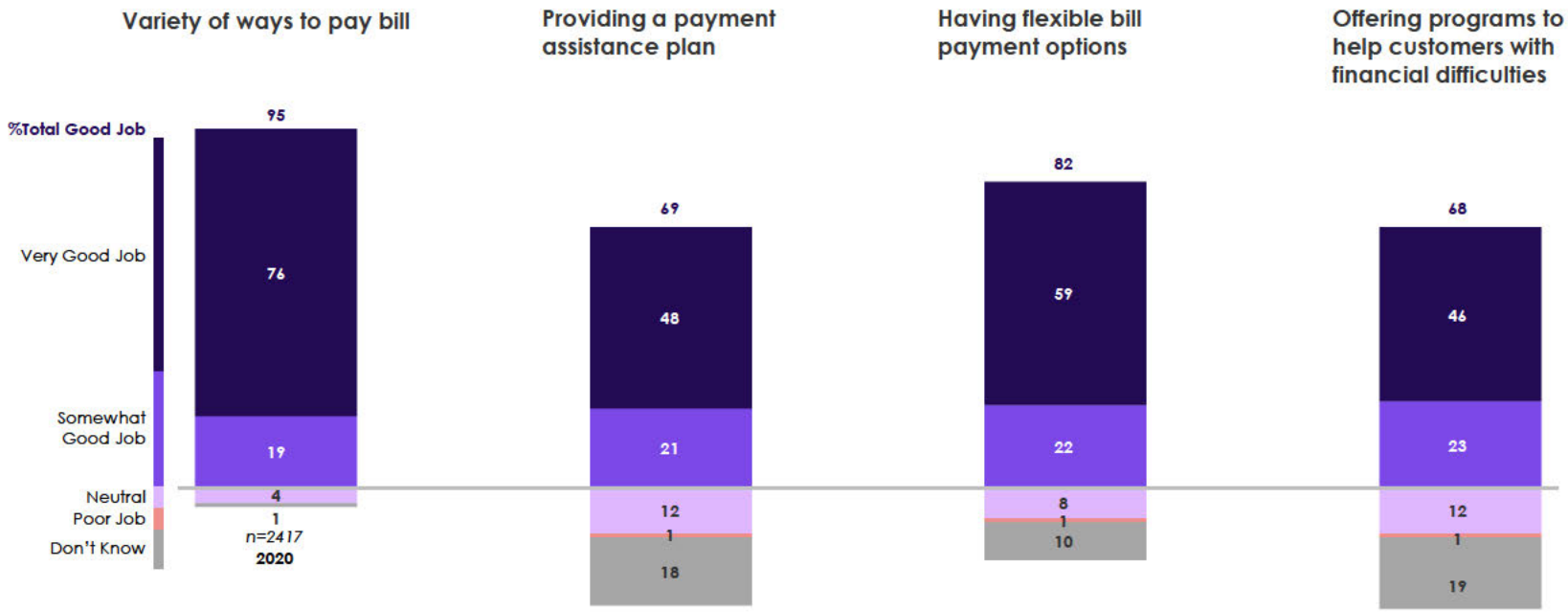


COURTEOU. Having friendly and courteous employees
KNOWLEDG. Having knowledgeable and well-trained employees

CUB/112
Jenks/30

Payment Assistance

Of the four Payment Assistance metrics, *Variety of ways to pay bill* performs the best (95% say NW Natural does a good job), followed by *Having flexible bill payments options* at 82%. The two remaining metrics, *Providing a payment assistance plan* and *Offering programs to help customers with financial difficulties* see just under seven in ten (69% and 68%, respectively) customers feeling that NW Natural does a good job. However, the lower ratings are likely driven by customers who haven't had difficulties in paying their bills, evidenced by the very high neutral (12% each) and don't know (18% to 19%) responses. As people continue to deal with financial hardships in 2020 and into 2021, it will be important for NW Natural to do their best to accommodate customers experiencing financial difficulties.



escalent

PAYVAR. Offering a variety of ways (channels) to pay your bill (mail, online, in person)
PAYAST. Providing a payment assistance plan to help manage bills
PAYFLX. Having flexible bill payment options
DIFPRG. Offering programs to help customers with financial difficulties

Sub-Drivers

Results by district are fairly similar across the Sub-Driver metrics, although scores are lowest among Coastal customers for *Providing a payment assistance plan* and *Offering programs to help customers with financial difficulties.* This is due in part to a larger proportion of "don't know" responses, suggesting Coastal customers may benefit from messaging around what NW Natural is doing in these areas.

%Positive Ratings	Total 2020	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Sub-Drivers						
General Employee Characteristics						
Having friendly and courteous employees	84	84	84	87	83	87
Having knowledgeable and well-trained employees	83	83	85	80	80	85
Payment Assistance						
Variety of ways to pay bill	95	95	95	95	95	97
Providing a payment assistance plan	69	69 E	70 E	68	66	62
Having flexible bill payment options	82	81 E	81 E	84 DE	77	75
Offering programs to help customers with financial difficulties	68	68	70	67	66	63
	n=2417	*962*	*428*	*276*	*326*	*255*

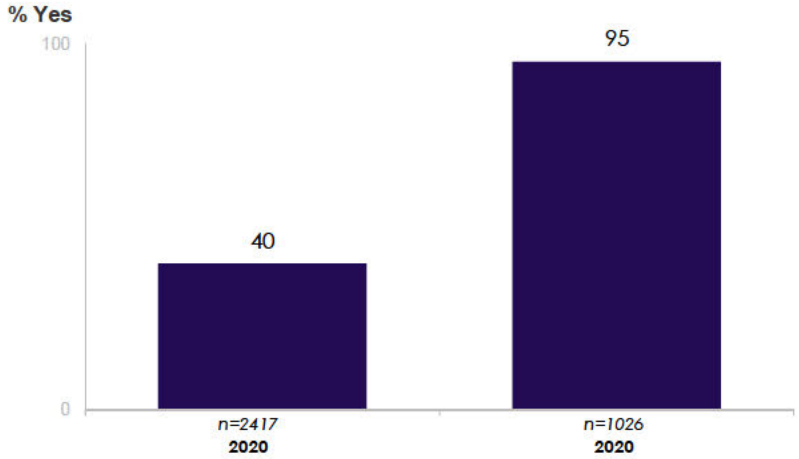
NW Natural Customer Satisfaction

Field Employees, Contact, and Website

NW Natural Field Employees

Two out of five (40%) NW Natural customers report having *observed or interacted with a field employee*. Coastal customers are significantly more likely than customers in Portland, Salem/Albany, Vancouver, and Eugene to recall *observing or interacting with a field employee* (see the following slide). Nearly all customers felt it was *easy to identify the employee* (95%) and provide total positive ratings (6-10) of 96% to 97% across the three employee attributes shown below.

Have you ever observed or interacted with a NW Natural Field Employee?



Was it easy to identify the person as a NW Natural or NW Natural contract employee?

(interacted with field employee; FLDINT=1)

Being respectful of customers' property

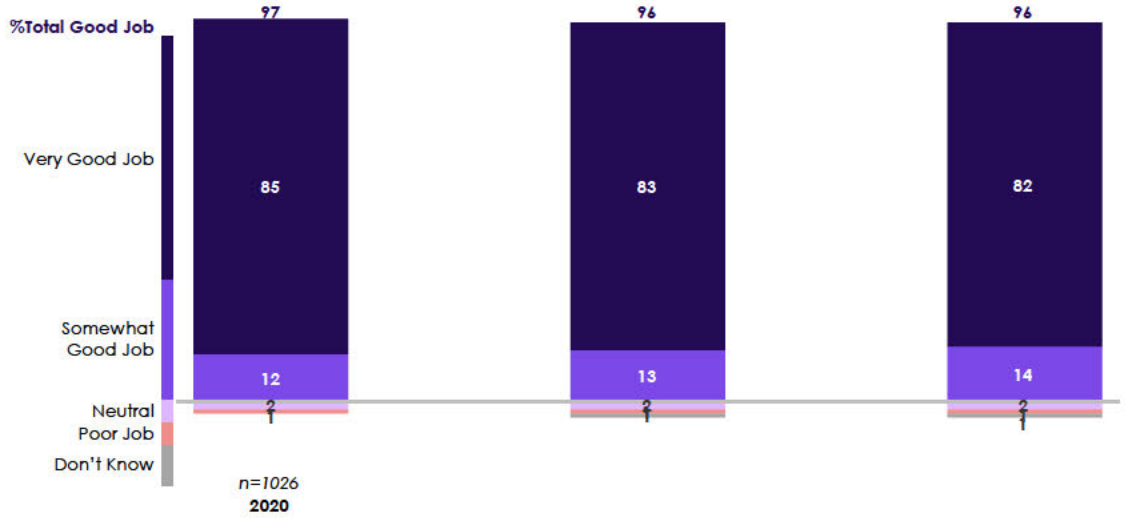
(interacted with field employee; FLDINT=1)

Being knowledgeable

(interacted with field employee; FLDINT=1)

Being willing to help when asked

(interacted with field employee; FLDINT=1)



FLDINT. Have you ever observed or interacted with a NW Natural Field Employee?
FLDIDENT. Was it easy to identify the person as a NW Natural or NW Natural contract employee?
RESPRP. Being respectful of customers' property
FKNOWL. Being knowledgeable
HELP. Being willing to help when asked

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NW Natural Field Employees by District

	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Interacted with NW Natural Field Employee (%yes)	41	42	36	43	51 ABCD
	n=962	*428*	*276*	*326*	*255*
Easy to Identify NW Natural Employee (%yes)	95	97	94	96	95
	n=398	*178*	*99*	*139*	*133*
Most recent interaction with NW Natural field employee…					
Being respectful of customers' property (%6-10)	97	99 CE	95	99 CE	95
Being knowledgeable (%6-10)	96	99 A	96	98	98
Being willing to help when asked (%6-10)	96	98	94	95	97
	n=398	*178*	*99*	*139*	*133*

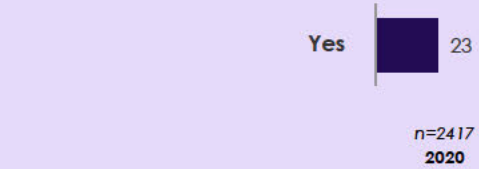
FLDINT. Have you ever observed or interacted with a NW Natural Field Employee?
FLDIDENT. Was it easy to identify the person as a NW Natural or NW Natural contract employee?
RESPRP. Being respectful of customers' property
FKNOWL. Being knowledgeable
HELP. Being willing to help when asked

CUB/112
Jenks/35

Contact with NW Natural Employees

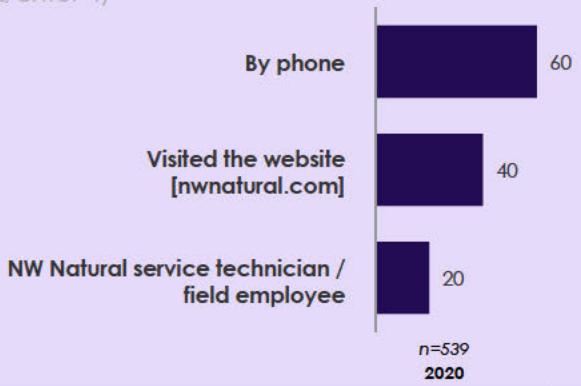
Nearly one in four (23%) NW Natural customers mention having made contact in the past six months, with Coastal and Eugene customers showing the highest contact rate compared to other districts (25% vs. 19% to 22%). A majority of customers made contact via phone (60%), followed by the website (40%), or an employee (20%). The vast majority of customers agree that it was *easy to handle their needs during the most recent interaction* (95%)

% Had contact with NW Natural in the past six months



	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
	22	21	19	25	25
	n=962	428	276	326	255

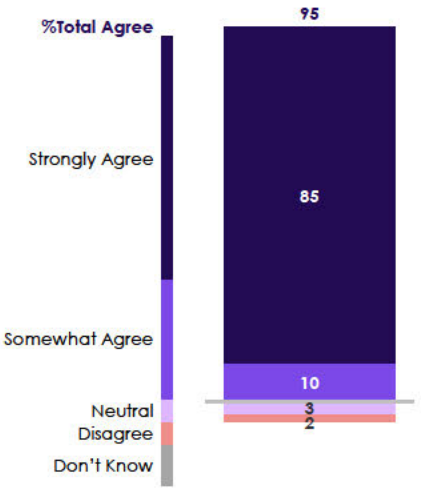
%How did you have contact with a NW Natural employee *(Contacted within the past six months; CNTCT=1)*



	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
By phone	57	56	62	70 A	61
Visited the website [nwnatural.com]	42	43	40	37	37
NW Natural service technician / field employee	22	22	13	16	28
	n=211	90	52	82	64

Easy for you to handle your needs during your most recent interaction

(Contacted within the past six months; CNTCT=1)



	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/ LC / COOS (E)
% Total Agree	95	93	100 D	90	95
	n=211	90	52	82	64

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CNTCT. Have you had contact with NW Natural via call center, website, or field employees within the past six months?
HOWCN. How did you have contact with a NW Natural employee?
HNDLINT. To what extent do you agree or disagree that NW Natural made it easy for you to handle your needs during your most recent interaction…?

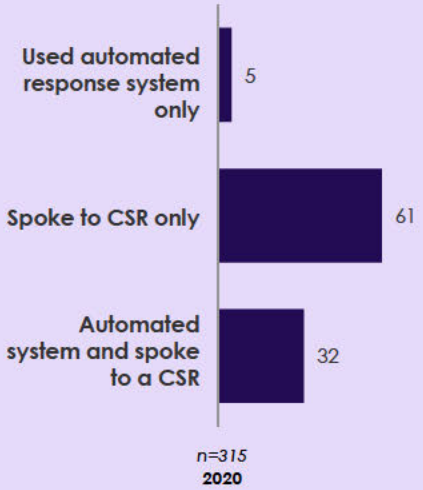
CUB/112
Jenks/36

Phone Contact with NW Natural

Among customers who most recently contacted by phone, a majority *spoke to a CSR only* (61%), followed by the *automated system and a CSR* (32%), or *the automated system only* (5%). Customers in Vancouver and Eugene were most likely to *speak to a CSR only* while customers in Portland and Salem/Albany were most likely to use a combination of the *automated system and a CSR*. Nearly all customers (96%) were *very satisfied* with their recent call.

%Most Recent Phone Contact Method

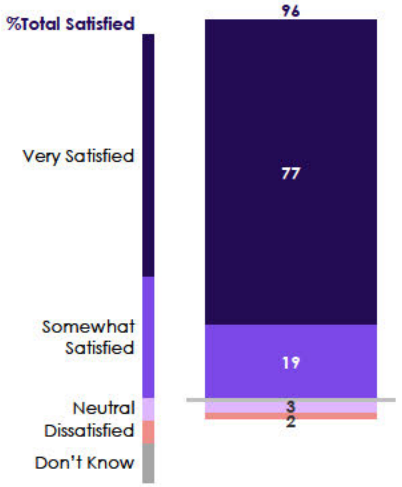
(among customers who most recently contacted via phone; HOWCN=1)



	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Used automated response system only	4	6	6	—	2
Spoke to CSR only	58	59	84 AB	82 AB	69
Automated system and spoke to a CSR	35 CD	34 CD	9	14	25
	n=120	51	32	57	39

Satisfaction with most recent call

(among customers who most recently contacted via phone; HOWCN=1)



	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/ LC / COOS (E)
% Total Satisfied	95	94	100	93	98
	n=120	51	32	57	39

escalent

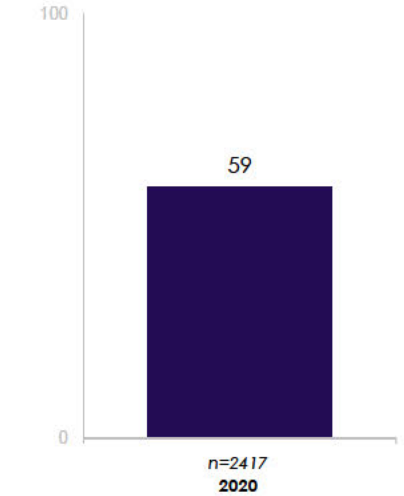
VRUUSE. When you called NW Natural this most recent time, did you use the automated telephone response system to answer your question, or did you speak to a customer service representative?
CALLHAND. How satisfied are you with NW Natural with regard to how your most recent call was handled?

CUB/112
Jenks/37

NW Natural Website Use

Over one-half (59%) of customers have *visited the website within the past six months* with Vancouver customers being the most likely visitors (see the following slide). Most customers are *satisfied with regard to their most recent visit* (96%) and majority feel it was *easy to navigate the website* (95%) and *easy to find their desired information without calling a CSR* (94%).

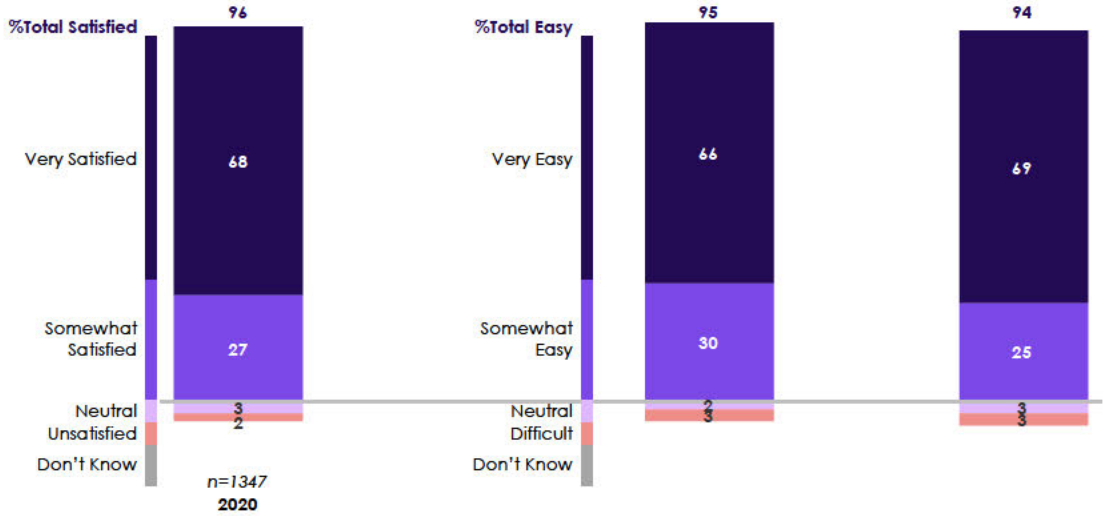
Have you visited the NW Natural website within the past six months?



Satisfaction with regard to most recent visit
(among customers who recently visited website; WEBVST=1)

Ease of navigation
(among customers who recently visited website; WEBVST=1)

Ability to find desired information without having to call a CSR
(among customers who recently visited website; WEBVST=1)



WEBVST. Have you visited the NW Natural website within the past six months?
WEBSAT. How satisfied are you with the NW Natural website with regard to your most recent visit?
EASENV. Ease of navigation
FINDINFO. Ability to find desired information without having to call a CSR

escalent

NW Natural Website Use by District

	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Visited NW Natural website within the past six months (%yes)	55	57	61	54	53
	n=962	*428*	*276*	*326*	*255*
Most recent website experience…					
Satisfaction with most website visit (%6-10)	96 D	95	96	91	94
Ease of navigating website (%6-10)	96 D	95	97 D	91	95
Ability to find desired info without having to call a CSR (%6-10)	94	94	96 D	90	92
	n=532	*246*	*169*	*176*	*135*

WEBVST. Have you visited the NW Natural website within the past six months?
WEBSAT. How satisfied are you with the NW Natural website with regard to your most recent visit?
EASENV. Ease of navigation
FINDINFO. Ability to find desired information without having to call a CSR

NW Natural Customer Satisfaction

News and Advertising

CUB/112
Jenks/40

NW Natural News Coverage

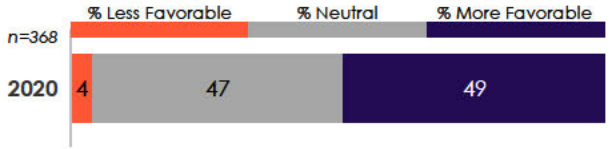
Only 14% of customers *recall news coverage about NW Natural in the past six months* with customers in Eugene being significantly more likely than each of the other districts (25% vs 11-15%, respectively) to recall news coverage. Nearly one-half (49%) of customers had a *more favorable opinion of NW Natural following the news coverage.*

14% of customers recall news coverage in the past six months

%What was read, seen, or heard in the news *(among customers who recall recent news coverage; NEWSCN=1)*

	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Rate information	10	10	7	7	7
Active in the community	6 D	5 D	21	—	2
Information/impacts of wildfires	5	13 D	—	4	20 AD
Environmental efforts/renewable energy	9	2	3	4	4
Responding to leaks/incidents	5	6	3	4	2
Coronavirus/COVID-19 response and impacts	6 D	2	3	—	4
Gas leaks/identifying and what to do	7	7	3	2	4
	n=137	60	29*	82	40

Opinion of NW Natural Following News Coverage
(among customers who recall recent news coverage; NEWSCN=1)



Opinion of NW Natural	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
More favorable	45	48	55	35	53
Neutral	50	52	45	52	43
Less favorable	4	—	—	11 B	4
	n=137	60	29*	82	40

escalent

NEWSCN. In the last 6 months, have you read, seen or heard any news coverage about NW Natural?
WHATN. What have you read, seen, or heard about NW Natural in the news in the last 6 months?
NEWSO. Thinking specifically about the news coverage over the last six months, has your opinion of NW Natural become more or less favorable?
*Base size less than 30, interpret results with caution.

CUB/112
Jenks/41

NW Natural Advertising

Over one in four (28%) customers *recall advertising from NW Natural in the past six months* with those in Vancouver (23%) showing the lowest recall rate compared to the other districts (30% to 36%). In general, customers are most likely to recall ads about *gas leaks* (11%). Around two in three (65%) customers have *no change in opinion following the ads,* with one-third having a more favorable opinion.

%Read, seen, or heard advertising

n=2417
2020

	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Recall advertising	31 C	30 C	23	36 C	33 C
	n=962	428	276	326	255

%What was read, seen, or heard from the ad

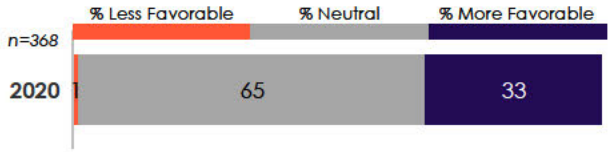
(among customers who recall recent ads; ADSCN=1)

n=745
2020

	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Gas leaks/identifying and what to do	12	10	16	8	9
Conservation/saving money on your bill	7 E	7	11 E	7	1
Safety messages [general]	6	6	6	10	13
Promoting natural gas/good service	5	5	8	8	8
	n=300	129	64	118	86

Opinion of NW Natural Following Ad

(among customers who recall recent news coverage; NEWSCN=1)



Opinion of NW Natural	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
More favorable	31	33	36	33	36
Neutral	67	67	64	62	59
Less favorable	1	1	—	4 A	3
	n=300	129	64	118	86

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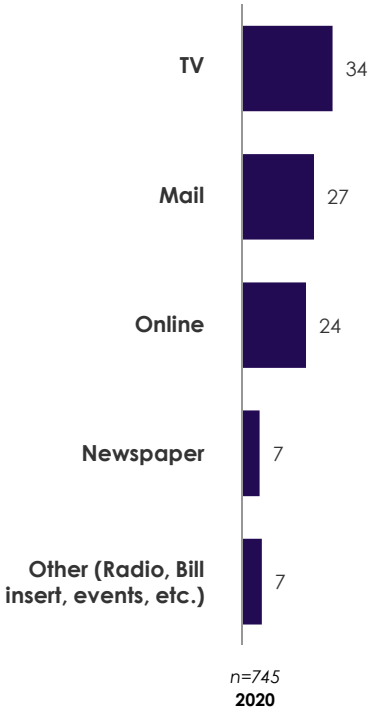
ADSCN. In the last 6 months, have you read, seen or heard any advertising from NW Natural?
WHATAD. What do you recall reading, seeing, or hearing from the NW Natural advertisements?
ADSO. Thinking specifically about the advertisements over the last six months, has your opinion of NW Natural become more or less favorable?

NW Natural Advertising (cont.)

Among customers who *recall advertisements in the past six months,* 34% saw the ad through TV, 27% read it through mail, and 24% read/saw it online. Coastal customers are significantly more likely than all other districts to recall seeing or reading the advertisement from the newspaper.

What was read, seen, or heard in the news

(among customers who recall recent ads; ADSCN=1)



	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
TV	36	39	38	27	34
Mail	24	28	25	34 A	29
Online	22	22	19	22	19
Newspaper	8	8	6	5	16 AD
Other (Radio, Bill insert, events, etc.)	7 E	4	9 E	9 E	1
	n=300	*129*	*64*	*118*	*86*

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HOWAD. Where did you most recently read, see, or hear of advertisements from NW Natural?

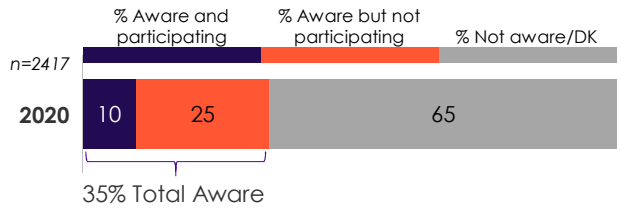
NW Natural Customer Satisfaction

Programs and ETO

NW Natural's Smart Energy Carbon Offset Program

About one out of three (35%) customers are aware of *NW Natural's Smart Energy Carbon Offset Program*. However, among all customers (including those unaware) only 10% mention that they are participating in the program.

Customers in Vancouver are significantly more likely than those in each of the other districts to be unaware of the program.



	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Total Aware	38 BC	32 C	18	37 C	41 BC
Aware and participating	13 BCE	7 C	2	10 C	8 C
Aware but not participating	25 C	25 C	16	27 C	33 ABC
Not aware/DK	62	68 AE	82 ABDE	63	59
	n=962	*428*	*276*	*326*	*255*

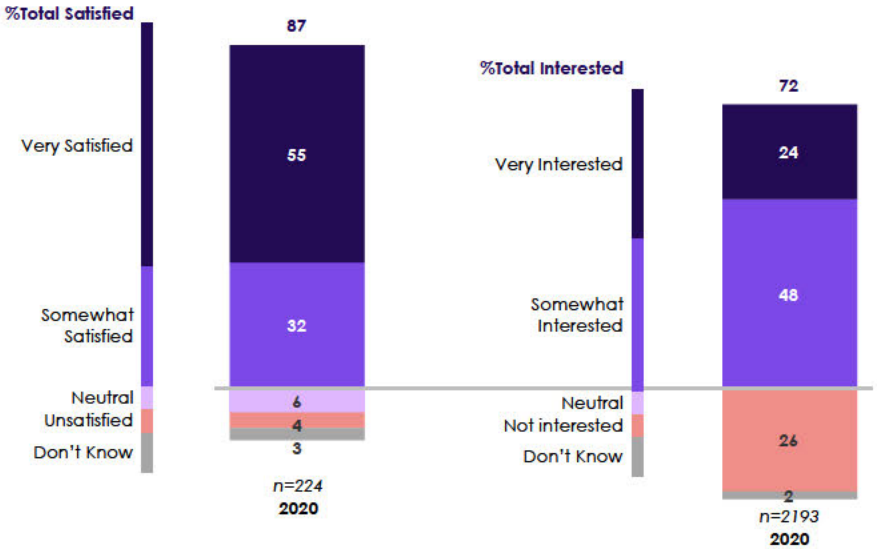
SECP_1. Prior to this survey, were you aware of NW Natural's Smart Energy Carbon Offset Program?
SECP_2. Do you currently participate in NW Natural's Smart Energy Carbon Offset Program?

CUB/112
Jenks/45

NW Natural's Smart Energy Carbon Offset Program (cont.)

Among customers who participate in *NW Natural's Smart Energy Carbon Offset Program,* total satisfaction (6-10 ratings) is high at 87% - however, with only 55% of participants indicating they are *very satisfied with the program,* this suggests there is some room for improvement. Customers who aren't aware of the program or do not participate have a relatively high *interest in participating in the program* at 72% with those in Portland showing the greatest interest at 74%.

Satisfaction with NW Natural's Smart Energy Carbon Offset program *(participates in Smart Energy Carbon Offset program; SECP_1=1)*



Interest in participating in the program in the future *(does not participate/unaware of program; SECP_1=2, DK OR SECP_2 NE 1)*

	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Satisfaction with NW Natura's Smart Energy Carbon Offset Program (%6-10)	89	79	–	88	93
	n=123	*30*	*6**	*32*	*20**
Interest in participating in the program in the future (%Total Interested)	74 BDE	68 E	69 E	66	60
	n=839	*398*	*270*	*294*	*235*

SECP_3. How satisfied are you with NW Natural's Smart Energy Carbon Offset Program?
SECP_4. Based on this description or what you already know about the Smart Energy Carbon Offset Program, how interested are you in participating in this program in the future?
*Base size less than 30, interpret results with caution.
**Base size less than 10, data cannot be displayed.

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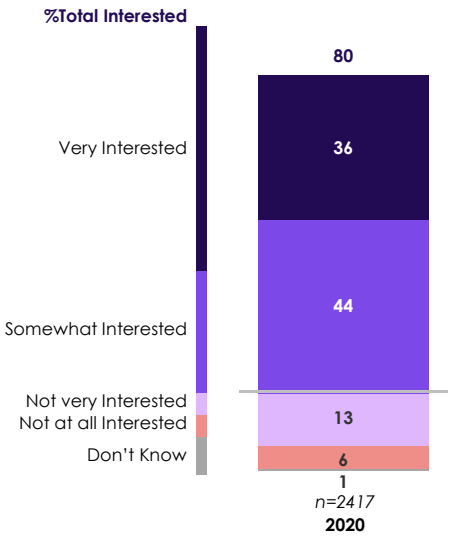
Renewable Natural Gas Program

With 80% of all customers interested, NW *Natural's Renewable Natural Gas Program* will likely resonate well across the customer base once introduced. Portland customers show the highest level of interest but interest is high in all districts.

Interest in participating in Renewable Natural Gas Program in the future



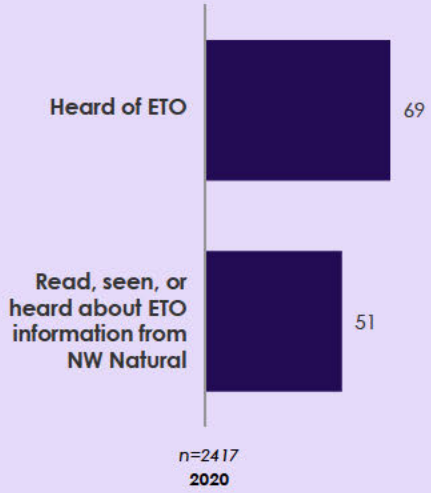
	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Total Interested	**81** BE	**76**	**77**	**79**	**73**
Very Interested	39 BCE	27	31	35 B	27
Somewhat Interested	43	50 A	46	44	45
Not very Interested	12	18 AD	14	12	16
Not at all Interested	5	6	8	7	11 AB
Total not Interested	**17**	**23 A**	**22**	**19**	**27 AD**
DK	2 B	0	1	2 B	0
	n=962	*428*	*276*	*326*	*255*

RNG_1. Based on this description or what you already know about the Renewable Natural Gas Program, how interested are you in participating in this program in the future?

Energy Trust of Oregon

Over two in three (69%) customers have *heard of the ETO* while one-half (51%) mention *reading/seeing/hearing about ETO information from NW Natural.* Customers in Portland and Salem/ Albany are much more likely than their counterparts in other districts to recall the ETO. Nine out of ten (90%) of customers are *satisfied with ETO information*.

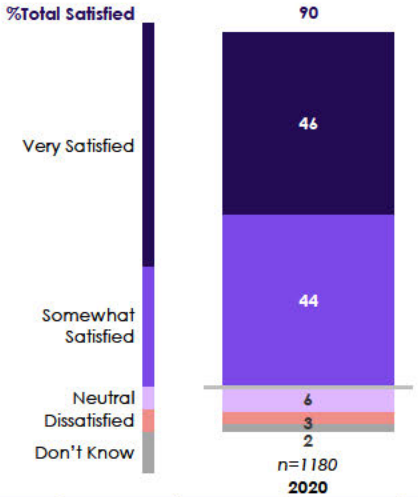
Energy Trust of Oregon



	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Heard of ETO	78 CDE	73 CDE	46	49	56 C
Read, seen, or heard about ETO information from NW Natural	59 CDE	55 CDE	30	36	42 C
	n=962	428	276	326	255

Satisfaction with ETO information

(among customers who are aware of ETO information; ETONWN=1)



	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/ LC / COOS (E)
% Total Satisfied	90	91	85	91	91
	n=563	233	84	117	107

ETOAWR. Have you heard of the Energy Trust of Oregon?
ETONWN. NW Natural also provides customers information and advice on how to use energy wisely, and can link customers to programs and incentives offered by the Energy Trust of Oregon (SHOW IF STATECODE=1: and the Oregon Department of Energy). Have you read, seen, or heard about this information?
ETOSAT. How satisfied are you with the information provided on energy efficiency incentives and programs offered by the Energy Trust of Oregon?

NW Natural Customer Satisfaction

Paired Comparison Exercise

Paired Comparison Exercise

For the next few questions, we would like to understand where NW Natural can focus its efforts to provide service in ways that are **most** important to you as a residential customer.

Here's how it will work:

- You'll see a series of 9 screens; each will include a pair of statements that describe two areas NW Natural could focus on to provide service.
- On each screen, you'll select the statement that you feel is most important to you as a customer.
- Even though both items you see on any one screen may be important (or unimportant) to you, please identify which one is most important to you as a customer.
- Some items will appear on more than one screen. However, each pair of items you will see will be a unique combination you will not have seen before.

Which of these issues is most important to you as a residential customer of NW Natural?

Takes action to address climate change

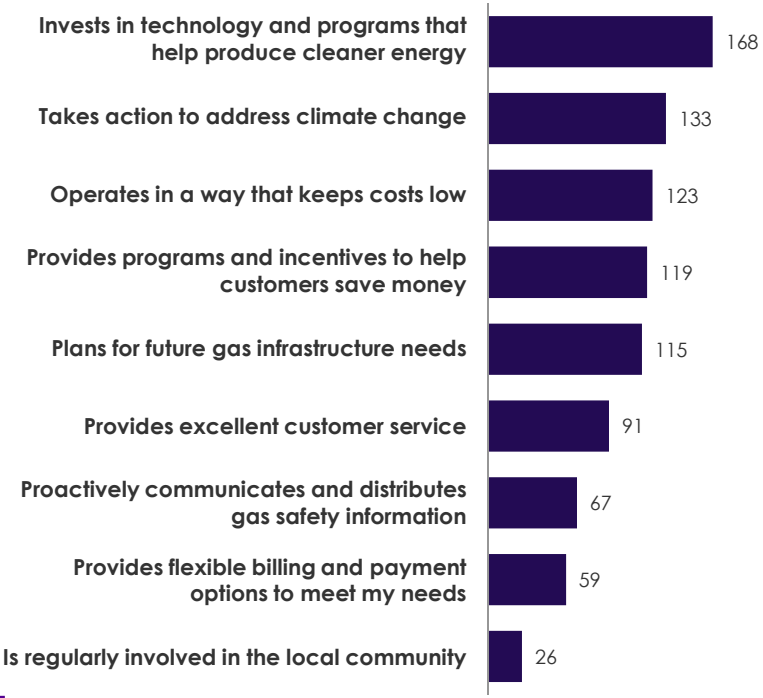
Provides programs and incentives to help customers save money

- A Paired Comparison exercise can be used to estimate the relative importance of various message and service offerings.
- Paired Comparison provides more robust discrimination than scaled ratings and presents respondents with a straightforward, engaging and respondent-friendly trade-off exercise.
- Paired Comparison can be used to estimate any dimension of interest—for example importance, appeal, or value.
- This technique requires that respondents make tradeoffs across statements. Unlike typical ratings, this method demands that some statements must be more preferred than others, while some statements must necessarily be forced to the bottom of the list.
- By having respondents make tradeoffs, a value is assigned for each statement for each respondent that indicates both the relative rank order and the strength of their preference. This allows for a clear ranking of description preference from high to low.
- The analysis of this data produces importances for each of the descriptions tested. Importances convey the relative importance of each statement, from most preferred to least preferred, and allow for a clear ranking of description preference.
- **Importances are indexed with an average of 100, so scores greater than 100 show higher than average importance and those less than 100 are lower than average.**

Paired Comparison Exercise

The two statements regarding clean energy and climate change were deemed the most important among customers; *Invests in technology and programs that help produce cleaner energy* (168) and *takes action to address climate change* (133). However, not far behind, the two statements which mentioned managing costs and helping customers save money were relatively high in importance compared to other statements; *operates in a way that keeps costs low* (123) and *provides programs and incentives to help customers save money* (119).

Most Important Issues to NW Natural Customers



	POR (A)	SAL/ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Invests in technology and programs that help produce cleaner energy	175 BCE	155	161	170 B	165 B
Takes action to address climate change	144 BCE	112	120	135 B	124
Operates in a way that keeps costs low	117	132 AD	131 A	123	130 A
Provides programs and incentives to help customers save money	115	125 AD	124 AD	117	122 A
Plans for future gas infrastructure needs	116	118	115	118	119
Provides excellent customer service	87	97 AD	97 A	91	93 A
Proactively communicates and distributes gas safety information	67	69	66	67	66
Provides flexible billing and payment options to meet my needs	54	65 ADE	60 D	52	57
Is regularly involved in the local community	25	26	25	27	23
	n=962	*428*	*276*	*326*	*255*

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PC1_ITEM. Which of these issues is most important to you as a residential customer of NW Natural?

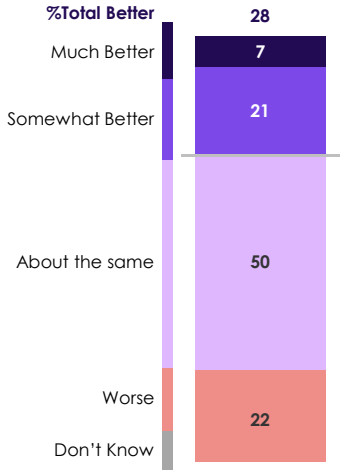
NW Natural Customer Satisfaction

Economic Outlook and Demographics

Economic Outlook

Even in the midst of a pandemic, the economic outlook across the districts serviced by NW Natural is generally positive with 78% of customers doing *better or the same financially compared to one year ago* and 54% *not at all concerned with paying household bills this year*. However, there is about one-fifth of customers that are experiencing some financial hardship at this time and/or concerned about paying HH bills and will need attention.

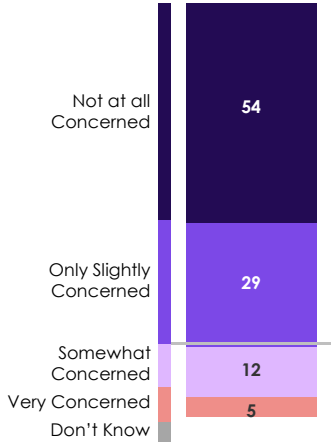
Current financial situation vs. one year ago



n=2417
2020

	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Total Better	25	28 E	32 AE	28 E	20
Much Better	6	8	11 A	7	6
Somewhat Better	19	19	21 E	21 E	14
About the Same	51	52	51	52	59 A
Worse	24 C	21	16	19	20
DK	0	—	—	0	1
	n=962	428	276	326	255

Concern with paying basic household bills this year



n=2417
2020

	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Not at all Concerned	55	51	62 ABD	50	55
Only Slightly Concerned	27	32	27	34 AE	25
Somewhat Concerned	13	11	9	11	14
Very Concerned	4	5 C	2	5	7 C
DK	0	—	—	0	—
	n=962	428	276	326	255

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ECON1. Do you consider the current financial situation in your household to be better than one year ago, about the same as a year ago, or worse than a year ago?
ECON2. How concerned would you say you are about paying basic household bills like your utility bills this year?

Demographics

	Total 2020	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Gender						
Male	45	41	42	42	38	43
Female	51	55	55	56	58	53
Employment						
Working full time	53	48 DE	44 E	54 BDE	40 E	27
Working part time	8	8 C	7	4	12 BCE	5
Retired	26	31	38 A	33	36	57 ABCD
Full-time student	1	1	1	0	1	—
Homemaker	4	4	4	4	5	3
Not employed, but looking for employment	4	4 B	1	3	2	2
Not employed and not looking for employment	1	1	2	0	1	2
Education						
H.S. or less	7	6	10 AD	7	4	9 D
Some college/voc./tech. school	24	22	29 A	25	23	32 AD
College grad or higher	67	71 BE	60	66 E	70 BE	57
Ethnicity						
White / Caucasian	76	80	81	80	84	83
Black or African American	3	1 D	1	3 BDE	—	—
Asian or Pacific Islander	6	6 BE	3	7 BE	4	2
American Indian or Alaskan Native	2	1	2	2	2	1
Hispanic or Latino	7	4	5 D	3	2	3
Middle Eastern	0	0	—	—	0	—
Mixed race [unspecified]	0	0	0	—	0	—
	n=2417	*962*	*428*	*276*	*326*	*255*

D1. Are you…?
D2. Are you currently…?
D3. Which of the following best describes your education?
D5. Is your racial or ethnic background…?
*Ratings may not add to 100% - "don't know" and "refused" responses not shown in the table above.

Demographics (cont.)

	Total 2020	POR (A)	SAL/ ALB (B)	VAN (C)	EUG (D)	AST/LC /COOS (E)
Income						
Less than $25,000	4	3 C	4 C	1	5 C	7 AC
$25,000 to $49,999	13	12	15 C	9	14	18 AC
$50,000 to $74,999	15	14	19 A	17	17	17
$75,000 to $99,999	16	17 E	16 E	15	17 E	9
$100,000 to $124,999	12	11	13	14 E	10	8
$125,000 to $149,999	7	8	5	8	6	7
$150,000 to $174,000	4	4	5	4	2	3
$175,000 to $199,000	2	3	2	3	4	2
$200,000 or more	7	8 B	5	9 B	5	5
Own or Rent Home						
Owner/buying	83	86	87	88	87	84
Renter	15	12	12	11	11	12
Home Type						
A single-family home	87	88	90	91	91	86
A duplex or triplex	3	2	3	1	2	2
An apartment in an apartment building or complex	3	2	1	1	2	4 BC
A condominium or townhome	6	7 BDE	3	7 BD	3	3
A manufactured or mobile home	0	0	1	—	1	4 ABCD
Some other type of home	1	1	1	—	1	0
	n=2417	*962*	*428*	*276*	*326*	*255*

D6. Was your 2019 total annual household income before taxes…?
D7. Do you own or rent your residence?
D8. Do you live in…?
*Ratings may not add to 100% - "don't know" and "refused" responses not shown in the table above.

CUB/113
Jenks/1

NW Natural Single-Family Home Natural Gas Price Premium

E190121

Online questionnaire
Version 1.9

2/19/2020

Chris Montaglione
Chris.Montaglione@marketstrategies.com
734.542.7736

escalent

<Project #>: <Project Name> (Online questionnaire)

Study objectives	• Quantify the home price premium associated with natural gas service and specific natural gas appliances and equipment versus non-gas homes relying on electricity, wood or other fuels for space heating, water heating, cooking, etc. • Understand perceptions of and preferences for different heating fuels, and the importance of energy efficiency among single-family home buyers when considering a home purchase
Qualified respondent	• Homeowners: Head or co-head of household with individual or shared responsibility for home purchase decision, and has recently purchased or definitely plans to soon purchase a single-family home in NW Natural's service area • Renters: Renters who definitely plan to purchase a single-family detached home within the next two years in NW Natural's service area; head or co-head of household with individual or shared responsibility for home purchase decision
Sample size goal	N=500
Survey length	15 minutes (estimated)
Sample source	Online Panels
Quotas	• TBD n=<###>

FONT COLOR KEY

If responses in orange are selected, the respondent will be terminated
Items in bold and blue are notes and instructions to the survey programmer
Text in black is what the respondent will see onscreen

CONTENTS

Redirect smartphone survey takers

Ask if respondent is taking the survey on a smartphone (MOB_HIST=1, 3)

WARNING. **Show if this is respondent's initial attempt at taking the survey (MOB_HIST=1):** It appears that you're taking this survey on a smartphone. Because there are elements in the survey that are incompatible with smartphones, please do the survey on a tablet (such as an iPad or Kindle Fire) or on a desktop/laptop computer instead.

Show if this is respondent's subsequent attempt at taking the survey, though s/he started on a larger device (MOB_HIST=3): Although you started taking this survey on a computer or tablet, we noticed you've since switched to a smartphone. Because there are elements in the survey that are incompatible with smartphones, please do the survey on a tablet (such as an iPad or Kindle Fire) or on a desktop/laptop computer instead.

For now, please close your browser. Once you've switched over to a tablet or a desktop/laptop computer, click on the survey link in your invitation once again to take part.

_____break_____

Opening screen

Thank you for choosing to take this important survey about energy use and preferences in your home. It should take less than 15 minutes to complete.

Your participation in this survey is anonymous and voluntary. Your individual answers will remain confidential and reported only in the aggregate. Click here to view our Privacy Policy.

Do not use the Back or Forward arrows on your browser to move through the survey. Please do so using only the arrows at the bottom of your screen.

Click on or tap the "Next" arrow when you are ready to begin your survey.

_____break_____

Screening questions

Ask all

S1. What is your age?
(Enter your response as a whole number in the box below.)

Accept responses between 0 & 99

Age (in years): [ ]

REF Prefer not to say

Terminate if respondent is under 18 (S1=0–17)

_____break_____

Ask if respondent refused age (S1=REF)

S2. Are you…?
(Select one. We need this information to determine what questions you will answer.)

1 Younger than 18
2 18–24
3 25–34
4 35–44
5 45–54
6 55–64
7 65 or older
REF Prefer not to say

_____break_____

Ask all

If fewer than 5 digits, display error message: PLEASE REVIEW THE ZIP CODE YOU ENTERED. YOUR ZIP CODE SHOULD HAVE 5 DIGITS.

S3. The next few questions are about the home you currently live in. If you have more than one home, please provide responses for your primary place of residence.

Please enter your home's five digit ZIP code in the box below.

Accept responses between 00000 & 99999

ZIP code: [ ]

REF Prefer not to say

Terminate if respondent did not enter a ZIP code included in client list of NW Natural service territory ZIP codes

_____break_____

Ask all

S4. Do you own or rent your home?

1 Own or buying
2 Rent or lease
REF Prefer not to say

_____break_____

Ask renters (S4=2)

S5. Have you ever been directly involved in the process of selecting and purchasing a single-family detached home as your primary place of residence?

1 Yes
2 No
REF Prefer not to say

_____break_____

Ask homeowners (S4=1)

S6. What was your role, if any, in the process of selecting and purchasing your current home?

1 I was the sole decision-maker
2 I shared responsibility for the decision
3 I had some input but was not directly involved in the decision
4 I was not involved in the decision at all
REF Prefer not to say

_____break_____

Ask all

S7. Which of the following best describes your current home?

1 A single family detached house (on a separate lot, not connected to other living units)
2 A duplex or triplex
3 A unit in an apartment building
4 A unit in a condominium
5 A rowhouse or townhouse (with adjacent walls to another residence, but no units above or below)
6 A mobile home or house trailer
7 Another type of residence; describe here: [OTHER: S]
REF Prefer not to say

_____break_____

Ask homeowners (S4=1)

S8. In what year did you purchase your current home?
(Your best guess is fine.)

1 Before 2000
2 2001 – 2005
3 2006
4 2007
5 2008
6 2009
7 2010
8 2011
9 2012
10 2013
11 2014
12 2015
13 2016
14 2017
15 2018
16 2019
17 2020
REF Prefer not to say

_____break_____

Ask homeowners (S4=1)

S9N. Please indicate the category that contains the approximate value of your current home?
(Your best guess is fine.)

1 Less than $100,000
2 $100,000 to less than $150,000
3 $150,000 to less than $200,000
4 $200,000 to less than $250,000
5 $250,000 to less than $300,000
6 $300,000 to less than $350,000
7 $350,000 to less than $400,000
8 $400,000 to less than $450,000
9 $450,000 to less than $500,000
10 $500,000 to less than $600,000
11 $600,000 to less than $700,000
12 $700,000 to less than $800,000

13 $800,000 to less than $900,000
14 $900,000 to less than $1,000,000
15 $1,000,000 to less than $1,250,000
16 $1,250,000 to less than $1,500,000
17 $1,500,000 to less than $1,750,000
18 $1,750,000 to less than $2,000,000
19 $2,000,000 or more
REF Prefer not to say

break

This is a hidden variable not seen by respondents

RECENT. Recent single-family homebuyer.

1 **Set if recent homebuyer ((S6=1 OR 2) AND S7=1 AND (S8=11-17) AND (S9N=4-19)):** Recent single-family homebuyer
2 **Set if not a recent homebuyer (S4=2 OR (S6=3-4 OR REF) OR S7 NE 1 OR (S8=1-10 OR REF) OR (S9N=1-3 OR REF)):** Not a recent single-family homebuyer

break

Ask all

S10. How likely are you to buy a single-family detached home in Oregon or Washington as your primary place of residence within the next two years? (A single-family detached home is a home built on its own lot, and not connected to other living units.)
Will you…?

Flip codes

1 Definitely not buy a single-family home within the next two years
2 Probably not, or
3 Probably
4 Definitely
REF Prefer not to say

_____break_____

Ask if R "definitely" plans to buy a SFH within two years (S10=4)

S11. In what year do you expect to buy a single-family home…?
(Your best guess is fine.)

1 2020
2 2021
3 2022 or later
REF Prefer not to say **(Terminate REF only if R is a 'renter' or 'not a recent SFH buyer' (S4=2 OR RECENT=2).)**

_____break_____

Ask if R "definitely" plans to buy a SFH in 2020 or 2021 (S11=1 OR 2)

S12. Currently, where are you in the process of selecting and buying a home?

1 Just thinking about it / have not begun actively looking at homes
2 Actively looking for a home
3 Have made one or more offers on a home
REF Prefer not to say

_____break_____

Ask if R "definitely" plans to buy a SFH in 2020 or 2021 (S11=1 OR 2)

S12A. What will your role be, if any, in the process of selecting and purchasing your future home?

1 I will be the sole decision-maker
2 I will share responsibility for the decision
3 I will have some input but will not be directly involved in the decision
4 I will not be involved in the decision at all
REF Prefer not to say

_____break_____

Ask if R "definitely" plans to buy a SFH in 2020 or 2021 (S11=1 OR 2)

S13N. Please indicate the category that contains the most likely price range for your next single-family home purchase (as your primary place of residence)?
(Your best guess is fine.)

1 Less than $100,000
2 $100,000 to less than $150,000
3 $150,000 to less than $200,000
4 $200,000 to less than $250,000
5 $250,000 to less than $300,000
6 $300,000 to less than $350,000

7 $350,000 to less than $400,000
8 $400,000 to less than $450,000
9 $450,000 to less than $500,000
10 $500,000 to less than $600,000
11 $600,000 to less than $700,000
12 $700,000 to less than $800,000
13 $800,000 to less than $900,000
14 $900,000 to less than $1,000,000
15 $1,000,000 to less than $1,250,000
16 $1,250,000 to less than $1,500,000
17 $1,500,000 to less than $1,750,000
18 $1,750,000 to less than $2,000,000
19 $2,000,000 or more
REF Prefer not to say

_____break_____

This is a hidden variable not seen by respondents

FUTURE. Future single-family homebuyer.

1 **Set if future homebuyer ((S10=4) AND (S11=1 OR S11=2) AND (S12=2-3) AND (S12A=1-2) AND (S13N=4-19)):** Definitely plan to purchase a qualifying single-family detached home in the next two years
2 **Set if not a future homebuyer ((S10=1-3 OR REF) OR (S11=3 OR REF) OR (S12=1 OR REF) OR (S12A=3-4 OR REF) OR (S13N=1-3 OR REF)):** Do not definitely plan to purchase a qualifying single-family detached home in the next few years

_____break_____

This is a hidden variable not seen by respondents

TERM. Set to terminate if R hasn't recently purchased a single-family home and doesn't plan to.

1 **Set if a recent or future home buyer (RECENT=1 OR FUTURE=1):** Will purchase a qualifying single-family home or have recently
2 **Set if not a recent and future homebuyer (RECENT=2 AND FUTURE=2):** Will not purchase a qualifying single-family home and have not recently

_____break_____

Current home characteristics (among single-family homeowners who have recently purchased their home)

Ask homeowners (S4=1)

Q1. The next few questions are about your current home (primary residence).

How many bedrooms does your home have?

1 Studio (no separate bedroom)
2 1 bedroom
3 2 bedrooms
4 3 bedrooms
5 4 or more bedrooms

_____break_____

Ask homeowners (S4=1)

Q2. How many bathrooms does your home have?
(A "½ bath" denotes a bathroom with a sink and toilet, but no bath or shower.)

1	1
2	1 ½
3	2
4	2 ½
5	3
6	More than 3

_____break_____

Ask homeowners (S4=1)

Q3. Please indicate the approximate square footage of your home?
(Your best guess is fine.)

Exclude space in any of the following from your response:
- an unheated garage
- an attic
- an unfinished basement

1 Less than 1000 square feet
2 1000 to less than 1500 square feet
3 1500 to less than 2000 square feet
4 2000 to less than 2500 square feet
5 2500 to less than 3000 square feet
6 3000 to less than 3500 square feet
7 3500 to less than 4000 square feet
8 4000 to less than 5000 square feet
9 5000 square feet or more

break

Ask homeowners (S4=1)

Q4. In what year was your current home built?
(Your best guess is fine.)

1 Before 1970
2 1970–1979
3 1980–1989
4 1990–1999
5 2000–2009
6 2010
7 2011
8 2012
9 2013
10 2014
11 2015
12 2016
13 2017
14 2018
15 2019
16 2020
DK Don’t know

break

Ask homeowners (S4=1)

Q4A. Was your home a new construction or did your home have a previous owner before you purchased it?

1 New construction
2 Existing home with previous owner
DK Don’t know

break

Ask homeowners who purchased new construction (Q4A=1)

Q4B. How important was it to purchase a home that was newly constructed?

Flip codes

1 Not at all important
2 Not very important
3 Somewhat important
4 Very important
5 Extremely important – I would not buy a home that wasn't a new construction
REF Prefer not to say

break

Ask homeowners (S4=1)

Q5. Does your current home have natural gas service?

1 Yes
2 No
DK Don't know

break

Ask homeowners who do not have natural gas service at home (S4=1 AND Q5=2)

Q6. Is natural gas service available to neighboring homes in your immediate area? (Do one or more nearby homes have natural gas service?)

1 Yes
2 No
DK Don't know

break

Ask homeowners (S4=1)

Q7. What is the main cooling system for your home?

1 Central air conditioner
2 Window air conditioner(s)
3 Portable air conditioner(s)
4 Heat pump with cooling
5 Ductless heat pump with cooling
6 Ceiling or portable fans
7 Another type of cooling system; describe here: [OTHER: M]
8 Not applicable—there is no cooling system in my home
DK Don't know

break

Ask homeowners (S4=1)

Q8. What fuel is used for the main heating system in your home?

1 **Show if R's home has natural gas service (Q5=1)** Natural gas
2 Electricity
3 Wood
4 Propane
5 Another type of fuel; describe here: [OTHER: M]
DK Don't know

break

Ask homeowners (S4=1)

Q9. Which best describes the type of main heating system used in your home?

1 Electric base boards
2 Electric wall heaters
3 Electric forced air furnace
4 Electric radiant (in floors or walls)
5 Electric heat pump
6 Electric ductless heat pump
7 **Show if R's home has natural gas service (Q5=1)** Natural gas forced air furnace
8 **Show if R's home has natural gas service (Q5=1)** Natural gas radiant (hydronic)
9 **Show if R's home has natural gas service (Q5=1)** Natural gas heat-rated fireplace (provides zonal heat)
10 Some other heating system; describe here: [OTHER: M]
DK Don't know

break

Ask homeowners and if "fireplace" not indicated in Q9 (S4=1 AND Q9 NE 9)

Q10. Does your home have a…?
(Select all that apply.)

1 **Show if R's home has natural gas service (Q5=1)** Natural gas fireplace
2 Wood-burning fireplace
3 Electric fireplace
DK Don't know
NA My home has no fireplace

break

Ask homeowners (S4=1)

Q11. Is your home's main water heater a…?

1 **Show if R's home has natural gas service (Q5=1)** Natural gas tank water heater
2 **Show if R's home has natural gas service (Q5=1)** Natural gas tankless water heater
3 Electric tank water heater
4 Electric tankless water heater
5 Heat pump water heater
6 Another type; describe here: [OTHER: M]
DK Don't know

break

Ask homeowners with natural gas service (S4=1 AND Q5=1)

Q12. Is your cooktop or stove heated by…?

1 Natural gas
2 Electric
3 Propane
5 Dual fuel – natural gas and electric
4 Another type of fuel; describe here: [OTHER: M]
DK Don't know

break

Ask homeowners with natural gas service (S4=1 AND Q5=1)

Q13. What type of clothes dryer do you have…?

1 Natural gas
2 Electric
DK Don't know

break

Ask homeowners (S4=1)

Q14. Does your home have…?

1 An outdoor barbecue grill
2 A fully-equipped outdoor kitchen
DK Don't know
NA My home doesn't have an outdoor barbecue grill or fully-equipped outdoor kitchen

break

Ask of those with an outdoor grill or kitchen (Q14=1-2)

Q15. Is your outdoor cooking fueled primarily by…?

1 **Show if R's home has natural gas service (Q5=1)** Natural gas
2 Propane
3 Charcoal/wood
4 Electric
5 Another type of fuel; describe here: [OTHER: M]
DK Don't know

break

Ask homeowners (S4=1)

Q16. Do any of the <u>outdoor</u> areas of your home have…?

1 **Show if R's home has natural gas service (Q5=1)** An outdoor space heater, fireplace or fire pit fueled by natural gas
2 A propane outdoor space heater, fireplace or fire pit
3 An electric outdoor space heater or fireplace
4 No outdoor heating
DK Don't know

break

Ask homeowners (S4=1)

Q17A. Does your home have…?
(Select all that apply.)

1 A swimming pool
2 A spa / hot tub
3 **Exclusive:** My home doesn't have a swimming pool, spa, or hot tub
DK Don't know

break

Ask homeowners (S4=1)

SOLAR1. Does your home have a solar power generation system, with solar panels mounted on your roof or elsewhere on your property to generate electricity for your home?

1 Yes
2 No
DK Don't know

break

Ask homeowners (S4=1)

EV1. Does your home have an electric vehicle charging system?
(Select all that apply.)

1 Yes, Level One (120v – standard electric outlet)
2 Yes, Level Two (240v - large 3-prong outlet such as for an electric clothes dryer)
3 Yes, separate panel for an Electric Vehicle
4 **Exclusive:** My home doesn't have a charging system specific to electric vehicles
DK Don't know

break

Desired home characteristics (among those who plan to purchase a single-family home in the next two years)

Ask if R "definitely" plans to buy a SFH in 2020 or 2021 and is actively looking (FUTURE=1)

Q18. The next few questions are about the desired characteristics of the single-family detached home you are planning to purchase within the next two years.

How many bedrooms would you like to have in your next home?
(Your best guess is fine.)

1 Studio (no separate bedroom)
2 1 bedroom
3 2 bedrooms
4 3 bedrooms
5 4 or more bedrooms

break

Ask if R "definitely" plans to buy a SFH in 2020 or 2021 and is actively looking (FUTURE=1)

Q19. How many bathrooms would you like to have in your next home?
(A "½ bath" denotes a bathroom with a sink and toilet, but no bath or shower.)
(Your best guess is fine.)

1 1
2 1 ½
3 2
4 2 ½
5 3
6 More than 3

break

Ask if R "definitely" plans to buy a SFH in 2020 or 2021 and is actively looking (FUTURE=1)

Q20. What is the approximate square footage you would like to have for your next home? *(Your best guess is fine.)*

Exclude space in any of the following from your response:
- an unheated garage
- an attic
- an unfinished basement

1 Less than 1000 square feet
2 1000 to less than 1500 square feet
3 1500 to less than 2000 square feet
4 2000 to less than 2500 square feet
5 2500 to less than 3000 square feet
6 3000 to less than 3500 square feet
7 3500 to less than 4000 square feet
8 4000 to less than 5000 square feet
9 5000 square feet or more

_____break_____

Ask if R "definitely" plans to buy a SFH in 2020 or 2021 and is actively looking (FUTURE=1)

Q4C. How important is it that your next home be a new construction?

Flip codes
1 Not at all important
2 Not very important
3 Somewhat important
4 Very important
5 Extremely important – I would not buy a home that was not new construction
REF Prefer not to say

_____break_____

Move-ins for DCM

Ask if R is a recent single-family home purchaser that does not plan to purchase another home in the next two years (RECENT=1 AND FUTURE=2)

This is a hidden variable not seen by respondents

S9A. S9 midpoint for a recent single-family home purchaser that does not plan to purchase another home in the next two years.

1 **Set if s9n=4:** $225,000
2 **Set if s9n=5:** $275,000
3 **Set if s9n=6:** $325,000
4 **Set if s9n=7:** $375,000
5 **Set if s9n=8:** $425,000
6 **Set if s9n=9:** $475,000
7 **Set if s9n=10:** $550,000
8 **Set if s9n=11:** $650,000
9 **Set if s9n=12:** $750,000
10 **Set if s9n=13:** $850,000
11 **Set if s9n=14:** $950,000
12 **Set if s9n=15:** $1,125,000
13 **Set if s9n=16:** $1,375,000
14 **Set if s9n=17:** $1,625,000
15 **Set if s9n=18:** $1,875,000
16 **Set if s9n=19:** $2,000,000

_____break_____

Ask if R is "definitely" planning to purchase a single-family home in the next two years (FUTURE=1)

This is a hidden variable not seen by respondents

S13B. S13 midpoint for R who is "definitely" planning to purchase a single-family home in the next two years.

1 **Set if s13n=4:** $225,000
2 **Set if s13n=5:** $275,000
3 **Set if s13n=6:** $325,000
4 **Set if s13n=7:** $375,000
5 **Set if s13n=8:** $425,000
6 **Set if s13n=9:** $475,000
7 **Set if s13n=10:** $550,000
8 **Set if s13n=11:** $650,000
9 **Set if s13n=12:** $750,000
10 **Set if s13n=13:** $850,000
11 **Set if s13n=14:** $950,000
12 **Set if s13n=15:** $1,125,000
13 **Set if s13n=16:** $1,375,000
14 **Set if s13n=17:** $1,625,000
15 **Set if s13n=18:** $1,875,000
16 **Set if s13n=19:** $2,000,000

_____break_____

Ask if R is a recent single-family home purchaser that does not plan to purchase another home in the next two years (RECENT=1 AND FUTURE=2)

This is a hidden variable not seen by respondents

Q3A. Q3 midpoint for a recent single-family home purchaser that does not plan to purchase another home in the next two years.

1 **Set if Q3=1:** 1,000 square feet
2 **Set if Q3=2:** 1,250 square feet
3 **Set if Q3=3:** 1,750 square feet
4 **Set if Q3=4:** 2,250 square feet
5 **Set if Q3=5:** 2,750 square feet
6 **Set if Q3=6:** 3,250 square feet
7 **Set if Q3=7:** 3,750 square feet
8 **Set if Q3=8:** 4,250 square feet
9 **Set if Q3=9:** 5,000 square feet

_____break_____

Ask if R is "definitely" planning to purchase a single-family home in the next two years (FUTURE=1)

This is a hidden variable not seen by respondents

Q20A. Q20 midpoint for R who is "definitely" planning to purchase a single-family home in the next two years.

1 **Set if Q20=1:** 1,000 square feet
2 **Set if Q20=2:** 1,250 square feet
3 **Set if Q20=3:** 1,750 square feet
4 **Set if Q20=4:** 2,250 square feet
5 **Set if Q20=5:** 2,750 square feet
6 **Set if Q20=6:** 3,250 square feet
7 **Set if Q20=7:** 3,750 square feet
8 **Set if Q20=8:** 4,250 square feet
9 **Set if Q20=9:** 5,000 square feet

_____break_____

Discrete Choice Exercise

In this next part of the survey, we want to understand the choices you would make in the process of selecting a home to purchase in your area.

Here's how this section will work:

- Assume you are looking for a single-family home to buy, and that you plan to make your decision today.
- You'll see a series of 9 scenario screens. Each will show a pair of options you can choose from.
- On each screen, you will select the home you'd realistically choose based on the information provided to you.
- Although each of the offerings may be similar, the features will change from screen to screen, so be sure to review each of the offerings on each screen carefully before you make your choice.

- Unless otherwise indicated, please assume each of the homes you'll be choosing from are in the same location and have comparable features and amenities beyond those specifically listed in each scenario.

break

PROGRAMMER NOTE:
If the respondent is a recent single-family home purchaser that does not plan to purchase another home in the next two years (RECENT=1 AND FUTURE=2), we will use the value indicated in S9A (midpoint of home value range), Q1 (# of bedrooms), Q2 (# of bathrooms), and Q3A (midpoint of square footage range) to set the size and price parameters for their DCM choice scenario (next page).

If the respondent is "definitely" planning to purchase a single-family home in the next two years (FUTURE=1), we will use the value indicated in S13B (midpoint of price range), Q18 (# of bedrooms), Q19 (# of bathrooms), and Q20A (midpoint of square footage range) to set the size and price parameters for their DCM choice scenario (next page).

For each screen, your task is to indicate which of 2 homes you would choose. Here is an example of what each screen will look like.

EXAMPLE CHOICE EXERCISE	Home A 4 BR / 2 BA 2000 square feet	HOME B 4 BR / 2 BA 2000 square feet
Natural Gas Service	Natural gas service provided	No natural gas to the home
Space Heating	Natural gas furnace	Electric furnace
Cooling	Central air conditioning	Central air conditioning
Fireplace	Natural gas fireplace	Wood-burning fireplace
Water Heating	Natural gas tank water heater	Electric tank water heater
Stove / Cooktop	Natural gas stove	Electric stove
Clothes Dryer Connection	Natural gas	Electric (240v)
Outdoor Natural Gas Connections for Cooking and Heating	Outdoor natural gas connections for an outdoor kitchen (including a cooktop or grill and outdoor heating)	No outdoor natural gas connections
Home Price	$412,000	$400,000
CHOOSE ONE	⊙	○

break

Ask all

SHOW THIS TEXT AT THE TOP OF THE SCREEN SHOWING THE 1ST SCENARIO R SEES

Here's the first "screen" we want you to evaluate.

If you had to choose between these 2 homes today, which would you pick?

_____break_____

Ask all

SHOW THIS TEXT AT THE TOP OF THE SCREEN SHOWING THE 2ND SCENARIO R SEES

This is a different screen. Treat this as an entirely new decision.

If you had to choose between these 2 homes today, which would you pick?

_____break_____

Ask all

SHOW THIS TEXT AT THE TOP OF THE SCREEN SHOWING THE 3RD & SUBSEQUENT SCENARIOS R SEES

If you had to choose between these 2 homes today, which would you pick?

_____break_____

When this text appears subsequently...	Set up to display this text when moused over:
Electric heat pump (with cooling)	An **electric heat pump** can both heat and cool your home. It can provide heating by drawing thermal energy from outside air and soil, and cooling by drawing the thermal heat out of your home. 
Electric ductless heat pump	An **electric ductless heat pump** (also called a minisplit system) is a zonal heating and cooling system that does not require the use of air ducts. The system includes a single outdoor unit comprised of a compressor and condenser and one or more indoor, wallmounted units containing individual coils within air handlers. Cooled or heated air is then blown into the room by a fan located in the evaporator unit. One outdoor unit can be linked to one or more indoor units, usually mounted high on a wall near the ceiling.

	 
Electric induction cooktop	An **electric induction cooktop** heats a cooking vessel by magnetic induction, instead of by thermal conduction from a flame, or an electrical heating element. For nearly all models of induction cooktops, a cooking vessel must be made of, or contain, a ferromagnetic metal such as cast iron or some stainless steels. Induction cooking can be quickly turned off. 
Outdoor kitchen	A fully-equipped **outdoor kitchen** can include a cooktop, built in barbecue grill, sink, refrigerator, cabinetry and more. 

Discrete Choice Exercise Features and Levels (respondents will not see this):

Features	Levels (options)
Natural Gas Service	Natural gas service provided
	No natural gas to the home
Space Heating	Natural gas furnace
	Electric furnace
	Electric heat pump
	Electric base-board heating
	Electric ductless heat pump
Cooling	Central air conditioning
	Electric heat pump with cooling
	Electric ductless heat pump with cooling
	No air conditioning
Fireplace	Natural gas fireplace
	Wood-burning fireplace
	No fireplace
Water Heating	Natural gas tank water heater
	Natural gas tankless water heater
	Electric tank water heater
	Electric heat pump water heater
Stove/Cooktop	Natural gas cooktop
	Electric cooktop
	Electric induction cooktop
Clothes Dryer Connection	Natural gas
	Electric
Outdoor Connections for Cooking and Heating	Outdoor natural gas connections for an outdoor kitchen (including gas outlets for cooktop/grill, fire pit and outdoor heating connections)
	Outdoor natural gas connection for a barbecue grill
	No outdoor natural gas connections
Home Price	Test a range of prices (TBD) around a baseline price based on the current stated value of the respondent's current home (or price range for home they plan to purchase).

DCM setup (single choice scenarios)

Disable the previous button here

Ask all

DCM1_START. Time stamp for time DCM exercise started.

[OPEN END: S]

_____break_____

Ask all

Assign on a least-filled basis

DCM1_VER. DCM version assigned.

1 Version 1
2 Version 2
3 Version 3
4 Version 4
5 Version 5
6 Version 6
7 Version 7
8 Version 8
9 Version 9
10 Version 10

_____break_____

Ask all

x=1 to 9

SEEN1_[X]. Card seen.

[RECORD NUMBER 1–90]

{SET (SEEN1_[X])}

_____break_____

Ask all

LOOP through DCM1_[X] once for each task the respondent will evaluate (in SEEN_[X] order)

Include text in the upper right corner of each screen for DCM1_1–DCM1_[X] that indicates how far along a respondent is with regard to the task: Screen 4 of 8

DCM1_[X]. What choice did the respondent make in this task?

1 Home A chosen in the task (that is, the top row feature block in the design file)
2 Home B

_____break_____

Ask all

DCM1_STOP. Time stamp for time DCM exercise ended.

[OPEN END: S]

_____break_____

Ask all

DCM1_TIME. Elapsed time spent on DCM exercise (in seconds).

[OPEN END: S]

_____break_____

Re-enable the previous button here

Additional single-family home preferences – natural gas service and amenities

Ask all

Q21. Now thinking about your ideal home, the next few questions are about your preferences for a single-family home that would be your primary place of residence in Oregon or Washington.

If you were looking for a single-family home to be your primary place of residence, how important would it be for it to have natural gas service, assuming it was available in your area?

Flip codes

1 Not at all important
2 Not very important
3 Somewhat important
4 Very important
5 Extremely important – I would not buy a home without natural gas service
REF Prefer not to say

break

Ask if R provided a response in Q21 (Q21=1-5)

Q21OE. What are the main reasons it would be **(restore response from Q21)** to have natural gas service in your home?
(Enter your response in the box below. Please be as specific as possible.)

break

RANDOMIZE CODES 1-2

Q22. What type of heating would you most prefer to have in your home?

1 Natural gas
2 Electric
3 Another type of heating; describe here: [OTHER: M]
4 No preference
REF Prefer not to say

break

Ask if R provided a response in Q22 (Q22=1-3)

Q22OE. What are the main reasons you would most prefer to have **(restore response from Q22)** heating in your home?
(Enter your response in the box below. Be as specific as possible.)

break

Ask all

RANDOMIZE CODES 1-3

Q23. What type of water heating would you most prefer to have in your home?

1 Natural gas
2 Electric
3 Propane
4 No preference
REF Prefer not to say

_____break_____

Ask all

RANDOMIZE CODES 1-3,5

Q24. What type of cooktop or stove would you most prefer to have in your home?

1 Natural gas
2 Electric
3 Propane
5 Dual fuel – natural gas and electric
4 No preference
REF Prefer not to say

_____break_____

Ask all

RANDOMIZE CODES 1-3

Q25. What type of fireplace would you prefer to have in a new home?

1 Natural gas
2 Electric
3 Wood burning
4 No preference
5 I would prefer NOT to have a fireplace
REF Prefer not to say

_____break_____

Ask all

RANDOMIZE CODES 1-2

Q26. What type of clothes dryer would you most prefer to have in your home?

1 Natural gas
2 Electric
3 No preference
REF Prefer not to say

_____break_____

Ask all

Q27. If selecting a home to purchase, how important would it be for your home to have a natural gas connection outside for outdoor cooking (for a barbecue grill or outdoor kitchen)?

Flip codes

1 Not at all important
2 Not very important
3 Somewhat important
4 Very important
5 Extremely important – I would not buy a home without outdoor natural gas connections for outdoor cooking
REF Prefer not to say

break

Ask all

Q28. How important would it be for your home to have natural gas connections outside for outdoor heating (outdoor space heater(s), fireplace, or fire pit)?

Flip codes

1 Not at all important
2 Not very important
3 Somewhat important
4 Very important
5 Extremely important – I would not buy a home without an outdoor natural gas connection for outdoor heating
REF Prefer not to say

break

Ask all

Q29. How important would it be for your home to have an outdoor kitchen?

Flip codes

1 Not at all important
2 Not very important
3 Somewhat important
4 Very important
5 Extremely important – I would not buy a home without an outdoor kitchen
REF Prefer not to say

break

Ask all

Q31. How important would it be for your home to have a solar power generation system, with solar panels mounted on your roof or elsewhere on your property to generate electricity for your home?

Flip codes

1 Not at all important
2 Not very important
3 Somewhat important
4 Very important
5 Extremely important – I would not buy a home without solar panels
REF Prefer not to say

break

Ask all

Q32. How important would it be for your home to have an Electric Vehicle (EV) charging station?

Flip codes

1 Not at all important
2 Not very important
3 Somewhat important
4 Very important
5 Extremely important – I would not buy a home without an EV charging station
REF Prefer not to say

_____break_____

Ask all

Q33. How important would it be for your home to have EnergyStar Windows?

Flip codes

1 Not at all important
2 Not very important
3 Somewhat important
4 Very important
5 Extremely important – I would not buy a home that didn't have EnergyStar Windows
REF Prefer not to say

_____break_____

Ask if R's current home does not have natural gas service or if R is a renter (Q5=2/DK OR S4=2)

Q30. Have you previously had natural gas service at a prior home or residence?

1 Yes
2 No
DK Don't know

_____break_____

Gas Safety/Environment

Ask all

Thinking about energy safety, how would you rate the following energy sources?
(For each energy source below, select the response that best describes its safety.)

Not at all safe		Neither safe nor unsafe		Very safe
1	2	3	4	5

DK Not sure

Randomize

Q34_1. Natural gas
Q34_2. Electricity

break

Ask all

Q35. Which of the following do you consider the cleaner source of energy?

Randomize

1 Natural gas
2 Electric power
DK Not sure

break

Ask all

Q36. Do you believe natural gas plays a positive or negative role in addressing climate change?

1 Positive role
2 Negative role
3 No opinion/Don't know

break

Ask all

Q37. Now, thinking about natural gas and the environment, how would you rate NW Natural on **protecting the environment**?
(Select the response that best describes how you feel.)

Very poor job	Somewhat poor job	Neither good nor poor	Somewhat good job	Very good job
1	2	3	4	5

DK Don't know
NA Not applicable

break

Demographics

Ask all

D1. Are you…?

1 Male
2 Female
REF Prefer not to say

break

Ask all

D2. Are you currently…?

1 Working full time
2 Working part time
3 Retired
4 A full-time student
5 Homemaker
6 Not employed, but looking for employment
7 Not employed and not looking for employment
REF Prefer not to answer

break

Ask all

D3. Which of the following best describes your education?

1 Some high school
2 High school graduate
3 Some college/vocation/technical school
4 College graduate
5 Graduate school or beyond
REF Prefer not to answer

break

Ask all

D4. Including yourself, how many adults live in your household?
(Enter your response as a whole number in the box below. Your best guess is fine.)

Accept responses between 1 & 10

[ ]

REF Prefer not to say

break

Ask all

D5. How many children under the age of 18 live in your household?
(Enter your response as a whole number in the box below. Your best guess is fine.)

Accept responses between 0 & 10

[ ]

REF Prefer not to say

break

Ask all

D6. Are you of Latino or Hispanic descent – for example Mexican, Puerto Rican, Cuban, or some other Hispanic background?

1 Yes, Latino/Hispanic
2 No, not Latino/Hispanic
DK Not sure
REF Prefer not to answer

_____break_____

Ask if respondent is not of Latino/Hispanic background (D6=2,DK)

D7. Is your racial or ethnic background…?

1 Caucasian
2 African American
3 Asian
4 Native American
5 Multiple racial or ethnic backgrounds
DK Not sure
REF Prefer not to answer

_____break_____

Ask all

D8. Was your 2019 total annual household income before taxes…?

1 Less than $25,000
2 $25,000 to $49,999
3 $50,000 to $74,999
4 $75,000 to $99,999
5 $100,000 to $149,999
6 $150,000 to $199,999
7 $200,000 or more
DK Not sure
REF Prefer not to answer

_____break_____

Survey close

Those are all the questions we have for you today. Thank you very much for your participation in this research study.

_____break_____

APPENDICES

Exceptions

No previous arrow
Force responses to all open-end questions

Track these variables

RECENT
FUTURE

Front end sample move-ins

Ask all

SAMPLE. Sample source.

1 Research Now
2 Federated Sample
3 Branded Research
4 ROI Rocket
5 Critical Mix

_____break_____

Variables to be created based on survey responses

Ask all

Place after S2

AGE. R age.

1 **Set if (S1=18–24 OR S2=2):** 18-24
2 **Set if (S1=25–34 OR S2=3):** 25-34
3 **Set if (S1=35–44 OR S2=4):** 35-44
4 **Set if (S1=45–54 OR S2=5):** 45-54
5 **Set if (S1=55–64 OR S2=6):** 55-64
7 **Set if (S1=65+ OR S2=7):** 65+

_____break_____

Ask all

Place after S3

CTY. R city.

1 **Set if (S3=97086, 97201, 97202, 97203, 97204, 97205, 97206, 97207, 97208, 97209, 97210, 97211, 97212, 97213, 97214, 97215, 97216, 97217, 97218, 97219, 97220, 97221, 97222, 97223, 97224, 97225, 97227, 97228, 97229, 97230, 97231, 97232, 97233, 97236, 97238, 97239, 97240, 97242, 97250, 97251, 97252, 97253,**

97254, 97256, 97258, 97266, 97267, 97268, 97269, 97280, 97281, 97282, 97283, 97286, 97290, 97291, 97292, 97293, 97294, 97296, 97298): Portland Metro

2 **Set if (S3=97301, 97302, 97303, 97304, 97305, 97306, 97307, 97308, 97309, 97310, 97311, 97312, 97314, 97317):** Salem

3 **Set if (S3=97401, 97402, 97403, 97404, 97405, 97408, 97412, 97440, 97455):** Eugene

4 **Set if (S3=98660, 98661, 98662, 98663, 98664, 98665, 98666, 98668, 98682, 98683, 98684, 98685, 98686, 98687):** Vancouver

5 **Set if (S3=else):** Other

_____break_____

CUB/114
Jenks/1

2021 TV Commercials and Renewable Gas Test

NW Natural Customer Insight Panel Study

May 2021

Shift + Numbers

Please watch the following video in full before answering the following questions:

Sorry

This video does not exist.

In your words, how would you summarize the main message of this video?

CUB/114
Jenks/3

Please tell us your reaction to the video:

	Extremely good	Moderately good	Slightly good	Neither good nor bad	Slightly bad	Moderately bad	Extremely bad
Credible	○	○	○	○	○	○	○
Relevant	○	○	○	○	○	○	○
Memorable	○	○	○	○	○	○	○
Overall	○	○	○	○	○	○	○

What did you like or dislike about the video?

Please watch the following video in full before answering the following questions:

Sorry

This video does not exist.

In your words, how would you summarize the main message of this video?

Please tell us your reaction to the video:

Extremely good	Moderately good	Slightly good	Neither good nor bad	Slightly bad	Moderately bad	Extremely bad

	Extremely good	Moderately good	Slightly good	Neither good nor bad	Slightly bad	Moderately bad	Extremely bad
Credible	○	○	○	○	○	○	○
Memorable	○	○	○	○	○	○	○
Relevant	○	○	○	○	○	○	○
Overall	○	○	○	○	○	○	○

What did you like or dislike about the video?

Now that you have watched two NW Natural videos, which one do you prefer? You could watch the videos again below if needed.

- ○ Shift
- ○ Big Numbers

Shift:

Sorry

This video does not exist.

Big Numbers:

Sorry

This video does not exist.

Dream Big

Please watch the following video in full before answering the following questions:

Sorry

This video does not exist.

In your words, how would you summarize the main message of this video?

Please tell us your reaction to the video:

Neither
good

	Extremely good	Moderately good	Slightly good	Neither good nor bad	Slightly bad	Moderately bad	Extremely bad
Memorable	○	○	○	○	○	○	○
Relevant	○	○	○	○	○	○	○
Credible	○	○	○	○	○	○	○
Overall	○	○	○	○	○	○	○

What did you like or dislike about the video?

Please watch the following video in full before answering the following questions:

Behind_It_All.mp4
from NW Natural

00:30

In your words, how would you summarize the main message of this video?

Please tell us your reaction to the video:

Extremely good	Moderately good	Slightly good	Neither good nor bad	Slightly bad	Moderately bad	Extremely bad

	Extremely good	Moderately good	Slightly good	Neither good nor bad	Slightly bad	Moderately bad	Extremely bad
Memorable	○	○	○	○	○	○	○
Relevant	○	○	○	○	○	○	○
Credible	○	○	○	○	○	○	○
Overall	○	○	○	○	○	○	○

What did you like or dislike about the video?

Now that you have watched two NW Natural videos, which one do you prefer? You could watch the videos again below if needed.

- ○ Dream Home
- ○ Behind it All

Dream Home:

CUB/114
Jenks/11

Sorry

This video does not exist.

Behind it All:

Behind_It_All.mp4
from **NW Natural**

00:30

RG

CUB/114
Jenks/12

NW Natural is considering changing the name **renewable natural gas** to **renewable gas**, and is interested in hearing your opinion about this change.

Why change the name to renewable gas?

In addition to working to deliver renewable natural gas to customers via our existing pipeline system, we are exploring other potential renewable energy sources, such as renewable hydrogen. **Renewable gas** is one term that could summarize both renewable natural gas and renewable hydrogen, as well as any new renewable energy sources in the future.

How do you like the proposed name - Renewable Gas?

- ○ Like a great deal
- ○ Like somewhat
- ○ Neither like nor dislike
- ○ Dislike somewhat
- ○ Dislike a great deal

Why do you ${q://QID3/ChoiceGroup/SelectedChoices} about the name Renewable Gas?

Between Renewable Natural Gas and Renewable Gas, which one do you prefer?

- Renewable Gas
- Renewable Natural Gas
- No preference

NG Ad

Here is an example of an ad using the new title Renewable Gas. Please provide your comments after reviewing the ad.

Please tell us your reaction to the ad

	Extremely good	Somewhat good	Neither good nor bad	Somewhat bad	Extremely bad
Clear	○	○	○	○	○
Credible	○	○	○	○	○
Memorable	○	○	○	○	○
Overall	○	○	○	○	○

CUB/114
Jenks/15

What did you like or dislike about the ad?

NW Natural®

Powered by Qualtrics

CUB/114
Jenks/16

Background

Objective:

- Evaluate four TV spots: Shift, Big Number, Dream Home and Behind it All.
  - Random half of all respondents reviewed Shift and Big Number, and another half Dream Home and Behind it All.
- Evaluate proposed name of Renewable Gas and one Renewable Gas print ad.

Field time: May 2021

# of Respondents: 1,035

CUB/114
Jenks/17

Key Findings

- Out of all four TV ads tested in the survey, Big Number received the most positive feedbacks (46% extremely good), followed by Shift (29%), Behind it All (29%), and Dream Home (18%).
  - Big number and Shift also score highest in term of relevancy: 58% and 46% rated them extremely relevant respectively.
- More than half of respondents(57%) like the name Renewable Gas, 24% have no opinion and 20% dislike it.
- Overall, slightly more people prefer Renewable Natural Gas name (38%) than Renewable Gas name (36%).
  - Younger age groups (45 or younger) prefer RG name (41%), while 45 – 65 group prefer RNG name (44%).
  - By income, 44% of $75K - $100K group prefer RG name, while slightly more in other age groups prefer RNG name.

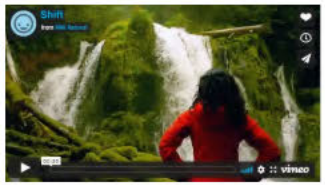
TV Commercials

CUB/114
Jenks/19

TV Spots Compare - Overall

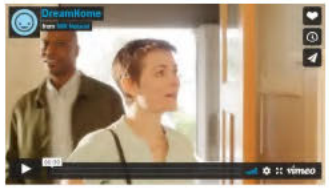
Please tell us your overall reaction to the video.

Big Number

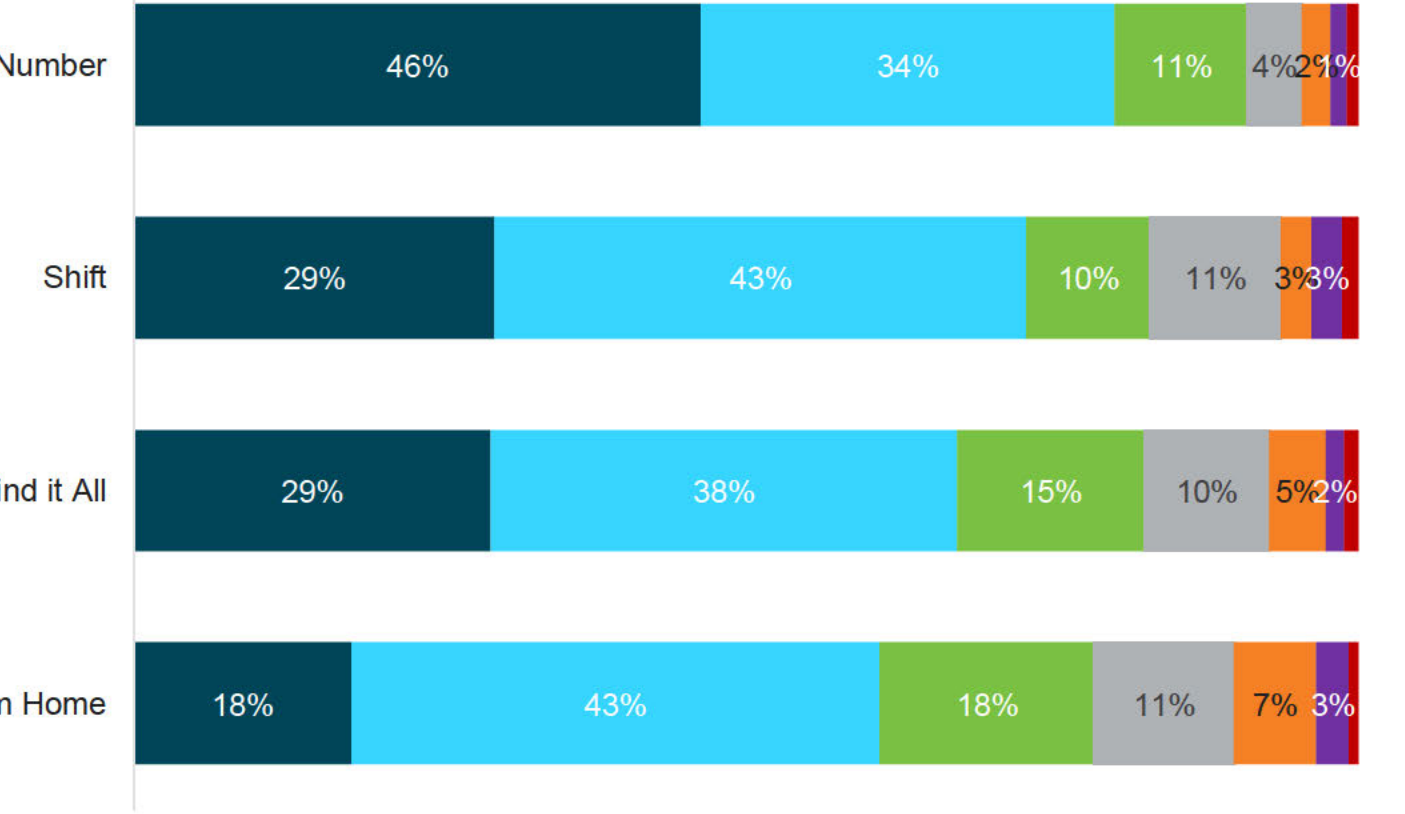


Shift

Behind it All



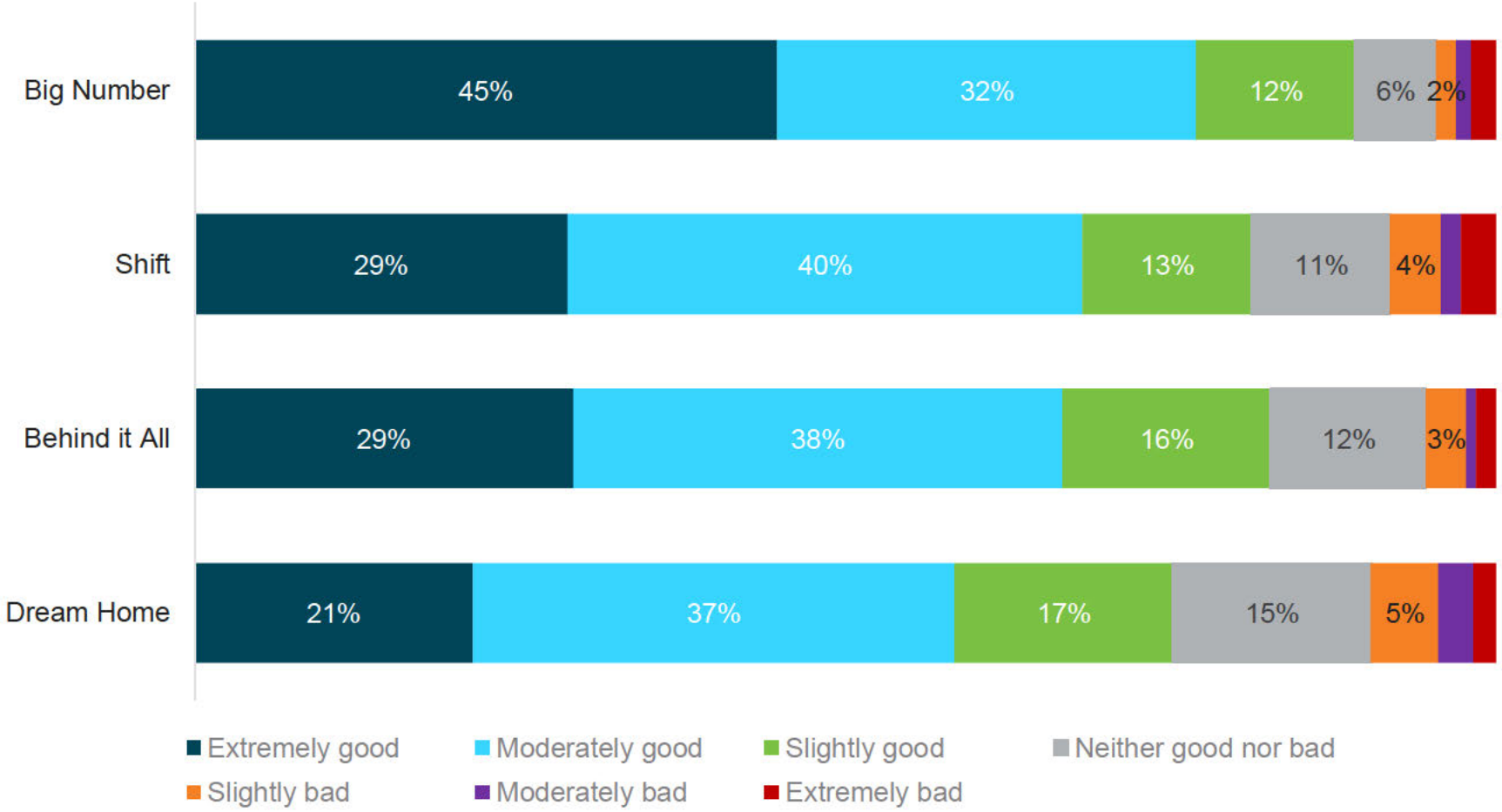
Dream Home



CUB/114
Jenks/20

TV Spots Compare – Credible

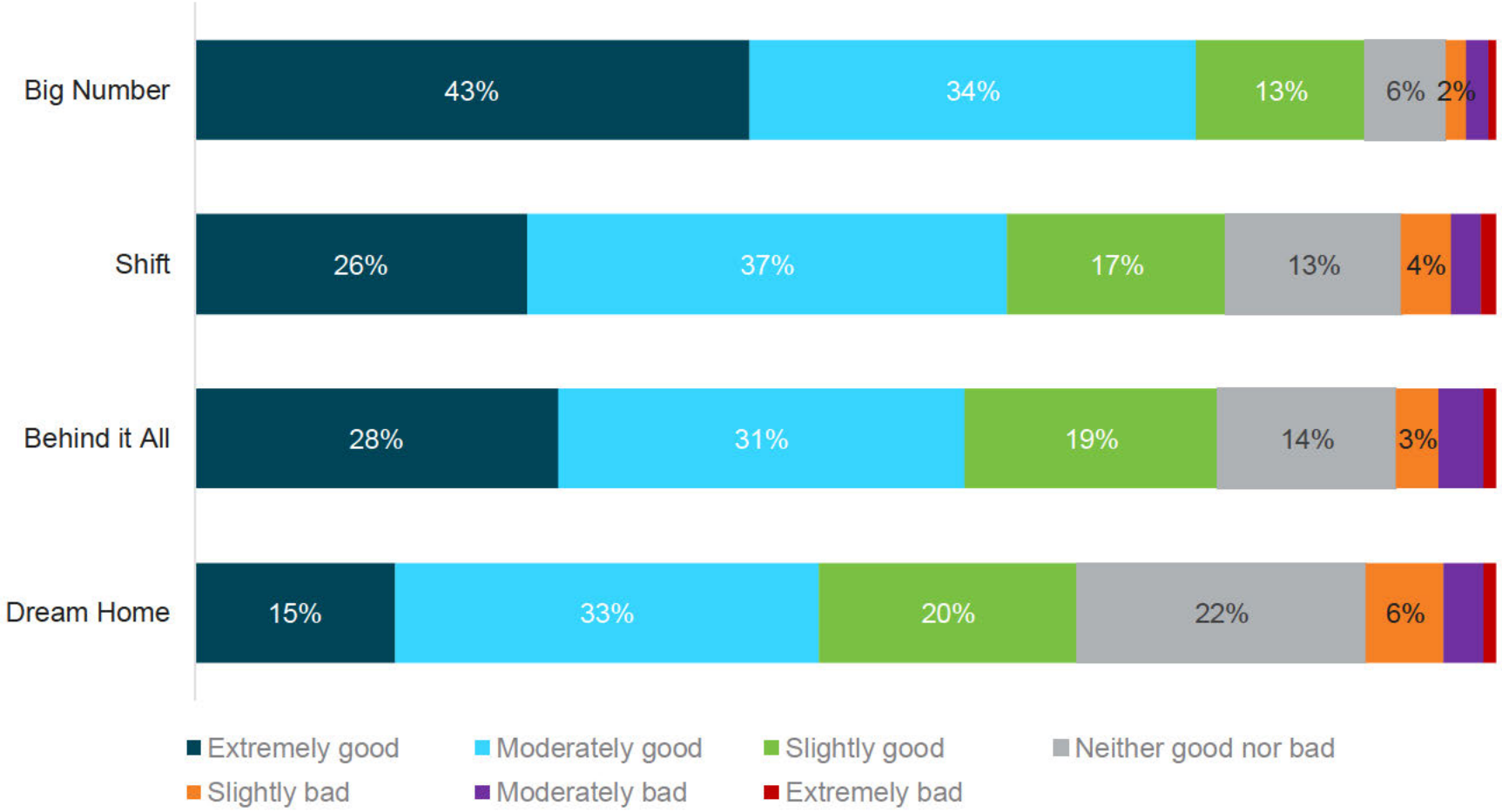
Please tell us your overall reaction to the video.



CUB/114
Jenks/21

TV Spots Compare – Memorable

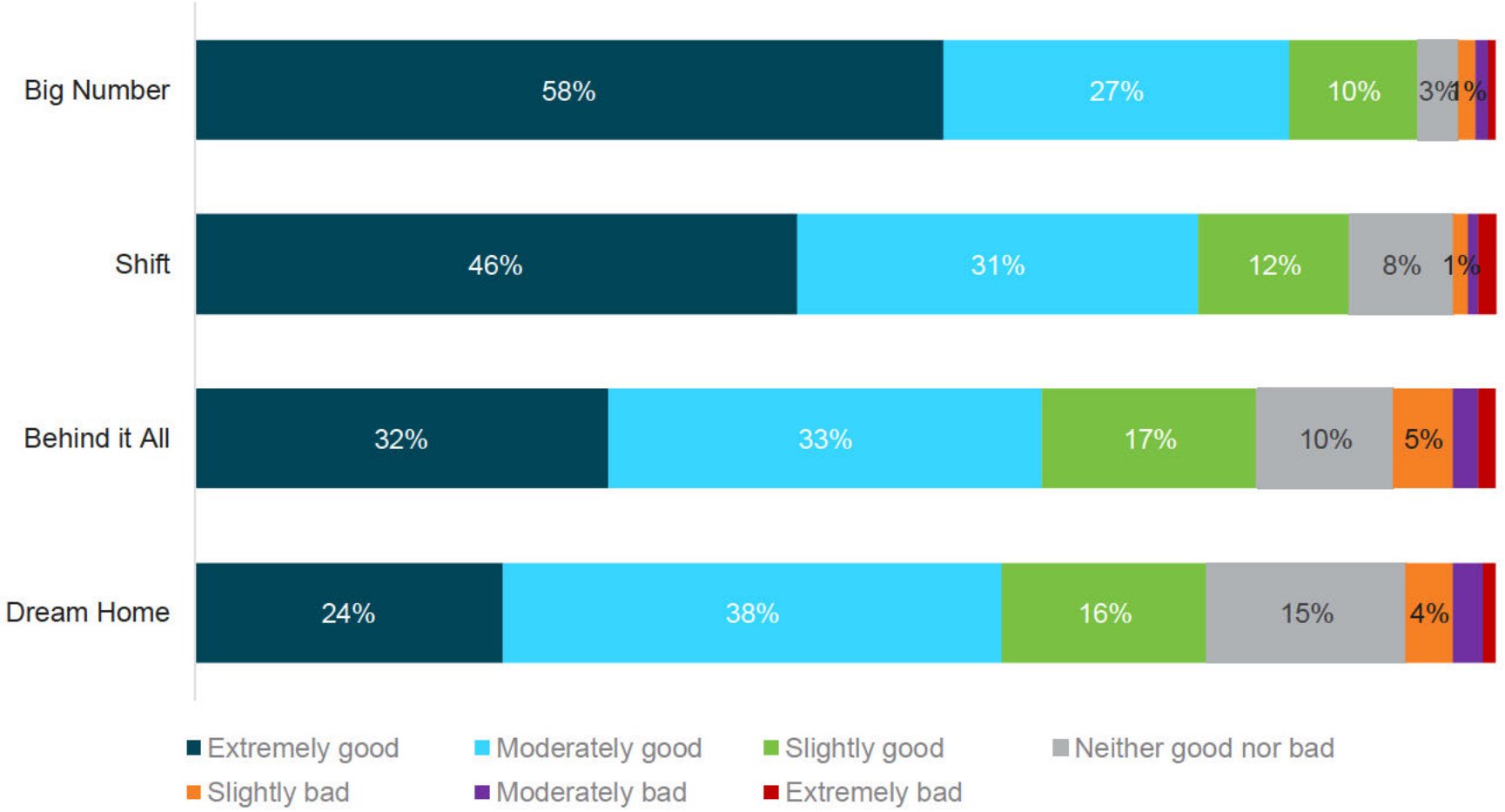
Please tell us your overall reaction to the video.



CUB/114
Jenks/22

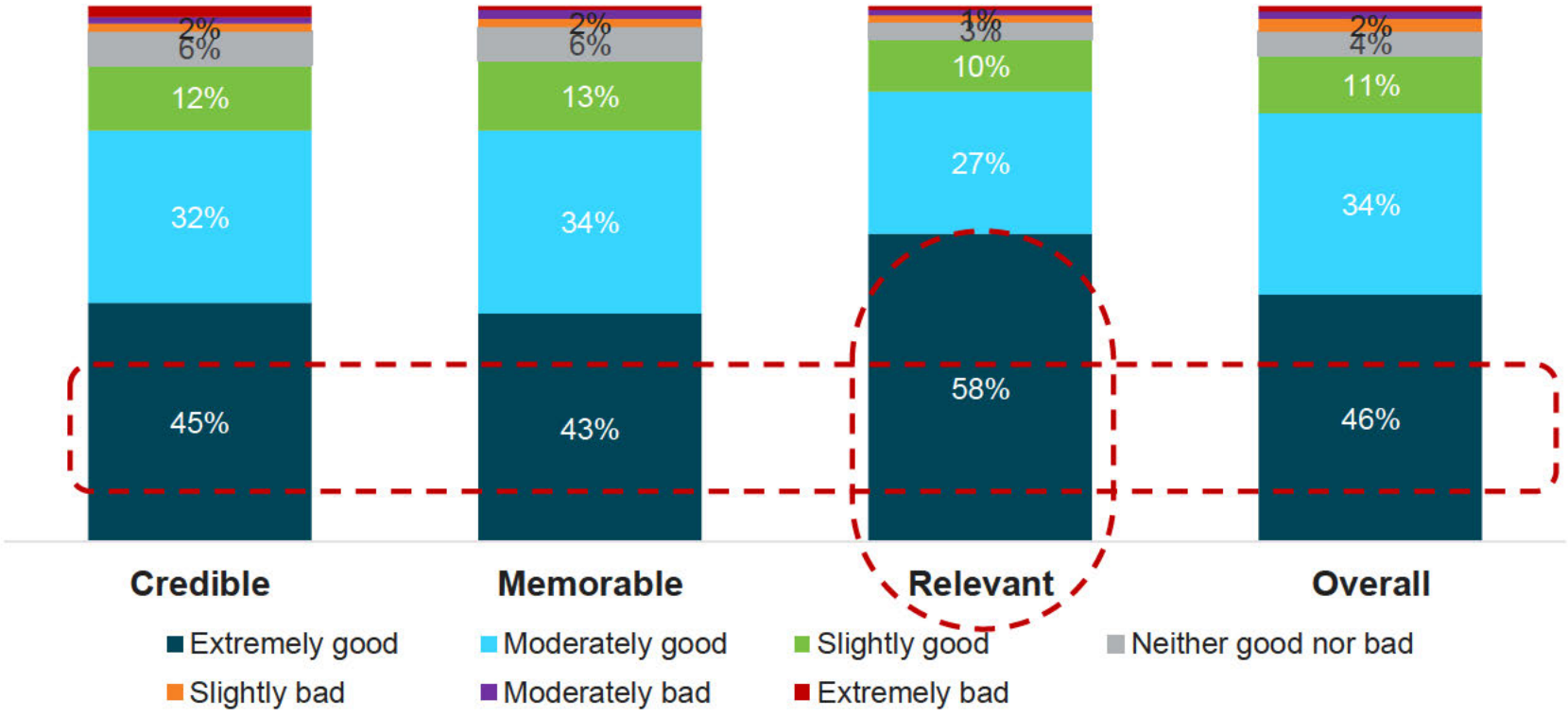
TV Spots Compare – Relevant

Please tell us your overall reaction to the video.



Big Number

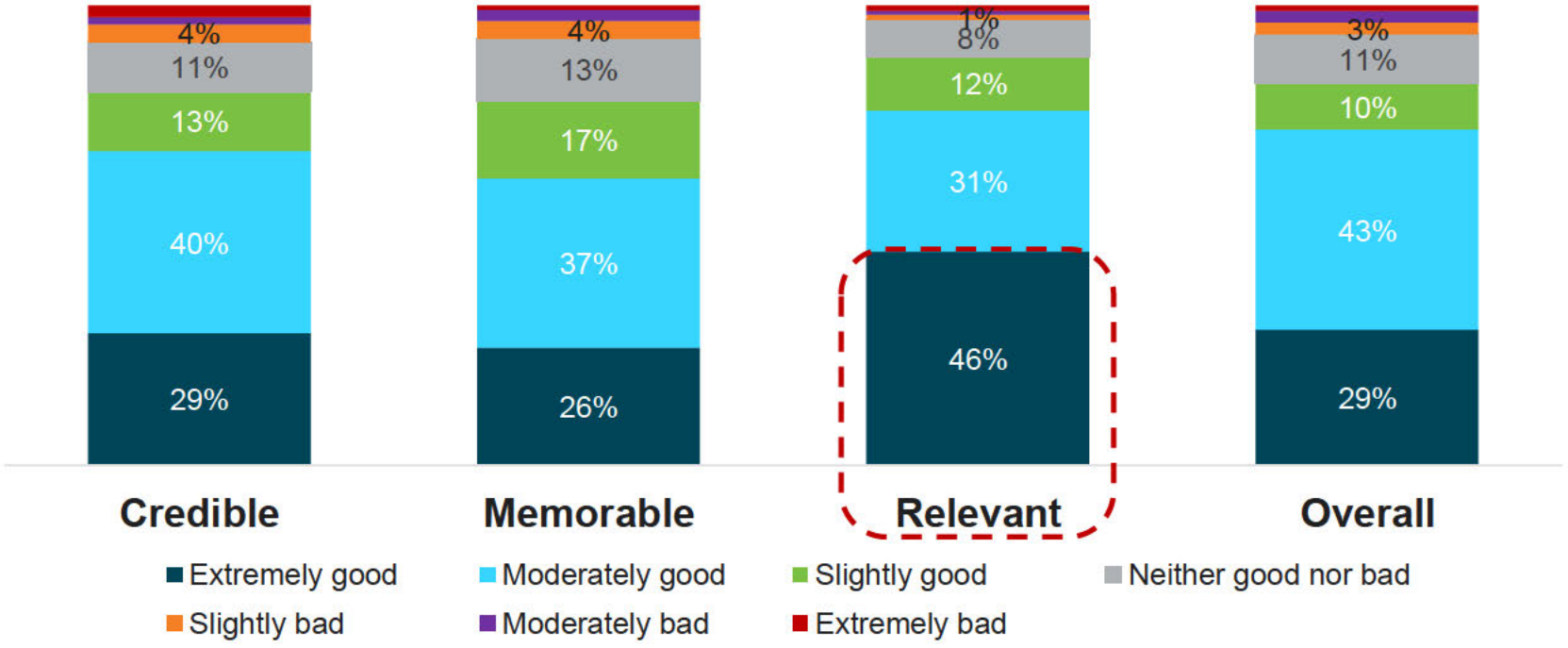
Please tell us your reaction to the video.



- This is the most popular ad among the four tested by a large margin, and respondents felt the ad is extremely relevant to them during the environmental discussion.
- People love the idea of turning waste into energy, and the ad also provide informative examples.
- However, some still hesitate because not enough specifics were given in the ad.

Shift

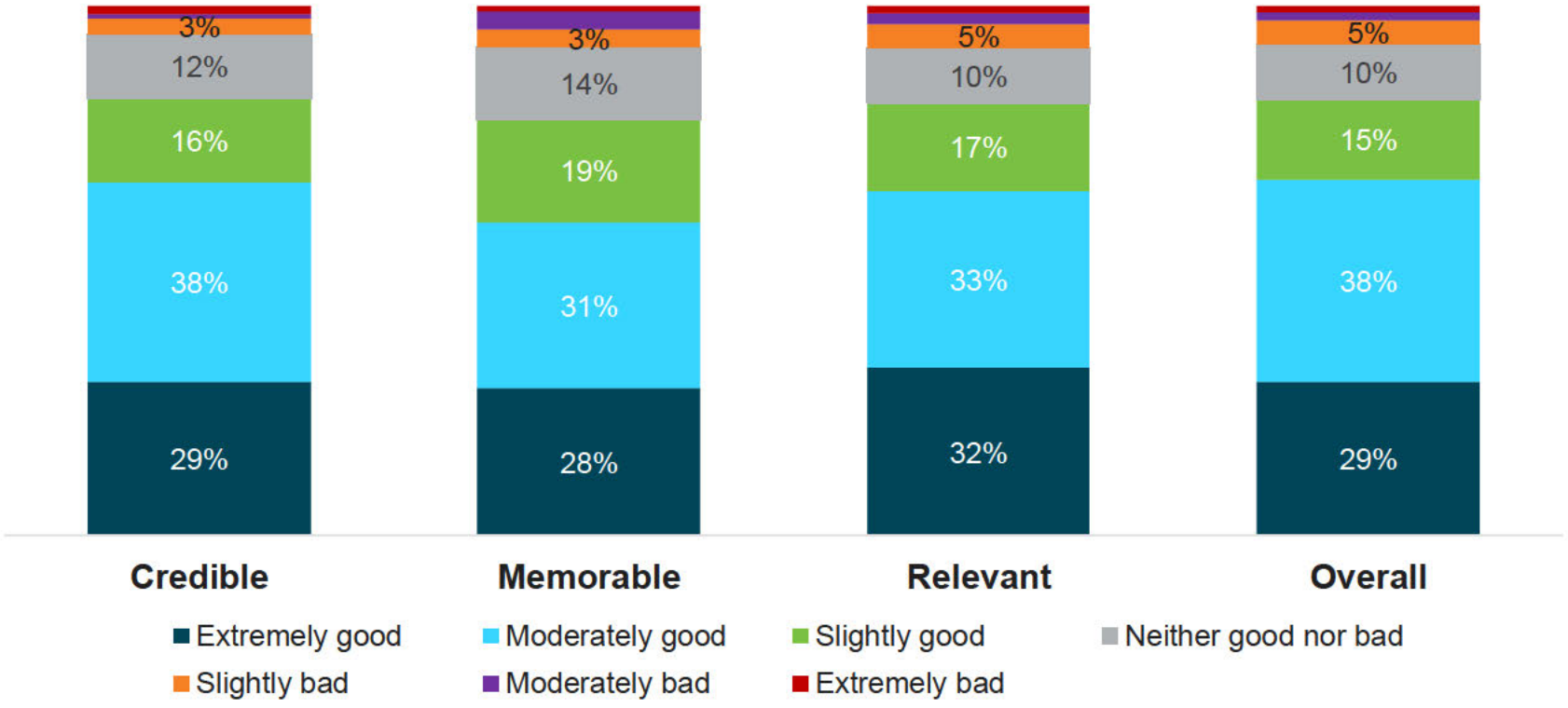
Please tell us your reaction to the video.



- This ad also well-received by the survey participants, and felt it is extremely relevant to them.
- People enjoy the Oregon outdoor sceneries in the ad and it also provides a very clear positive message.
- On the flip side, several respondents felt that the ad is greenwashing and lack of specifics.

Behind it All

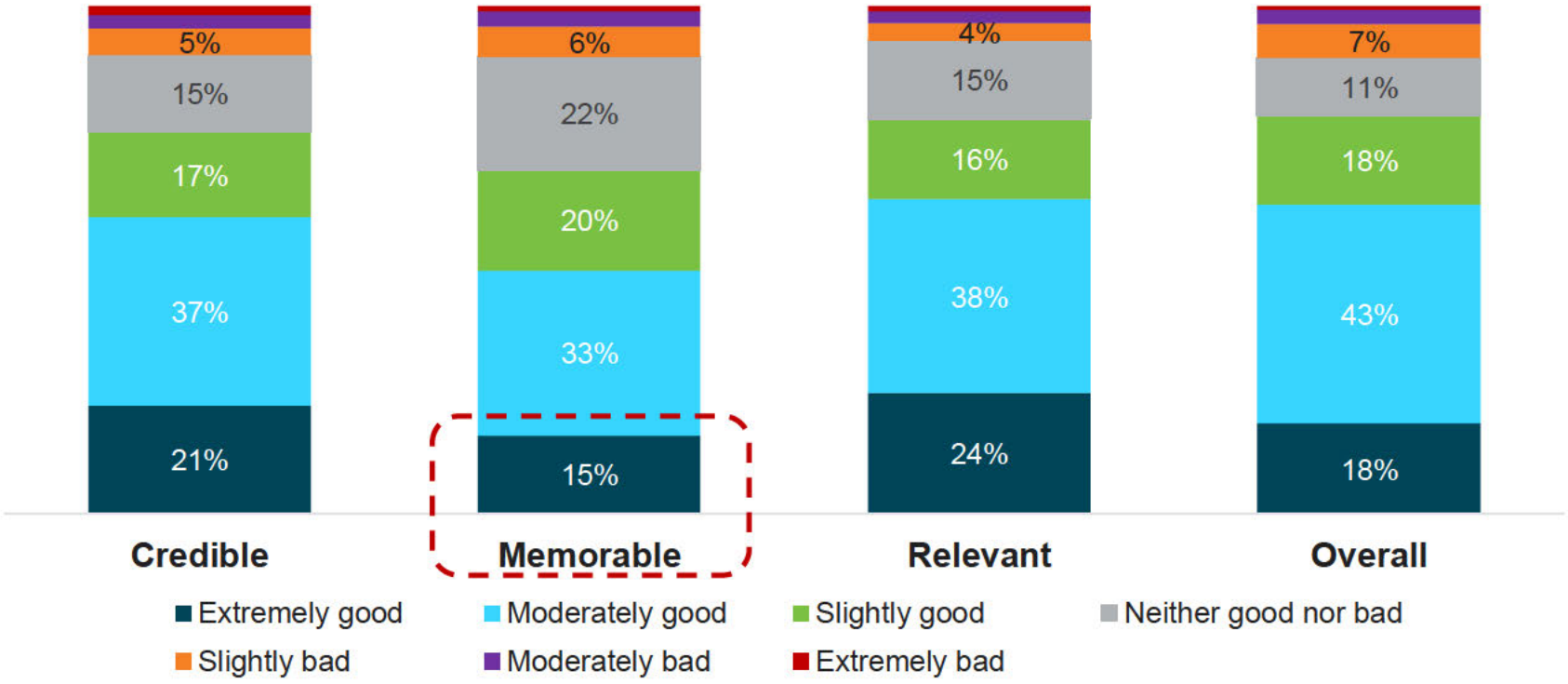
Please tell us your reaction to the video.



- This ad also well-received by the survey participants.
- People enjoy the ad's warm feeling and family focus.
- But several respondents was confused what messages this ad is trying to convey.

Dream Home

Please tell us your reaction to the video.

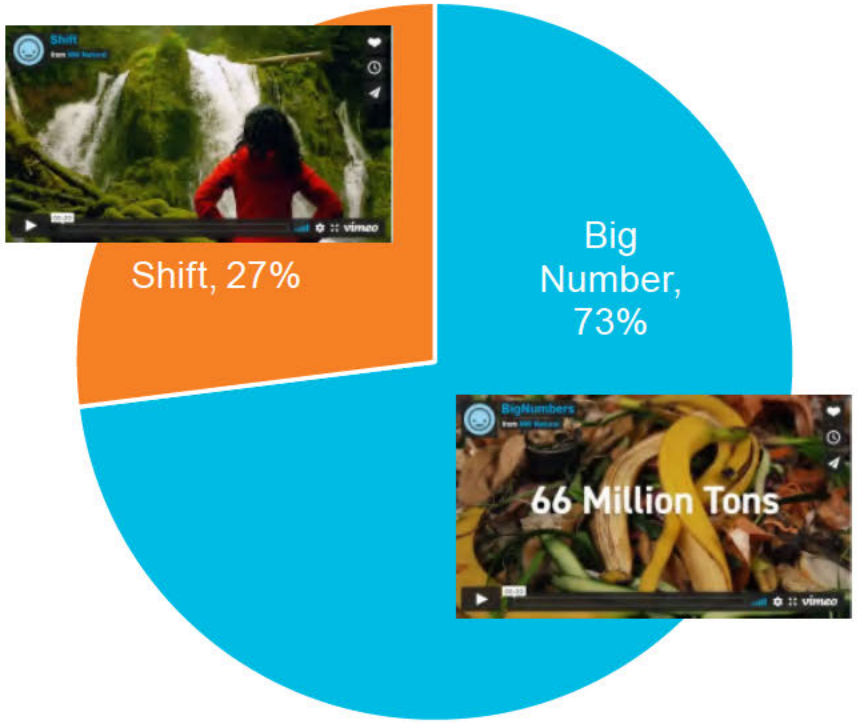


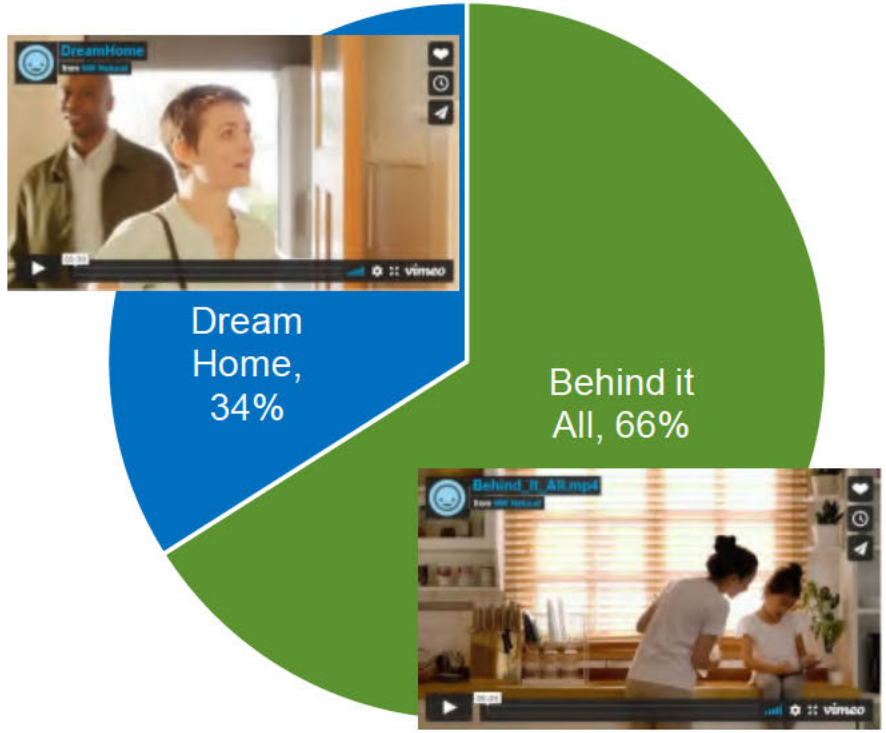
- This ad is rated less favorably by the respondents comparing to other three ads.
- People like this ad because it tells a very simple and clean message, and its diverse cast.
- Those people who dislike the ad felt that it is cheesy and forgettable.

CUB/114
Jenks/27

Pair Comparison

Now that you have watched two NW Natural videos, which one do you prefer?



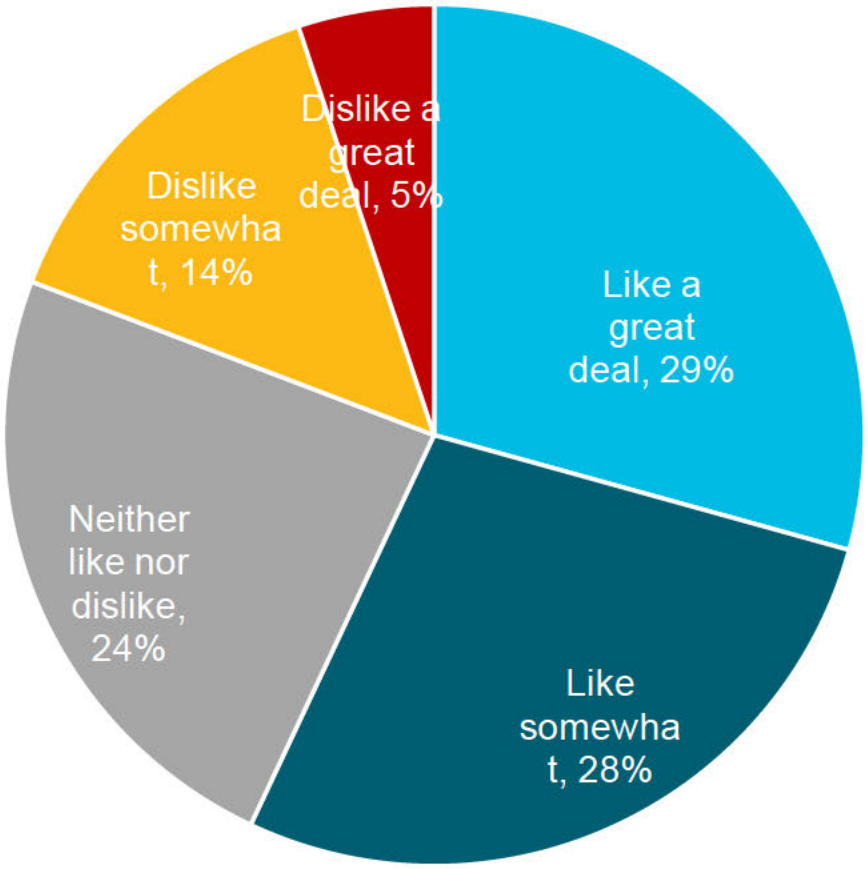


Renewable Gas

CUB/114
Jenks/29

Renewable Gas

How do you like the proposed name - Renewable Gas?



Reasons for their choice:

Like:

- Short, simple, clear, concise
- Broader, inclusive, and encompassing
- Clean and renewable energy

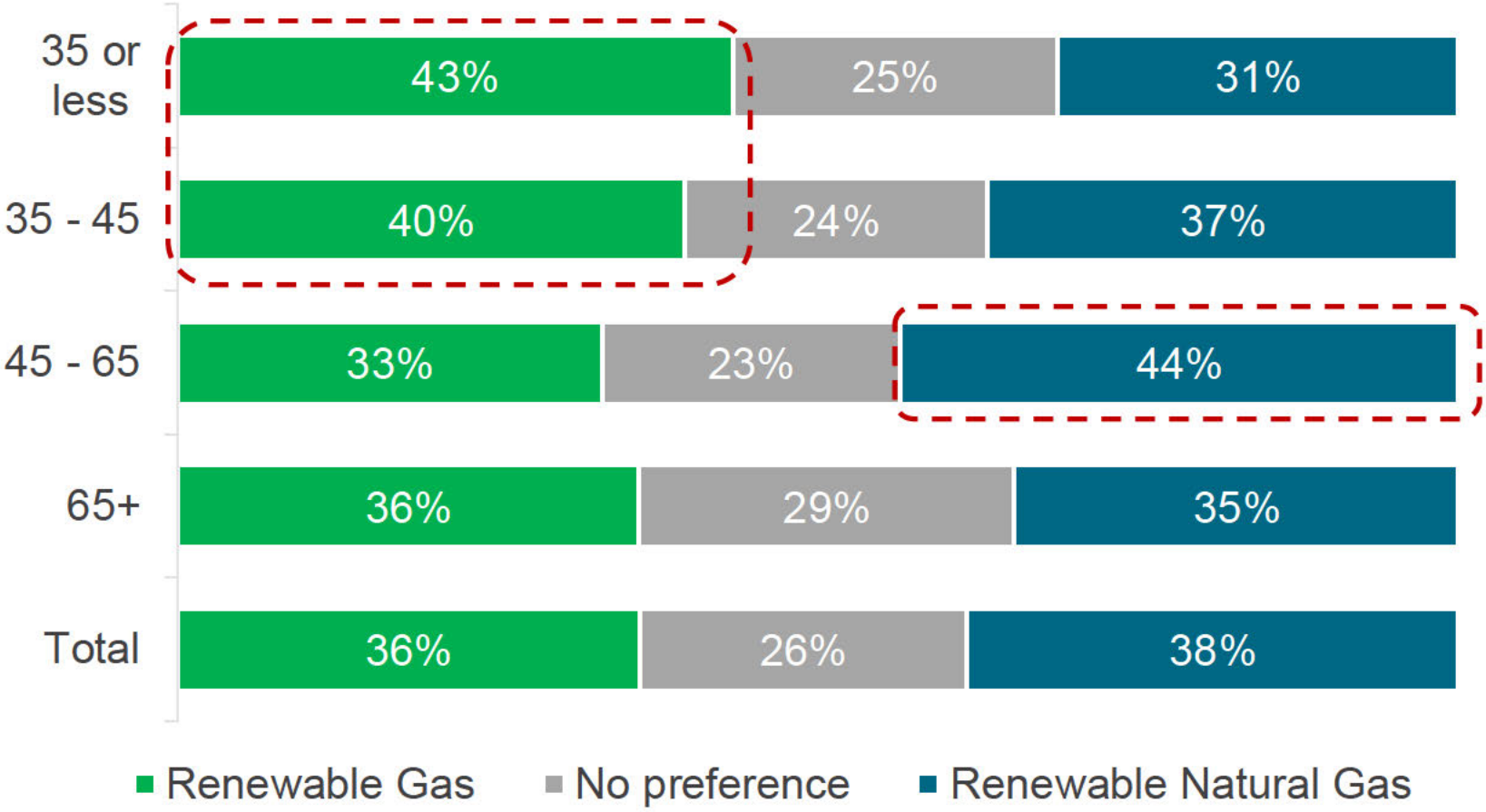
Dislike:

- Greenwashing, deceptive/covering up
- Sounds like gasoline
- I like the word “natural”
- Too board/vague/generic

CUB/114
Jenks/30

RG Vs. RNG by Age

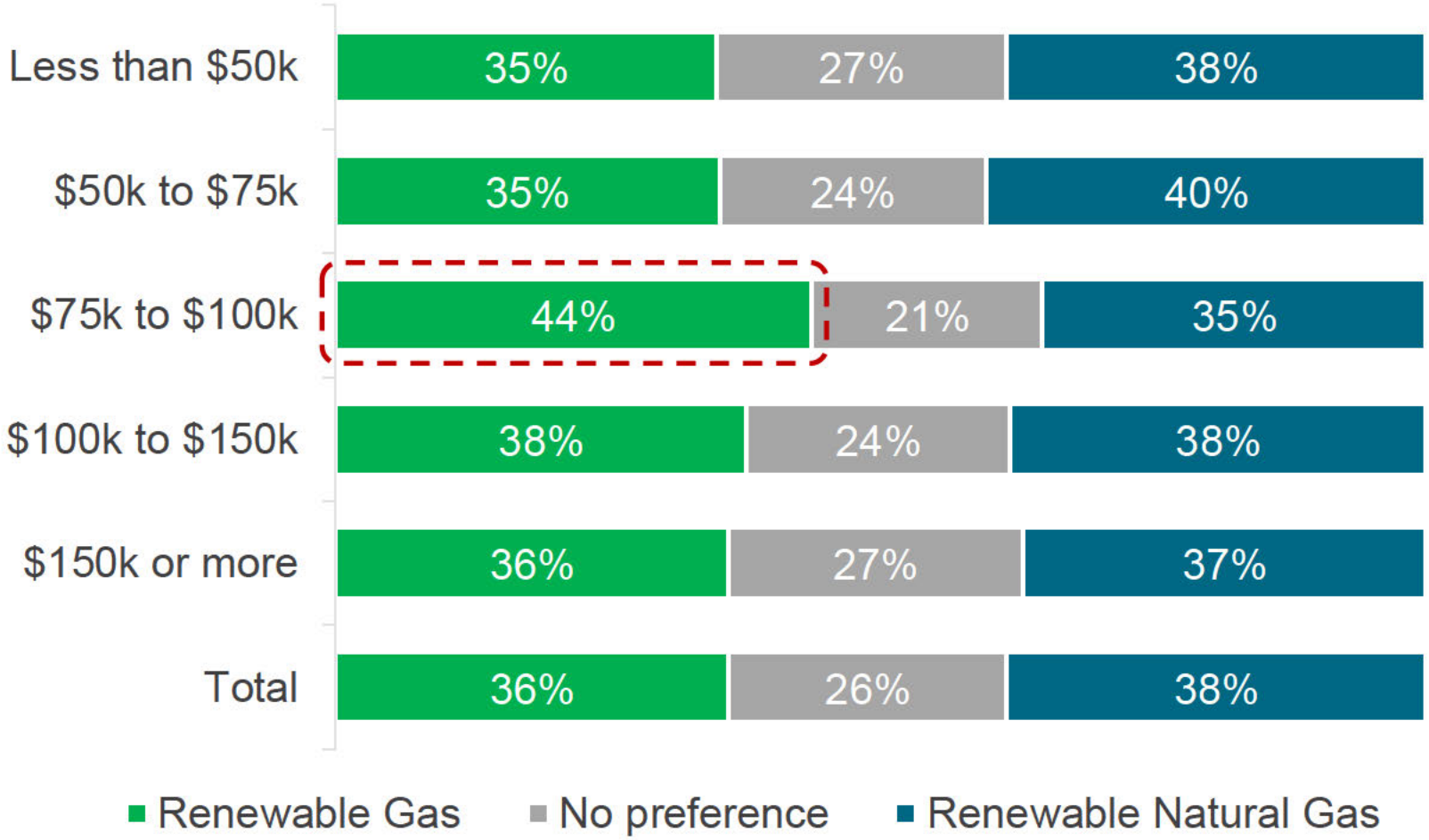
Between Renewable Natural Gas and Renewable Gas, which one do you prefer?



CUB/114
Jenks/31

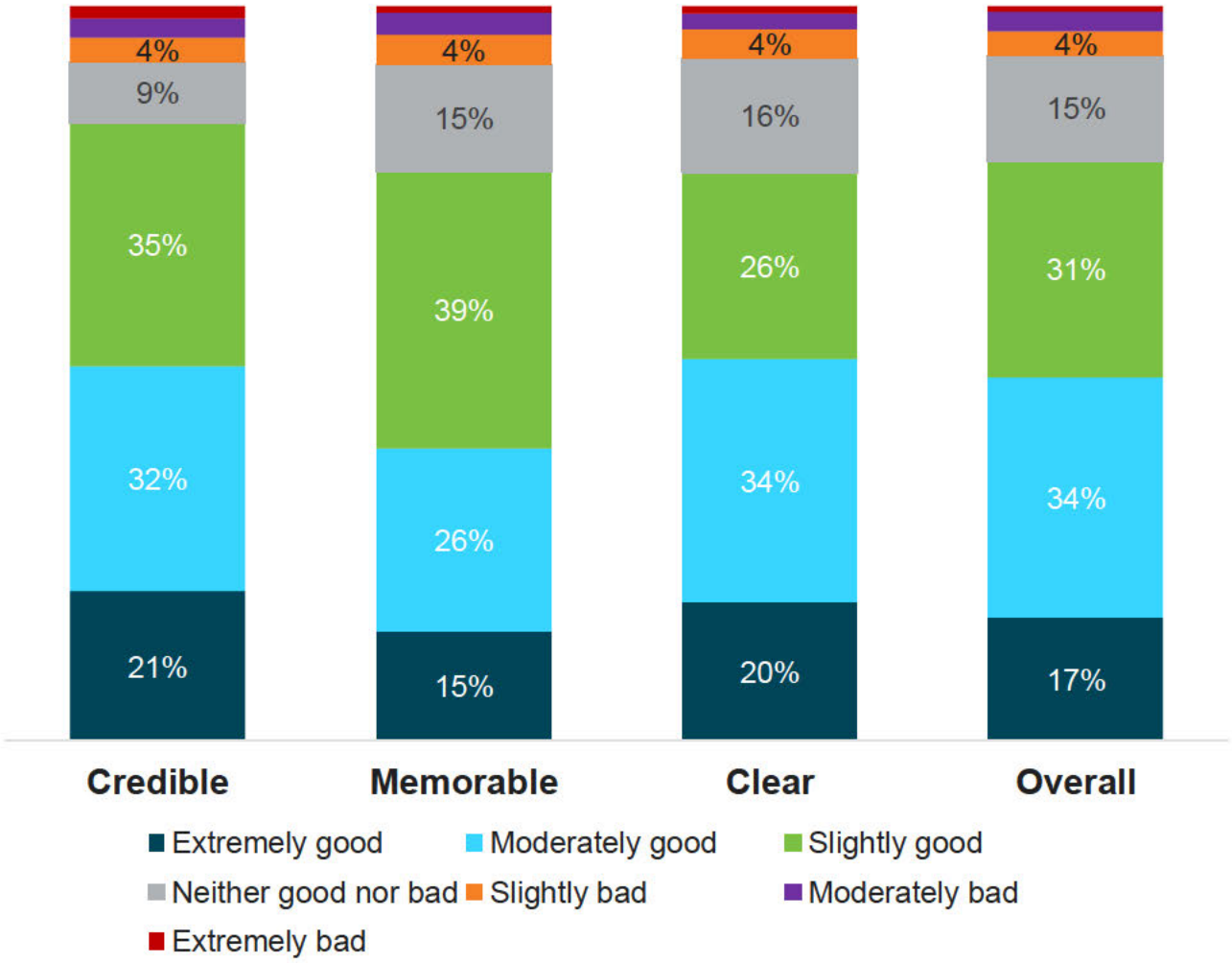
RG Vs. RNG by Income

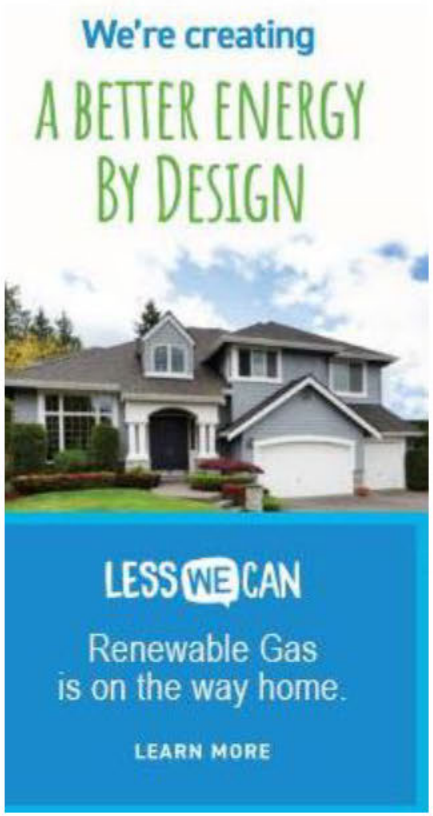
Between Renewable Natural Gas and Renewable Gas, which one do you prefer?



Renewable Gas Print Ad

Please tell us your reaction to the ad





NW Natural Homebuilder and HVAC Contractor Satisfaction 2019

December 2019

CUB/115
Jenks/2

Background and Methodology

- The online survey was conducted among HVAC contractors and home builders in NW Natural's service territory.
- We invited builders and HVAC contractors who have been frequently interacting with NW Natural to participate in this study.
- Sample Source: Marketing
- Respondents:

	# of Completes	# of Companies	# of Top 10 Companies
HVAC Contractors	62	40	7
Home Builders	29	27	6

- Survey Length: 6 minutes
- Data Collection Period: Nov 10 - 20, 2019
- All analysis are weighted by the number of gas homes built or conversions made in 2018 and 2019

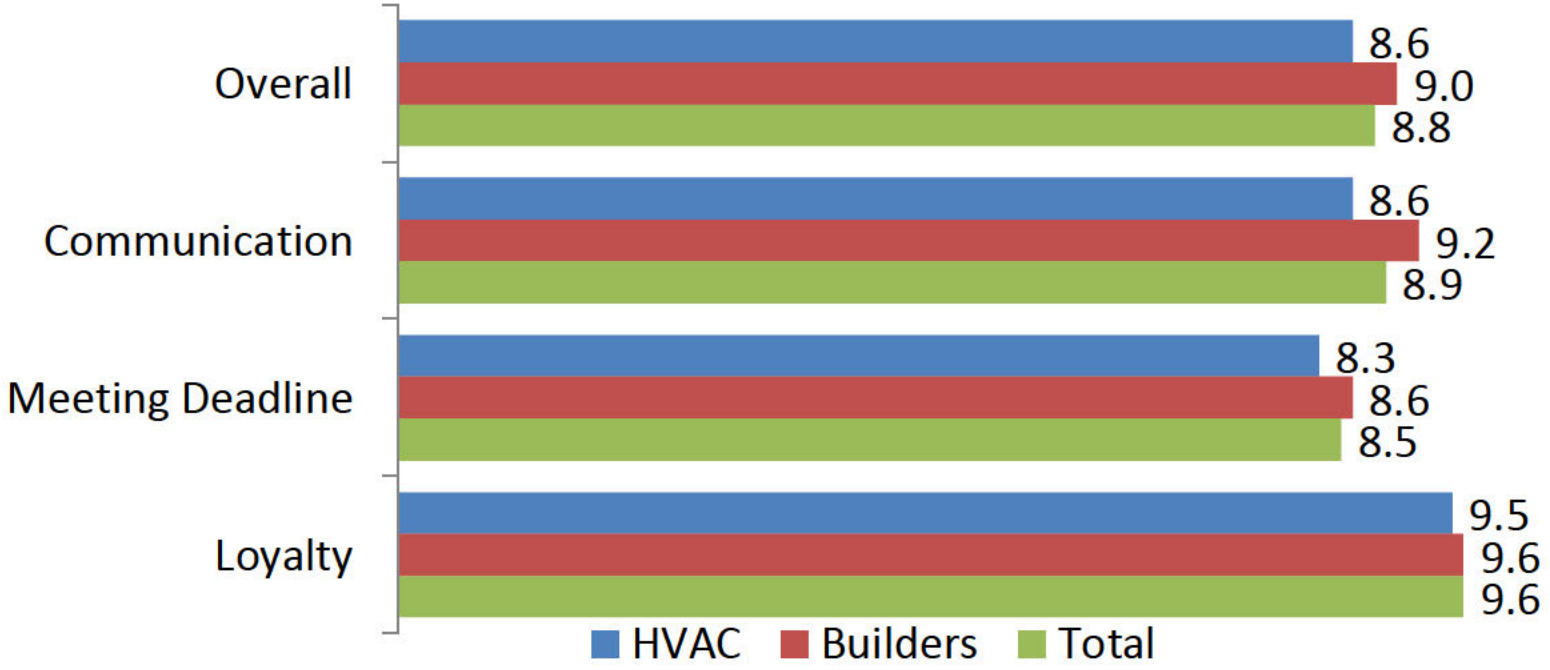
Executive Summary

- Both HVAC contractors and home builders are very satisfied with their partnership with NW Natural: they rated 8.8 out of 10 in 2019.
- Comparing to office staff, builders are not as satisfied with our field staff in this survey (office 9.5 vs. field7.9)
- According to their comments, there are two common opportunities for improvement: better communications, and some process improvement.

Overall Satisfaction with NW Natural

Satisfaction by Area

(On a scale from 0-10, weighted averages)



- Both HVAC contractors and home builders are very satisfied with NW Natural services.
- Meeting deadline is one area that might need some improvement.
- Most of them are willing to use natural gas for their future projects.

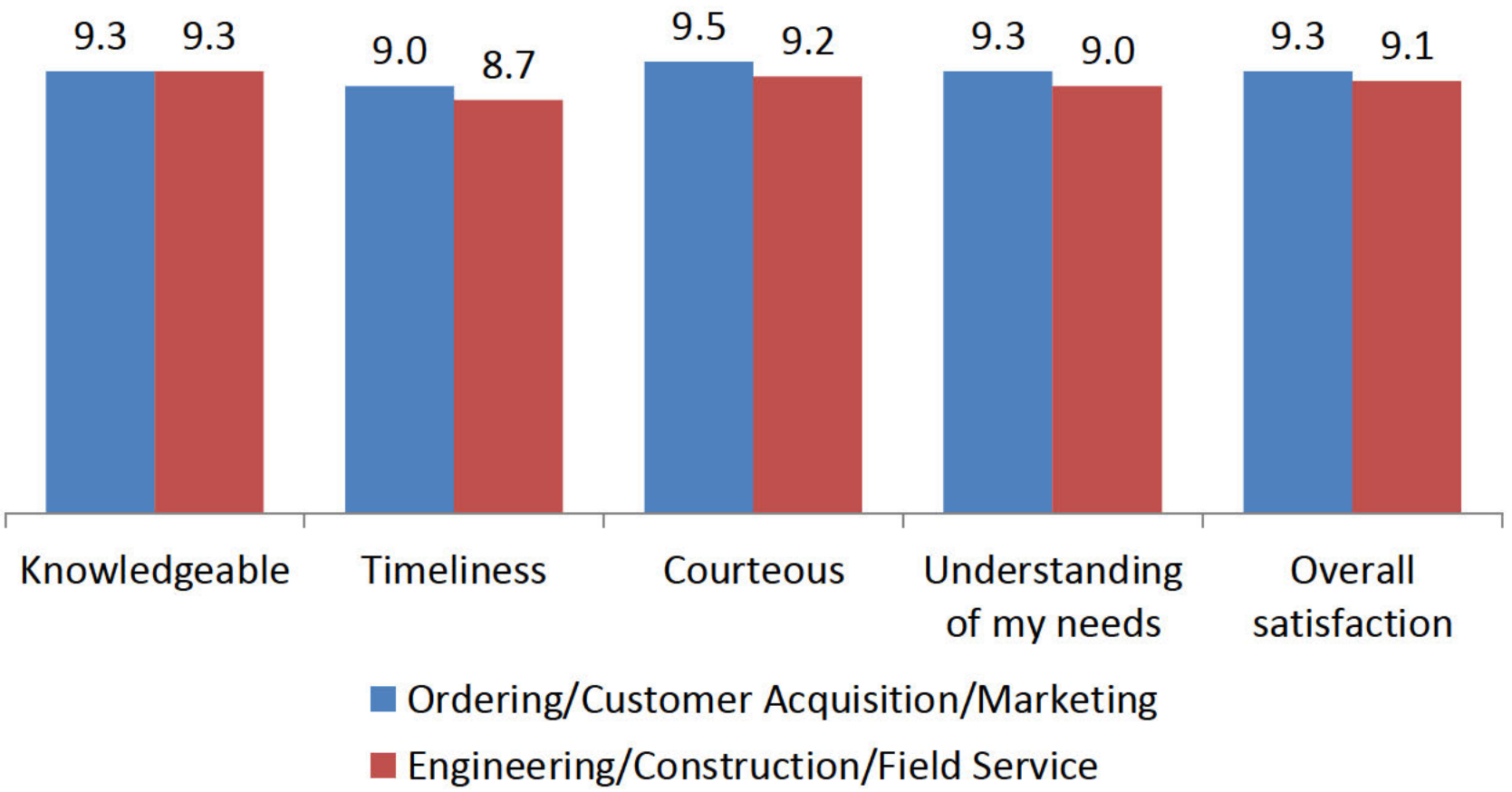
CUB/115
Jenks/6

Staff Interaction Satisfaction

CUB/115
Jenks/7

Staff Satisfaction - HVAC

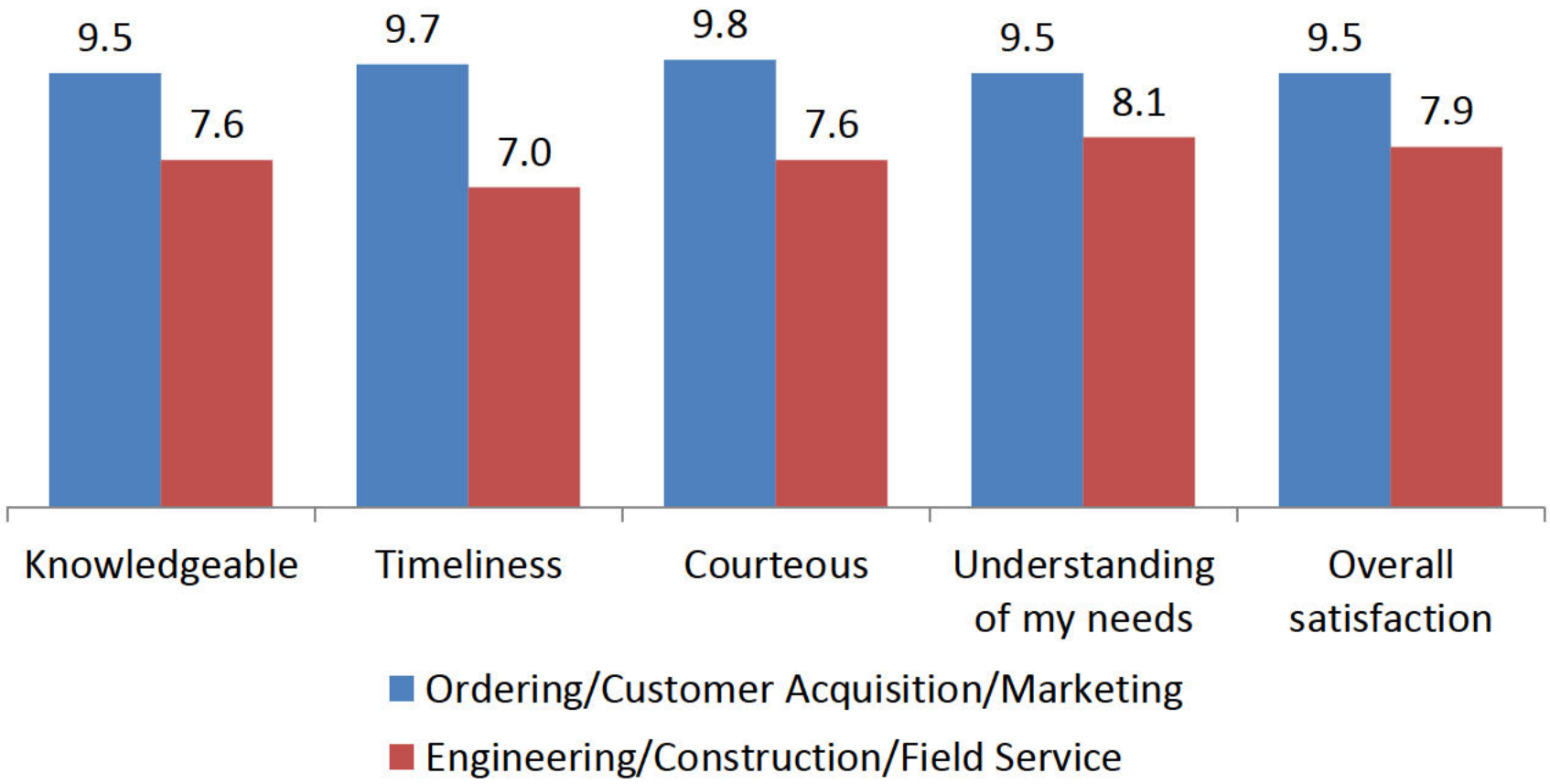
Please rate your satisfaction with the following departments:



CUB/115
Jenks/8

Staff Satisfaction - Builders

Please rate your satisfaction with the following departments:



Verbatim

CUB/115
Jenks/10

Builder Suggestions

Better communications

- Single point of contact.
- Very difficult to figure out how to gain access to your compounds (Sherwood and Hillsboro)

Process improvement

- The order intake website is very slow
- Need streamlining the meter setting process for multifamily
- Be willing to coordinate, Inspect and approve shorter lengths open trench for the gas line installation. 2,000 feet is just too much trench to be left open for NW Natural.

CUB/115
Jenks/11

HVAC Contractor Suggestions

Better communications

- Better follow up. We have to call in too many times to get answers
- Let us know that we were not a preferred contractor this last year. We install over 500 jobs per year and half or more are natural gas. but we still need 10 conversions to be a preferred contractor.
- I placed an order for meter set but the house already has one, but the system does not catch that and no one was following up with me.

Process improvement

- Remove the gas sticker when the meter is set
- Just triple checking the accuracy of lead information. Once in a while (not that often) we get a wrong number or error.

NW Natural Homebuilder and HVAC Contractor Satisfaction 2020

January 2021

CUB/115
Jenks/13

Background and Methodology

- The online survey was conducted among HVAC contractors and home builders in NW Natural's service territory.
- We invited builders and HVAC contractors who have been frequently interacting with NW Natural to participate in this study.
- Sample Source: Marketing
- Respondents:

	# of Completes	# of Companies	# of Top 10 Companies
HVAC Contractors	56	35	3
Home Builders	33	27	6

- Survey Length: 6 minutes
- Data Collection Period: Dec 1 - 10, 2020
- All analysis are weighted by the number of gas homes built or conversions made in 2019 and 2020

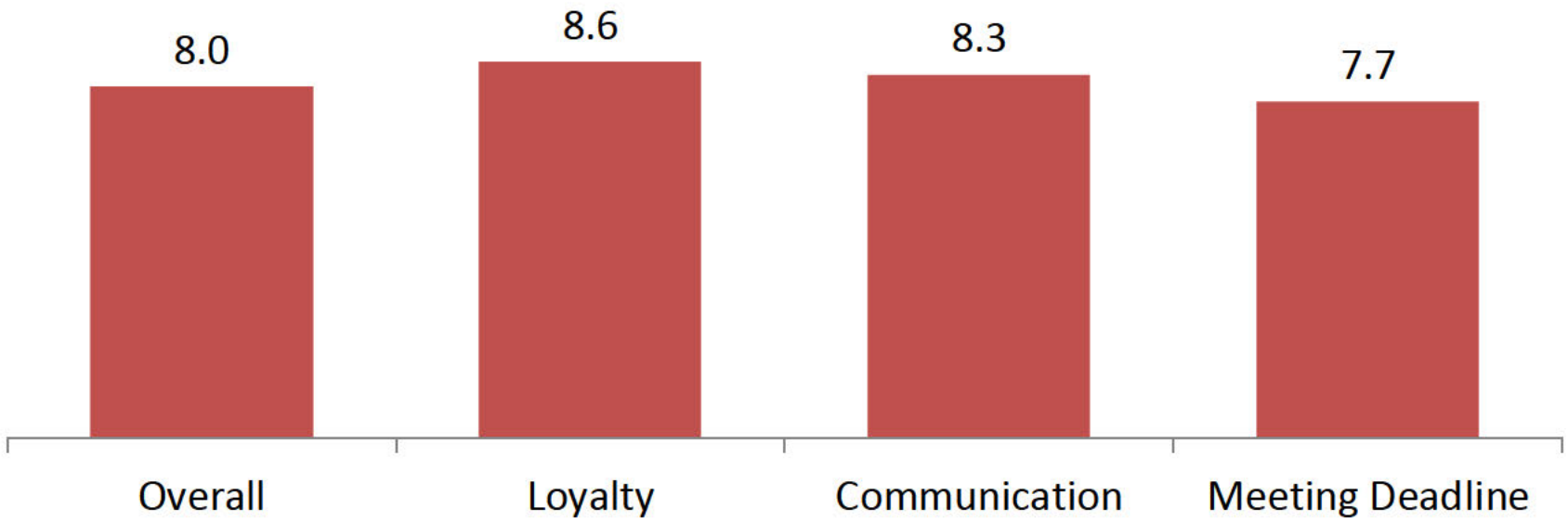
Executive Summary

- Both HVAC contractors and home builders remained quite satisfied with their partnership with NW Natural (8 out of 10), though declined slightly from 2019 (8.8).
- Homebuilder satisfaction dropped from 9.0 in 2019 to 7.9 last year. Some of them call for better communication and timely installation.
- While HVAC contractor satisfaction increased from 8.6 to 8.9. They also want better communication and timely response from the marketing team.

Overall Satisfaction with NW Natural

Satisfaction by Area

(On a scale from 0-10, weighted averages)



- Both HVAC contractors and home builders remained quite satisfied with NW Natural services but decreased slightly from 2019.
- Meeting deadline is one area that might need some improvement.
- Most of them are willing to use natural gas for their future projects.

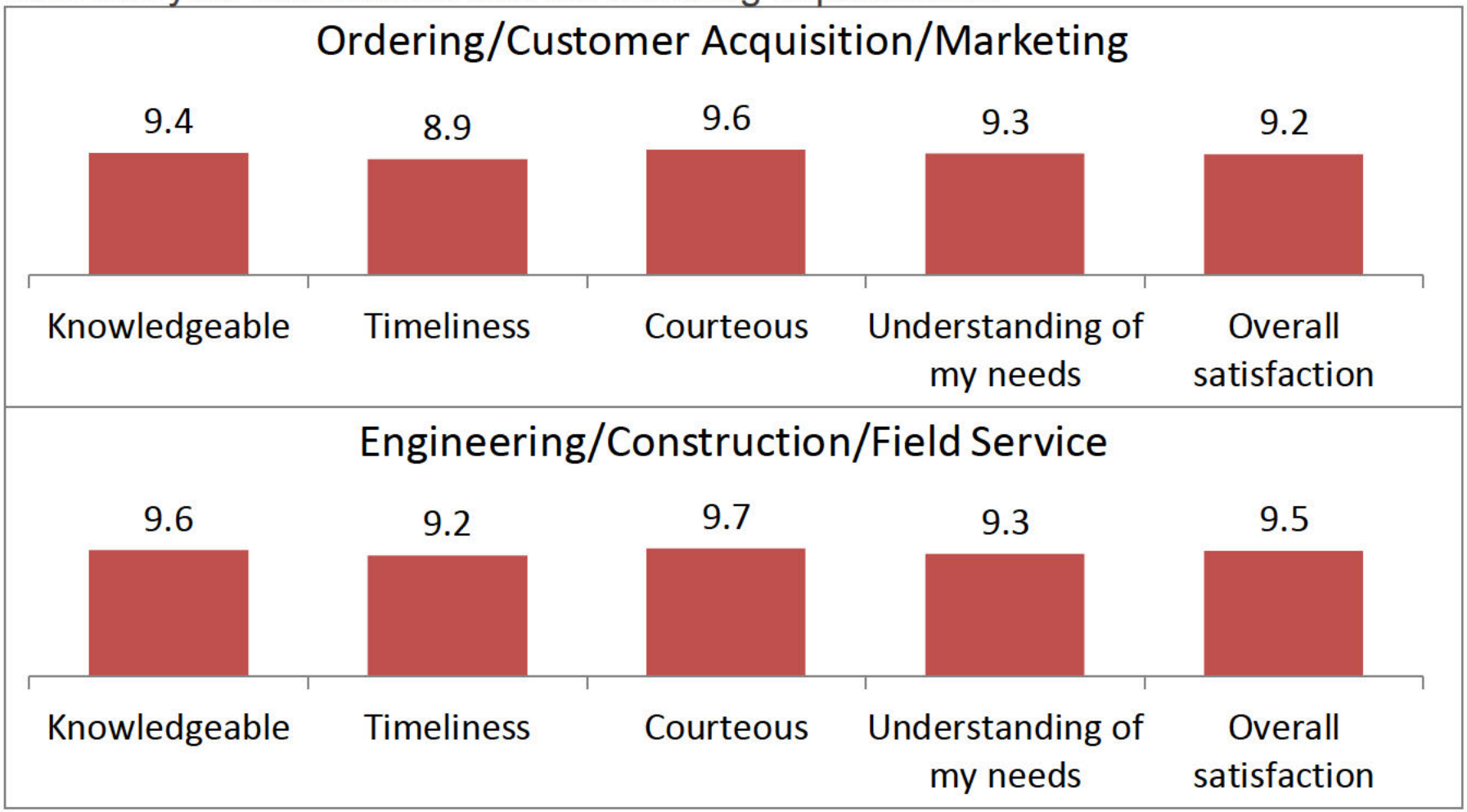
CUB/115
Jenks/17

Staff Interaction Satisfaction

CUB/115
Jenks/18

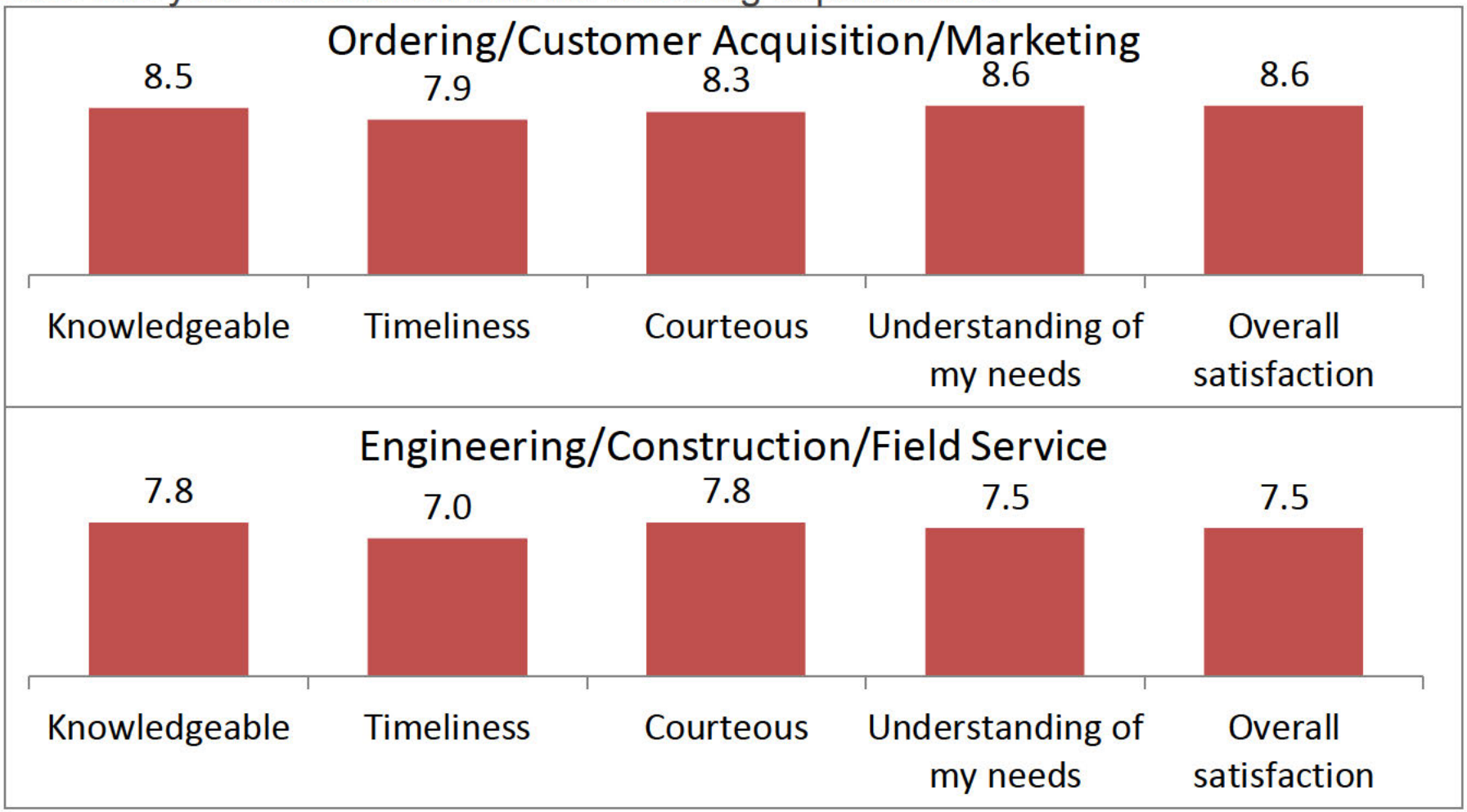
Staff Satisfaction - HVAC

Please rate your satisfaction with the following departments:



Staff Satisfaction - Builders

Please rate your satisfaction with the following departments:



CUB/115
Jenks/20

Verbatim

CUB/115
Jenks/21

Builder Suggestions

- Provide notice prior to eventually showing up for service line install.
- Improve communication and timeliness of meter setting.
- Having it take weeks to get gas into open trenches is not acceptable. If given the choice we will not install gas rather than wait and be at the mercy of NW natural. You need to get the gas in the ground quickly.
- Better schedule for backbone installation
- Able to adjust or accommodate last minute change
- Fix the partner link so that we don't have to email the forms in.

HVAC Contractor Suggestions

- We need a better foundation of expected communication so we can all be on the same page with customers.
- Access to see online orders and status of orders.
- Follow through and a better timely response to the Comfort Consultant.
- Would appreciate a written confirmation via email from NW Natural as soon as each conversion is scheduled for the gas line and meter.
- It is hard to get through to the Marketing Dept, and it will prompt you to leave a message. You have no idea when you will hear back, and sometimes I call the next day and get through. It makes me wonder what the process is for the message option.
- With everyone working remote I don't know or have confidence that a new service agreement was received and has been processed. I don't think I should need to work to get this information.
- The new website tool does not seem to indicate what bucket a conversion will be, and provides no potential costs. It would be great to go back to the old way where this information was provided.
- Commercial new gas service estimating. It takes too long and too much paperwork to even know if it is feasible. Some ballpark estimate would be great.
- NW Natural is more reluctant than they used to be to set a 2 lb meter at a residence

NW Natural Homebuilder and HVAC Contractor Satisfaction 2021

January 2021

Background and Methodology

- The online survey was conducted among HVAC contractors and home builders in NW Natural's service territory.
- We invited builders and HVAC contractors who have been frequently interacting with NW Natural to participate in this study.
- Respondents:

	# of Completes	# of Companies	# of Top 10 Companies
HVAC Contractors	58	33	3
Home Builders	30	24	2

- Survey Length: 6 minutes
- Data Collection Period: Nov 1 - 15, 2021
- All analysis are weighted by the number of gas homes built or conversions made in 2020 and 2021

Executive Summary

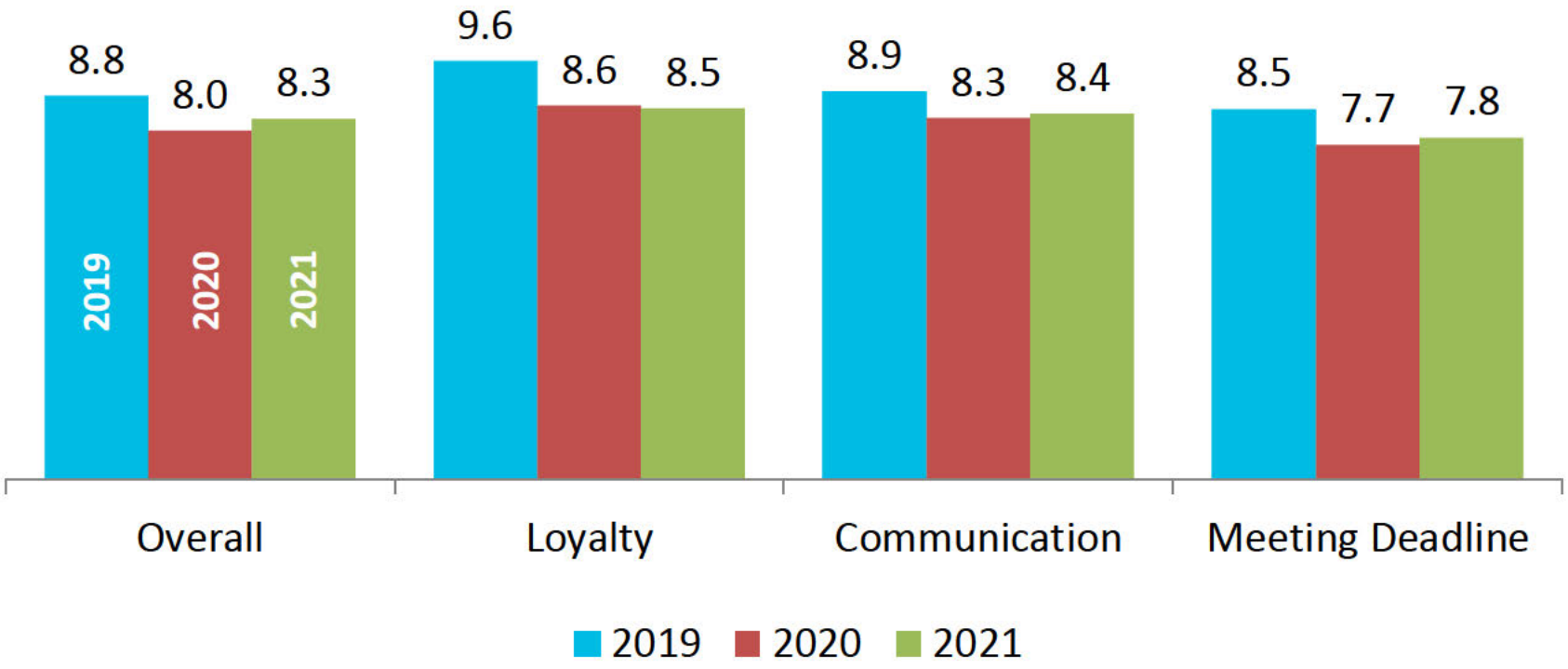
- Both HVAC contractors and home builders remained quite satisfied with their partnership with NW Natural (8.3 out of 10).
  - Homebuilder satisfaction remained unchanged at 7.9.
  - While HVAC contractor satisfaction increased from 8.6 to 8.9.
- A lot of our trade allies are very concern about natural gas ban in both new constructions and conversions and want NW Natural to fight those anti-gas regulations, and a couple of them want us to be more flexible with fees to stay competitive.

Overall Satisfaction with NW Natural

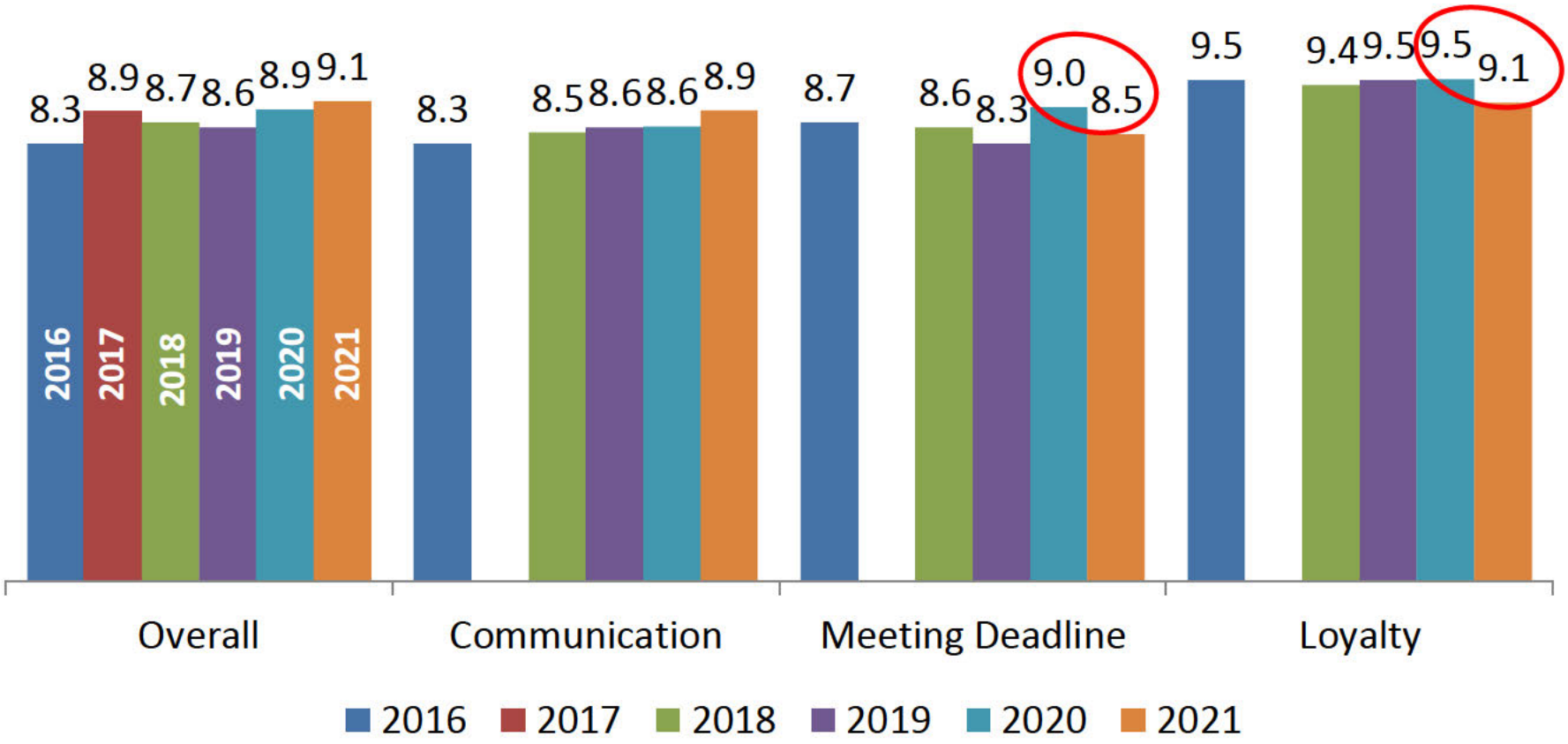
CUB/115
Jenks/27

Overall Satisfaction

(On a scale from 0-10, weighted averages)



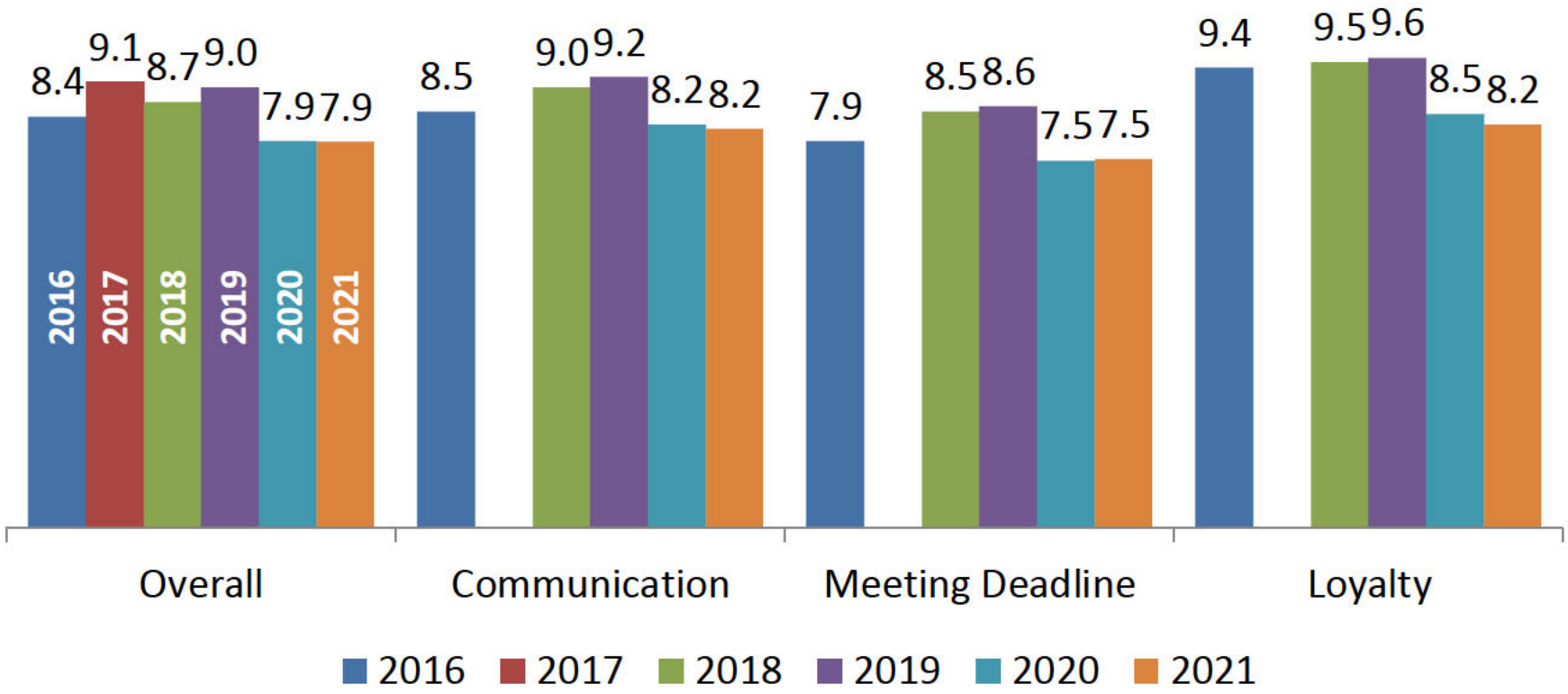
HVAC Contractors Satisfaction History



Note: we only asked a high-level overall satisfaction question in 2017.

CUB/115
Jenks/29

Builders Satisfaction History



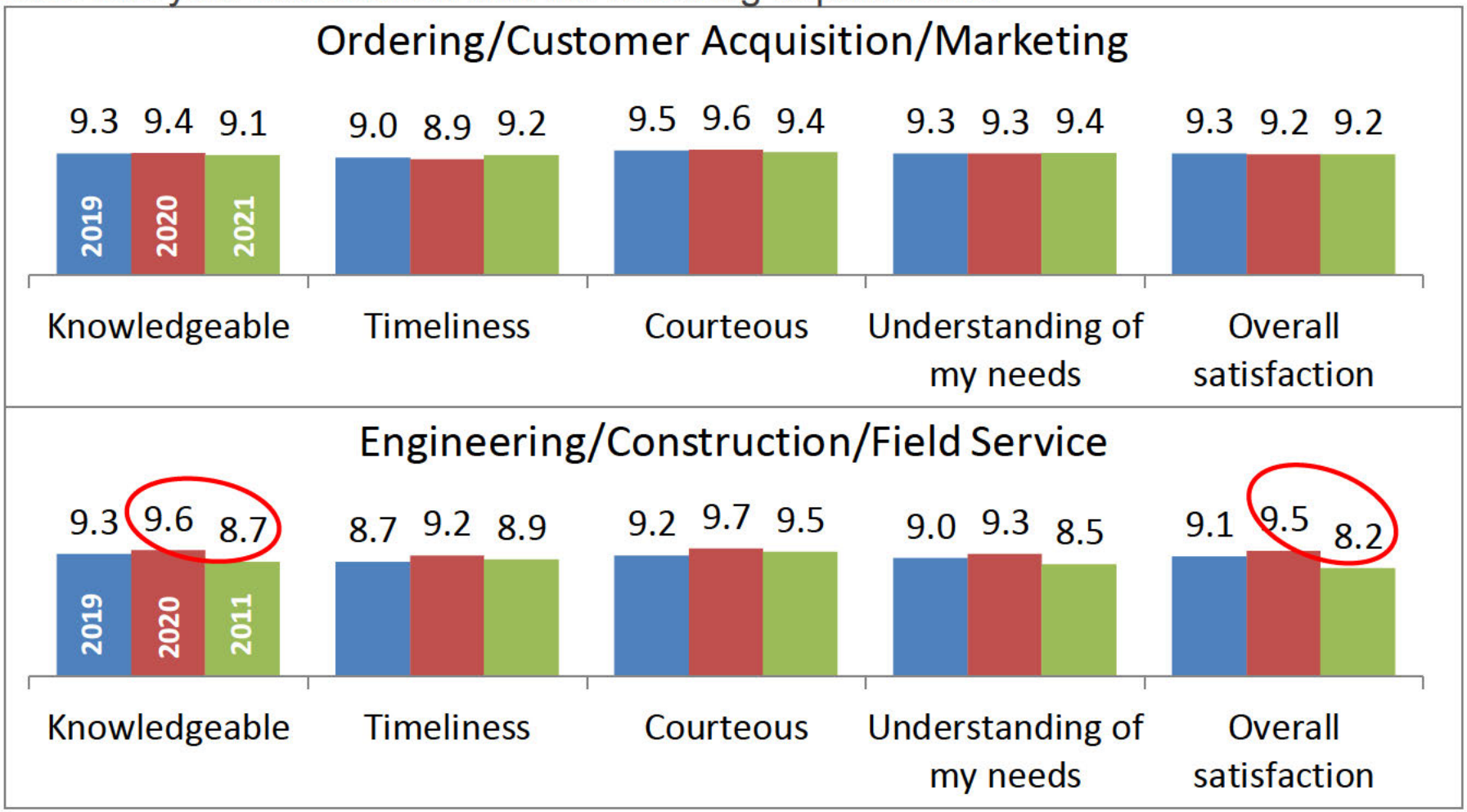
Note: we only asked a high-level overall satisfaction question in 2017.

Staff Interaction Satisfaction

CUB/115
Jenks/31

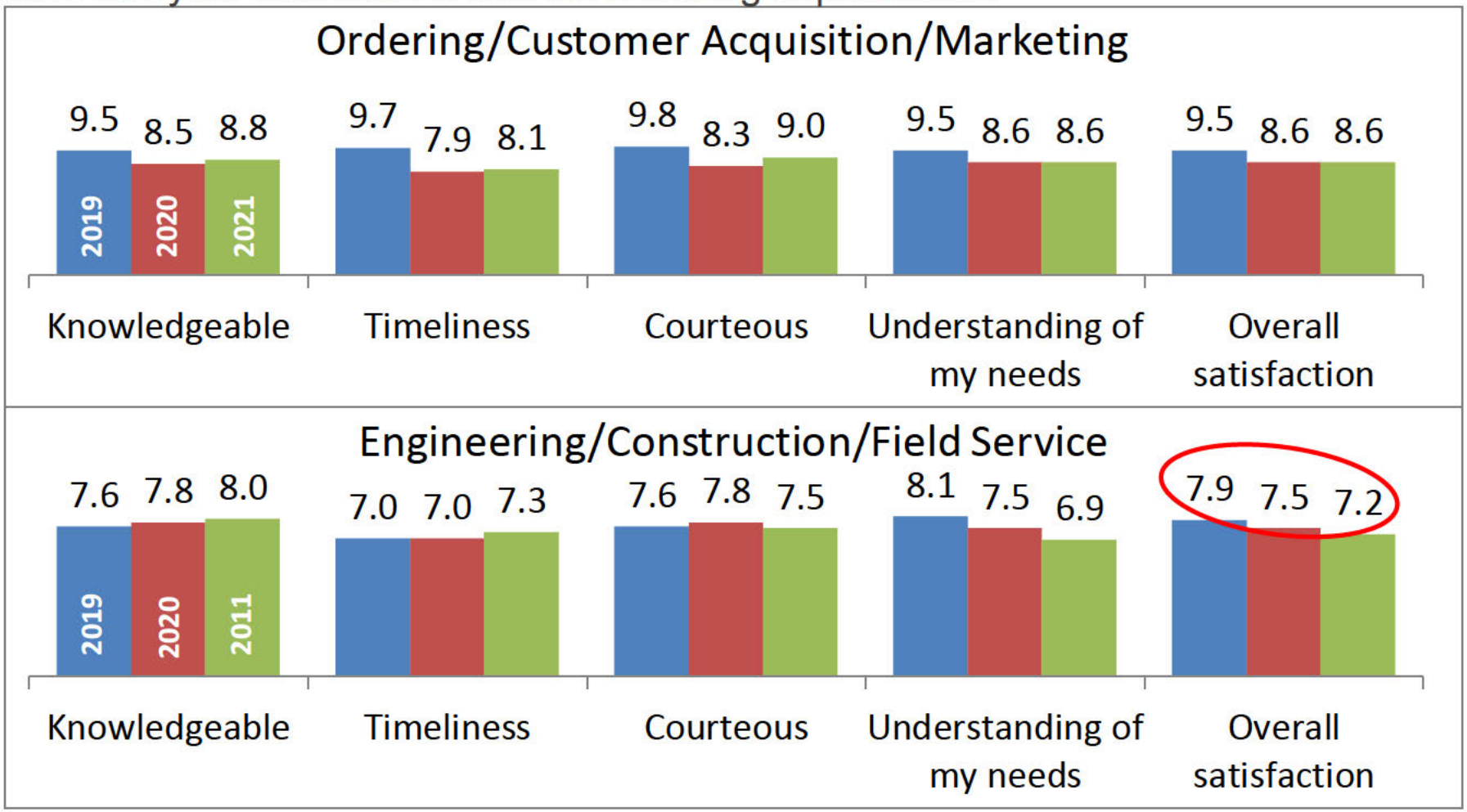
Staff Satisfaction - HVAC

Please rate your satisfaction with the following departments:



Staff Satisfaction - Homebuilders

Please rate your satisfaction with the following departments:



Verbatim

Builder Suggestions

- Understanding cost structures - the gas vs electric situation we are dealing with in SW WA (soon to be OR) better. How we on the developer side can schedule in advance during franchise backfill. Usually, we expect a 2-week lead time before NW natural shows up to install mainline - how can we schedule that in advance or reduce that 2 week "wait time"
- Any of my dissatisfaction is related to cost of install and when it is paid for new subdivisions. If it is not changed there is a good chance that we will stop putting gas in our subdivisions. I understand Washington Code has made it hard on NW Natural. But the unwillingness to let us pay the cost of install at time of home connection rather than a large check up front is not a partnership. We are in other markets in Washington and those has providers have lower install costs and are more flexible than NW Natural. I've been told this is out of NW Natural hands due to regulation, but it seems others have found a way to be flexible and still comply. I urge you to please consider working with builders more by being more flexible
- Loy Clark installers are one of the worse workers on our sites. They do not abide by safety standards and are not courteous on the job. They consistently have no respect for others work and ALWAYS track mud in the street which is against state code. There needs to be some oversight on them from NW Natural.
- Fix the online partner portal so we don't have to submit paper forms.
- Shorten the lead time if possible.
- Your development timelines are getting longer, once PGE gas been approved, our waiting time for NWNG to get in the trench has increased.
- Pressure Washington CODE Agency's to accept GAS!! (SF & MF Residential)
- Re-evaluate the credits and services NW Natural is willing to provide for new construction services. In the past couple years we have had to pay more for installs than we ever have. At a time when electric is being pushed on us from government, we are already fighting a battle to install gas, which doesn't get made easier when we have to pay for it.
- Keep state of Oregon from stopping us from using gas in our new home construction
- Our construction team is just moving towards electric. It's not my decision.

CUB/115
Jenks/35

HVAC Contractor Suggestions

- Got to green tag and set meters faster.
- A little more flexible on the pricing constraints of your promotional programs for leads. The prices are too low especially considering the material costs fluctuations we are experiencing.
- having a direct marketing line to make calls faster and not have to go through the phone tree each time
- Listen to your Partners on Maintenance Programs and Fees.
- Better rebates to upgrade furnaces to the consumer
- A direct line to customer service to follow up on NW Natural Tech notes and existing meter status.
- Service Techs to not price quote for the contractors of what they think things should cost...
- More combined marketing efforts.
- phone people need more experience, tough times right now..

CUB/116
Jenks/1

2019 Natural Gas Safety Online Customer Survey

Market Intelligence, Strategic Planning
January 2019

Research Background

Methodology: Online Survey fielded in December 2019

Sample: 2,000 emails are randomly drawn from gas customer database.

Completion: 259 completed the survey.

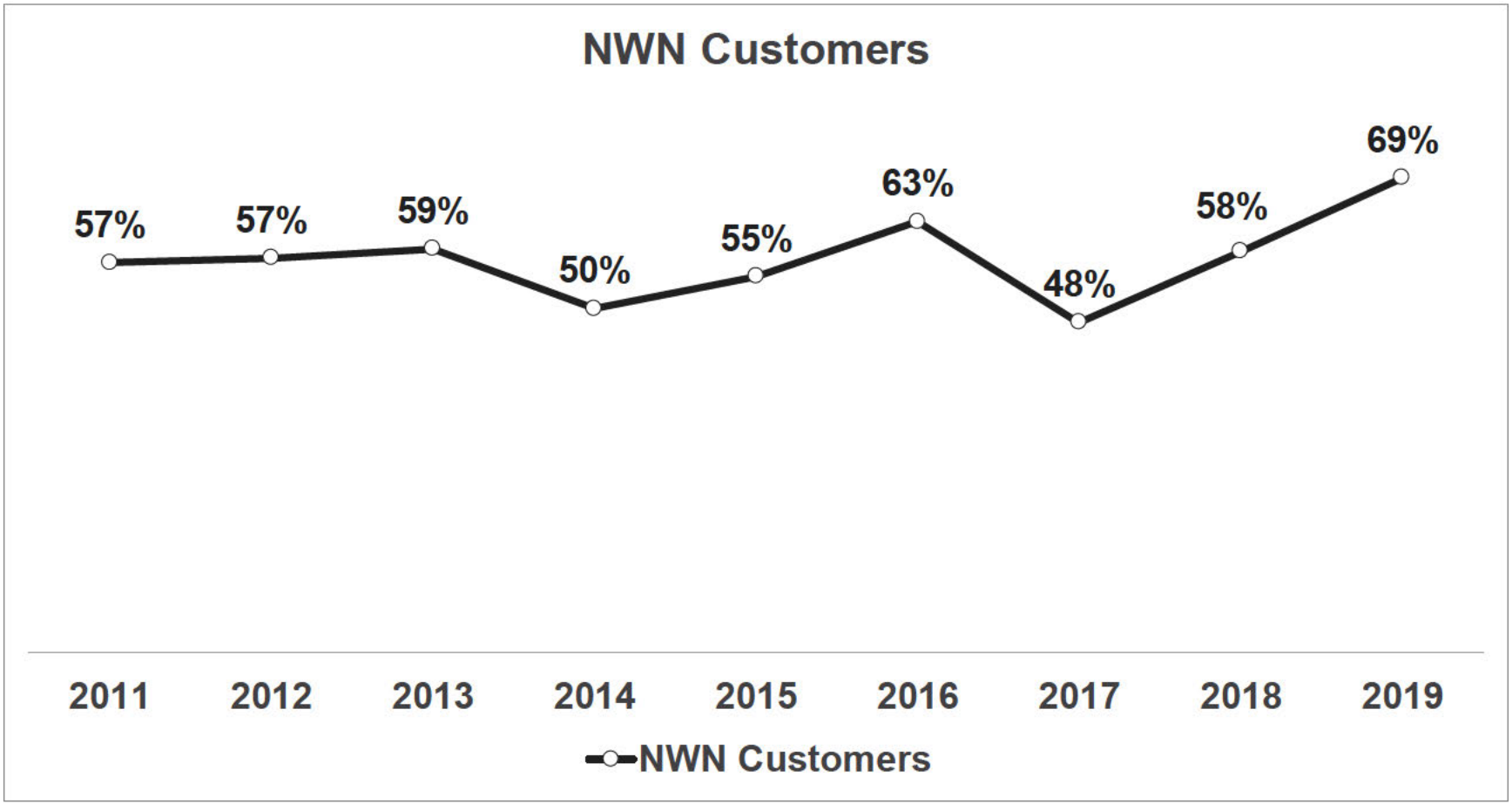
Confidence level: 95%

Margin of error: +/-6%

CUB/116
Jenks/3

Awareness of Natural Gas Safety

In the past year, have you seen or heard any information relating to natural gas safety?



What Did the Safety Information Say

	Customers
Gas smells like rotten eggs/Company made it smell bad	29%
If you smell gas, leave	37%
Call the gas company if you smell gas	46%
Safety instructions/Be careful/Check pilot is lit	8%
Call before you dig/Locate pipelines/Care digging	8%
What to do with leak/Turn off gas/Know shutoff	6%
Other (price/product info, annual check-up)	13%

5% of our customers recalled some news about natural gas incidents around the county.

Where did you see or hear that information

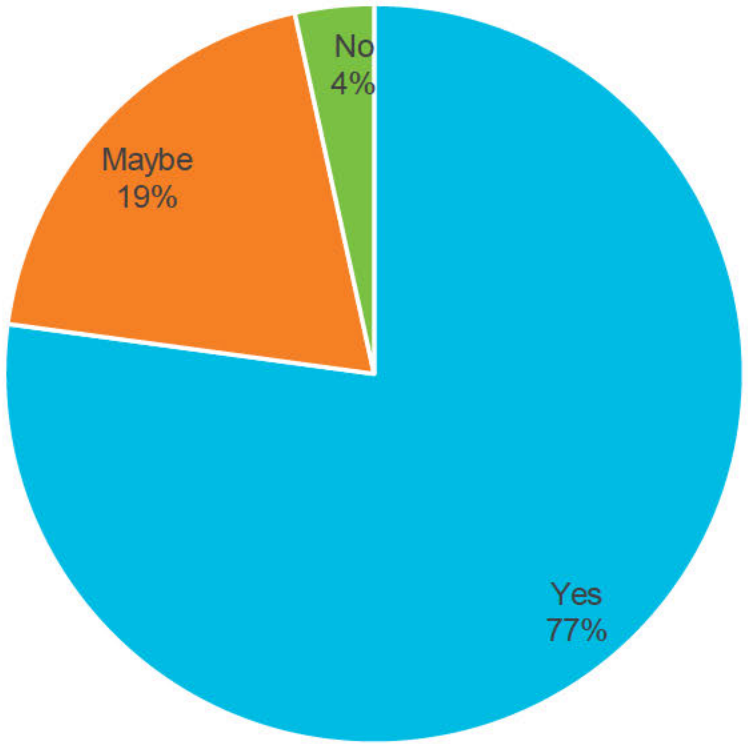
Media Channel	Customers
TV news, Commercial, General	48%
Gas company brochure/ Handout / Mailer	35%
Newspaper or Magazine Ad/ Article	6%
Radio Ad/ Item	6%
Meeting/ Community Event/ Word of Mouth	5%

CUB/116
Jenks/6

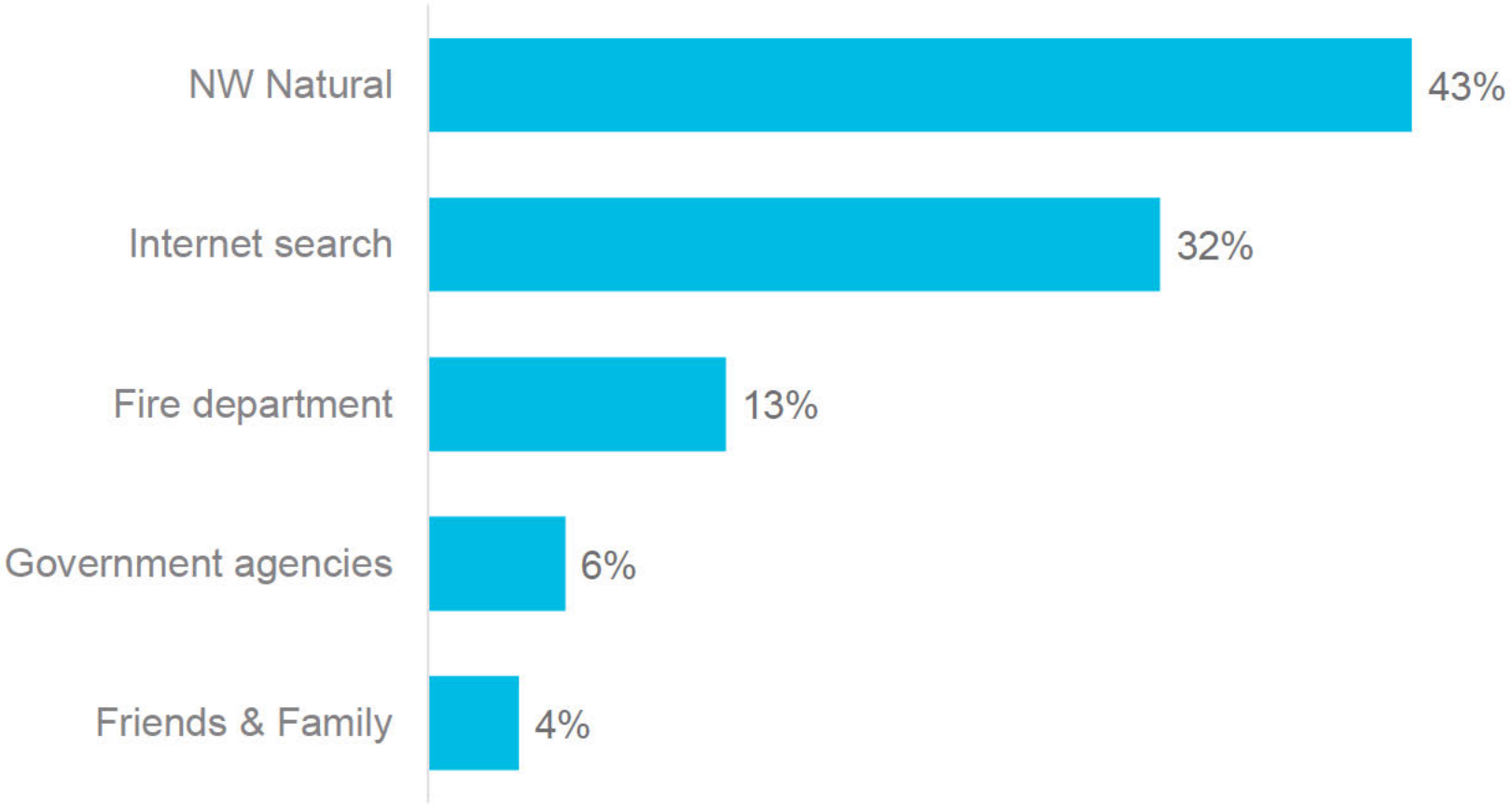
Feel Safe around natural gas

- Most customers surveyed (77% yes and 19% maybe) said they feel safe around natural gas.
- Only 4% of them do not feel safe around natural gas, most of them are afraid of natural gas leak and explosions.
  - One claimed that they need leak sensors to detect gas leaks.
  - Another said that the gas company might charged for odor calls.

Do you feel safe around natural gas?



Natural Gas Safety Message Preferred Source



What Does Natural Gas Smell Like to You

	Customers
Eggs/Bad, rotten eggs	81%
Sulphur	14%
Something really awful/Stinky	3%
I don't know, but have smelled it	3%
Butane/Propane/Gasoline/Gas	3%
Broccoli/Onions/Garlic/Cabbage	1%
Unique/Distinctive/Special Odor	0%

What Would You Do If You Smelled Natural Gas

	Customers
Call the utility/Gas Company	63%
Leave the area/Get kids out	59%
Call 911/Fire department	24%
Turn off the valve/Gas Source	14%
Check appliances/Look for source	8%
Open windows/doors	3%
Others	2%

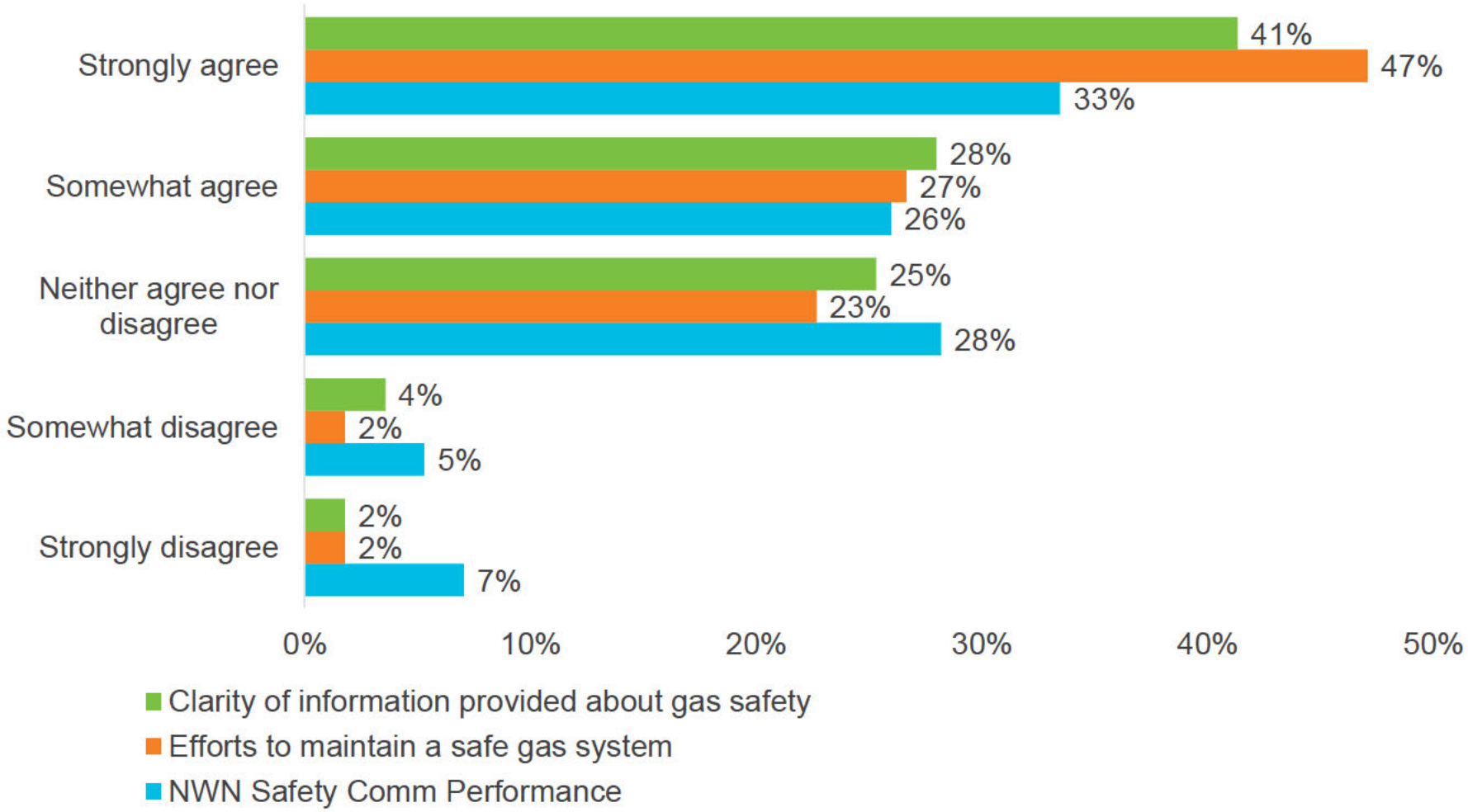
CUB/116
Jenks/10

Smell, Go, Let Us Know Messaging

	Customers
All steps	41%
Part of the message	23%
Don't know or other messages	37%

CUB/116
Jenks/11

NW Natural Safety Communication Performance



CUB/116
Jenks/12

NW Natural Safety Communication Performance verbatim

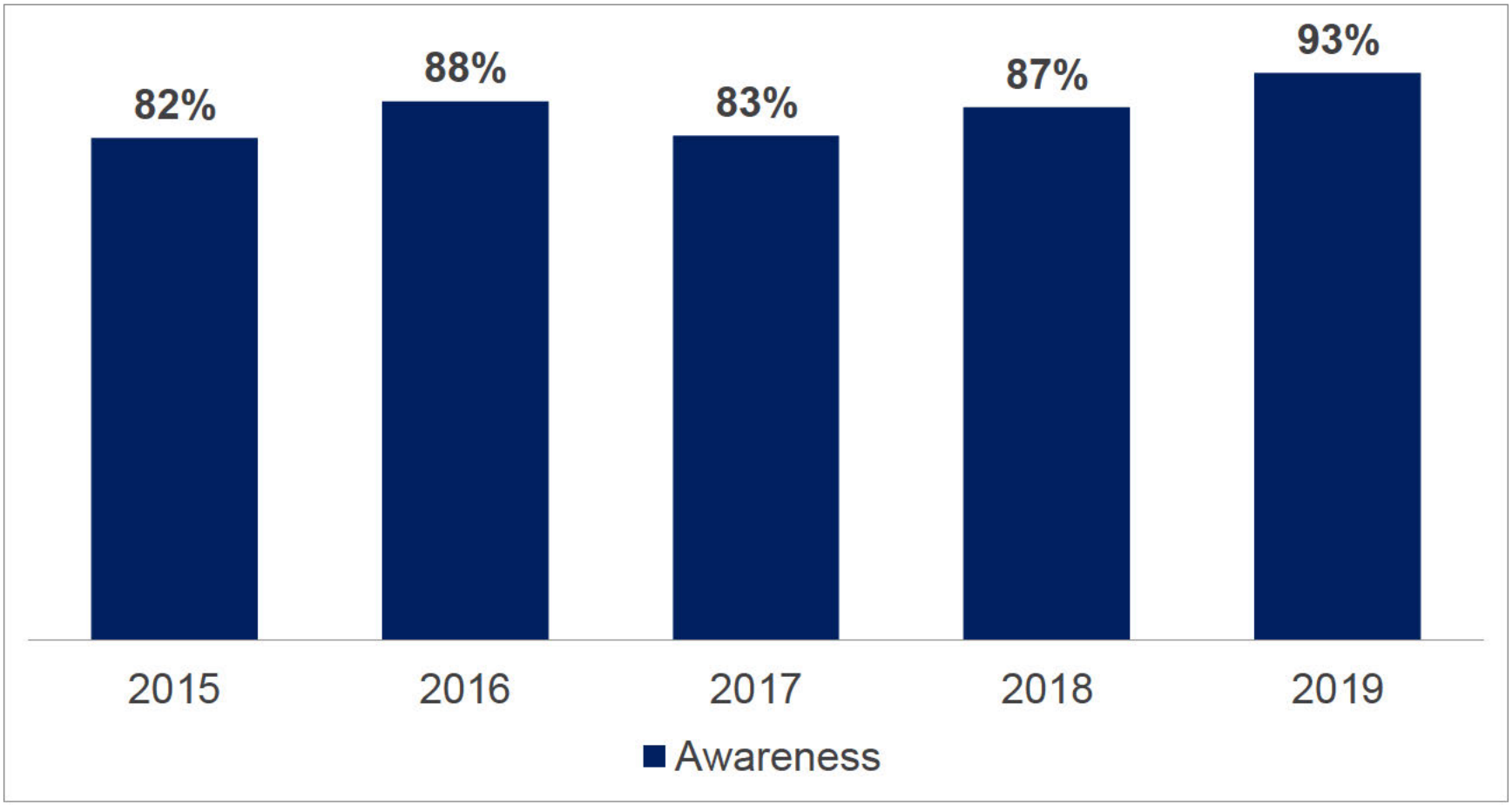
Why not

- Most of the 26 people actually could not tell why they believed that NW Natural does not do a good job.

Why

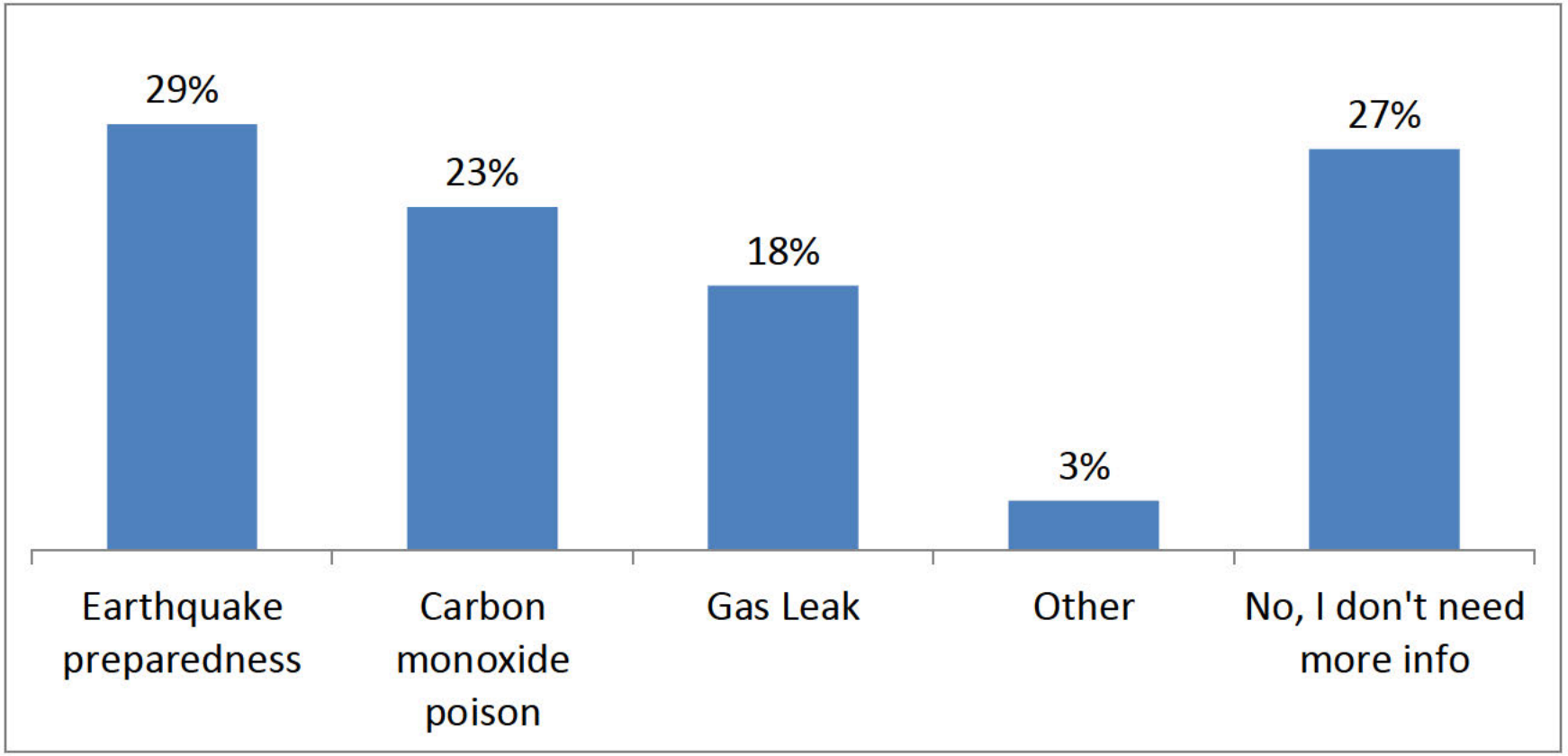
- Customers recalled seeing safety TV commercials on a regular basis.
- They also remembered reading safety messages in their bill inserts.
- A few of them also said that they received safety information through emails.

Awareness of Call Before You Dig



More Safety Information Needed

Would you like to receive more information about any of the following topics?



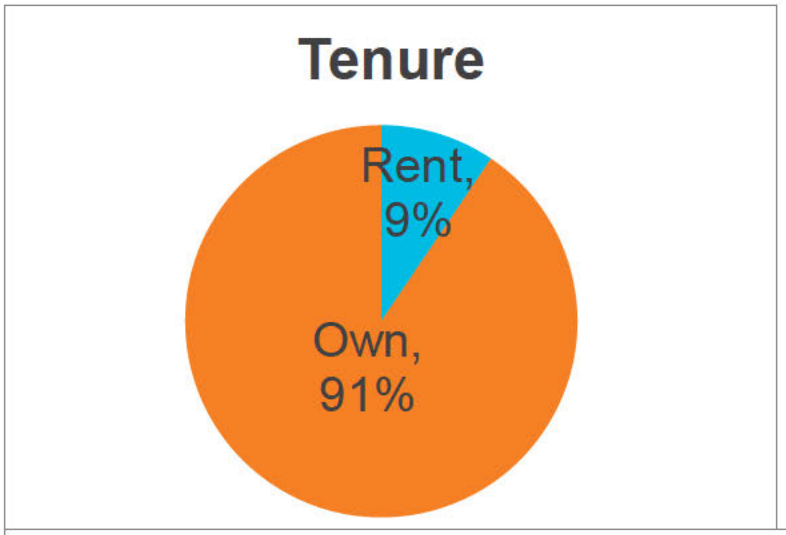
CUB/116
Jenks/15

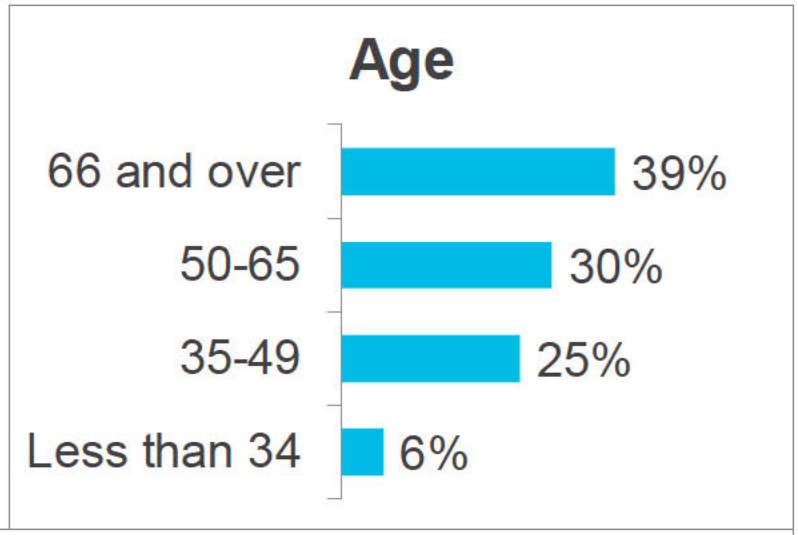
Importance of News Sources

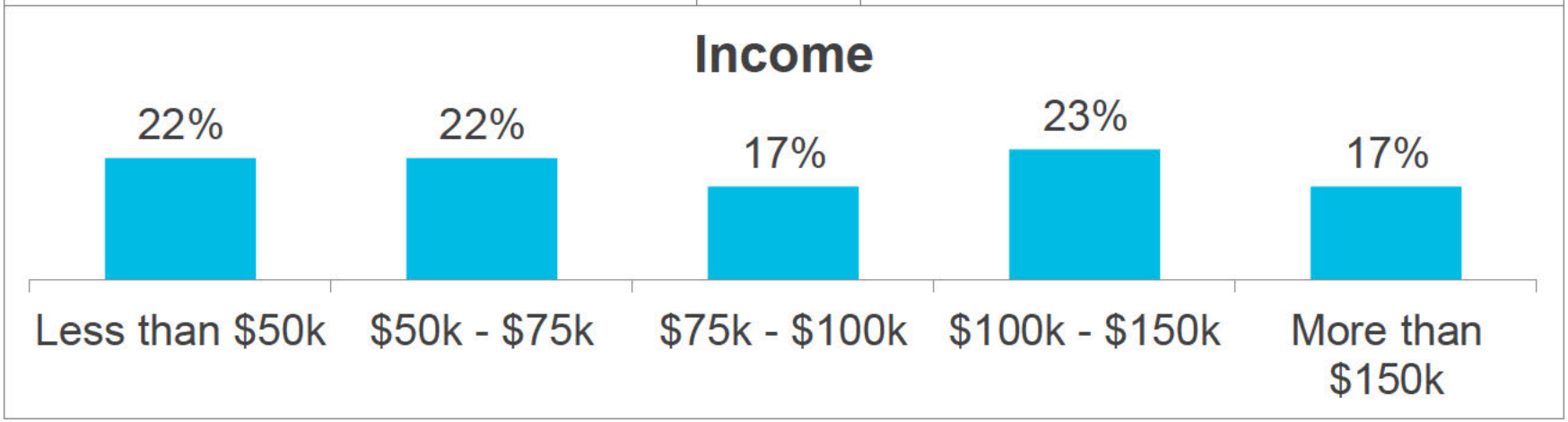
please rate how important the following sources of news and information are to you on 5 point scale. (1 – extremely important, 5 – not at all important)

CUB/116
Jenks/16

Demographic Information







CUB/116
Jenks/17

2020 Natural Gas Safety Customer Survey

Market Intelligence, Strategic Planning
January 2021

CUB/116
Jenks/18

Research Background

Methodology: Online Survey fielded in December 2020

Sample: 2,000 emails are randomly drawn from gas customer database.

Completion: 265 completed the survey.

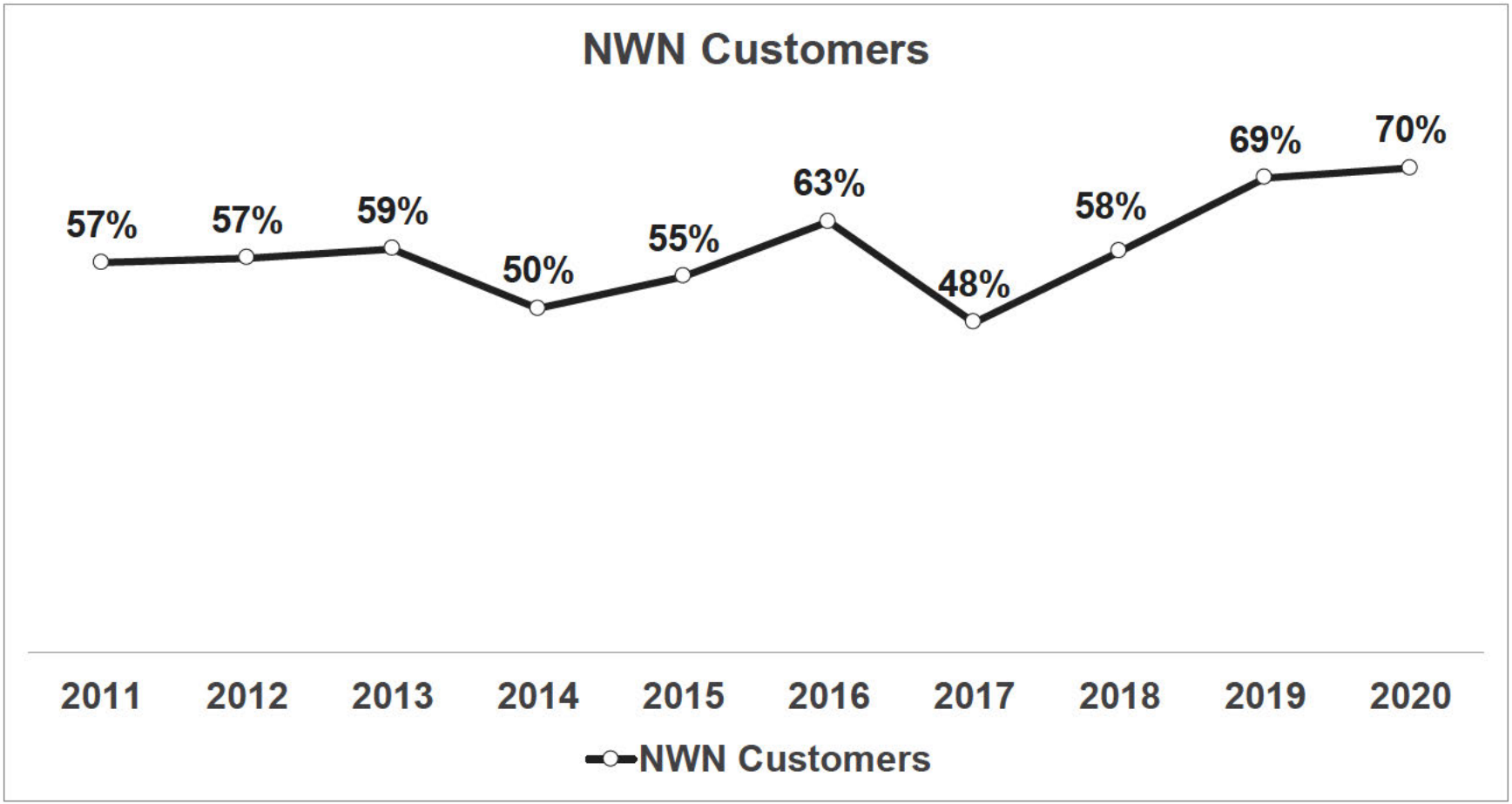
Confidence level: 95%

Margin of error: +/-6%

CUB/116
Jenks/19

Awareness of Natural Gas Safety

In the past year, have you seen or heard any information relating to natural gas safety?



CUB/116
Jenks/20

What Did the Safety Information Say

	Customers
Gas smells like rotten eggs/Company made it smell bad	40%
If you smell gas, leave	45%
Call the gas company if you smell gas	52%
Safety instructions/Be careful/Check pilot is lit	9%
Call before you dig/Locate pipelines/Care digging	5%
What to do with leak/Turn off gas/Know shutoff	6%
Other (price/product info, annual check-up)	12%

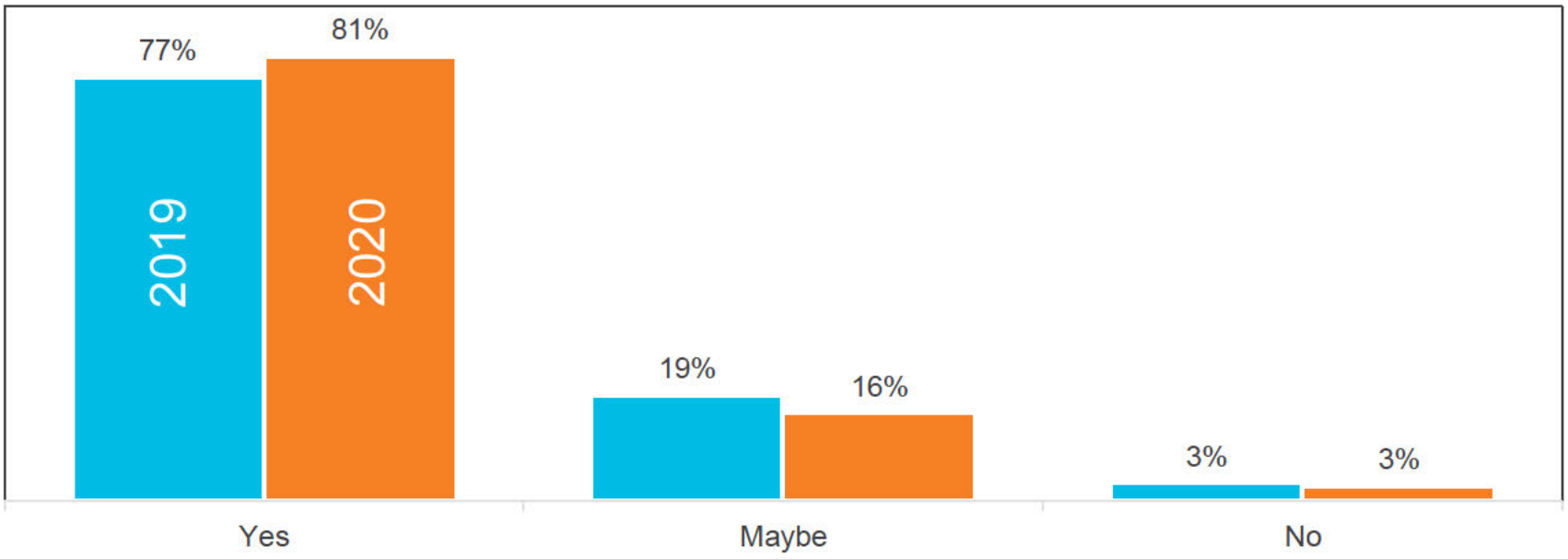
Where did you see or hear that information

Media Channel	Customers
TV news, Commercial, General	40%
Gas company brochure/ Handout / Mailer	41%
Newspaper or Magazine Ad/ Article	4%
Radio Ad/ Item	7%
Meeting/ Community Event/ Word of Mouth	8%

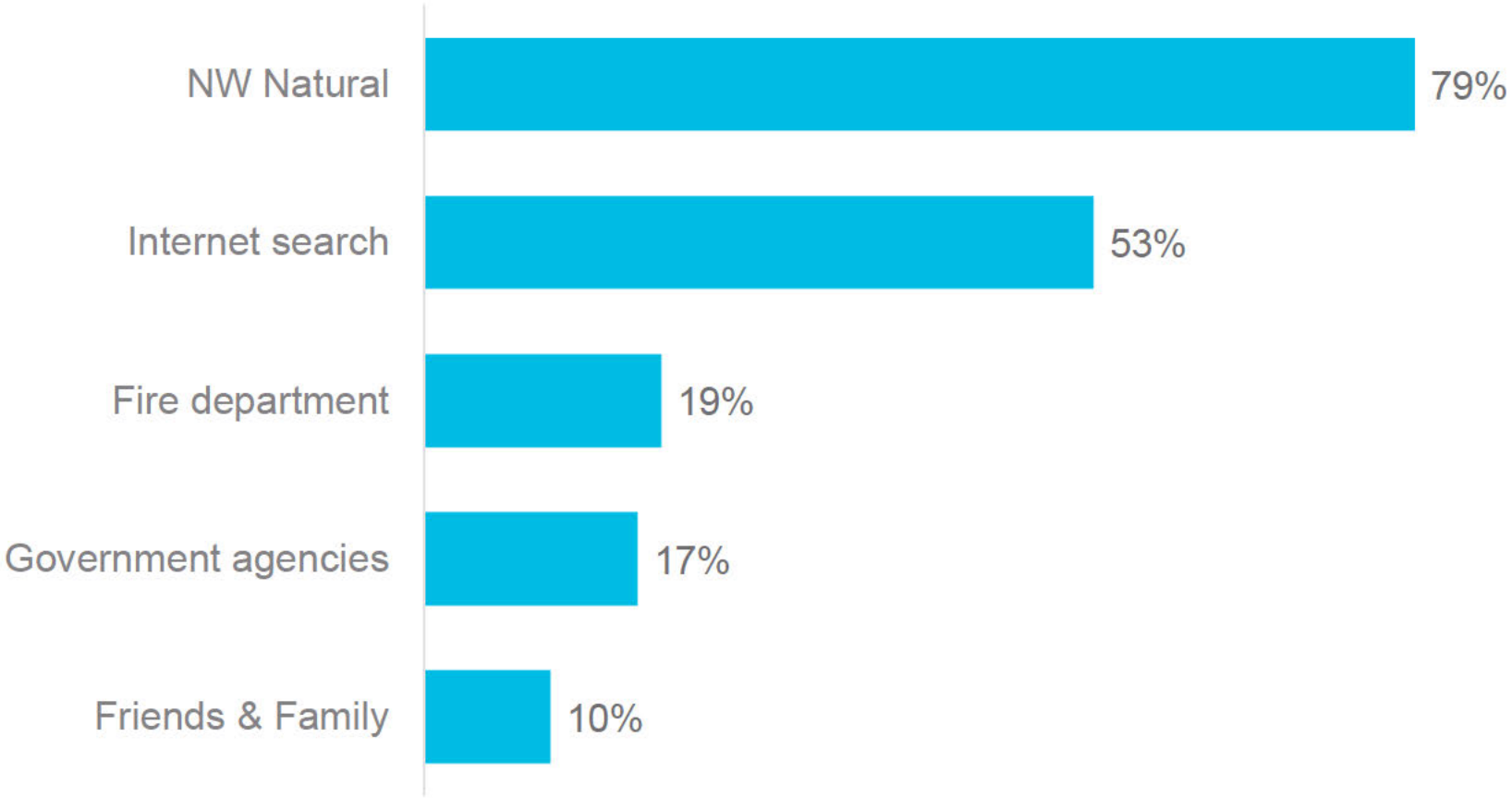
CUB/116
Jenks/22

Feel Safe around natural gas

- Most customers surveyed (81% yes and 16% maybe) said they feel safe around natural gas, a slight increase from the previous year.
- Only 3% of them do not feel safe around natural gas, most of them are afraid of natural gas leak and explosions.



Natural Gas Safety Message Preferred Source



What Does Natural Gas Smell Like to You

	Customers
Eggs/Bad, rotten eggs	87%
Sulphur	16%
Something really awful/Stinky	2%
I don't know, but have smelled it	2%
Butane/Propane/Gasoline/Gas	1%
Broccoli/Onions/Garlic/Cabbage	1%
Unique/Distinctive/Special Odor	2%

CUB/116
Jenks/25

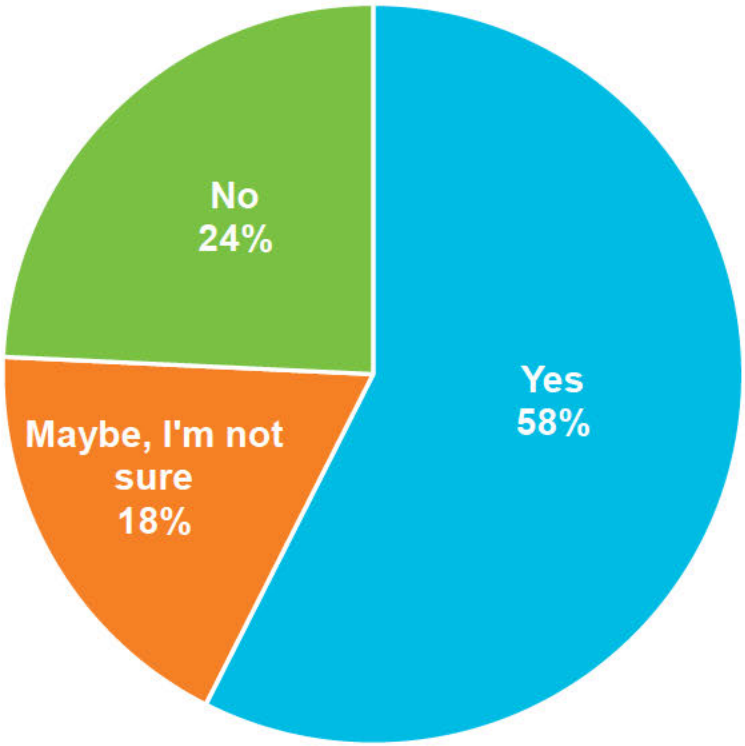
What Would You Do If You Smelled Natural Gas

	Customers
Call the utility/Gas Company	76%
Leave the area/Get kids out	54%
Call 911/Fire department	19%
Turn off the valve/Gas Source	14%
Check appliances/Look for source	15%
Open windows/doors	6%

CUB/116
Jenks/26

Smell, Go, Let Us Know Messaging

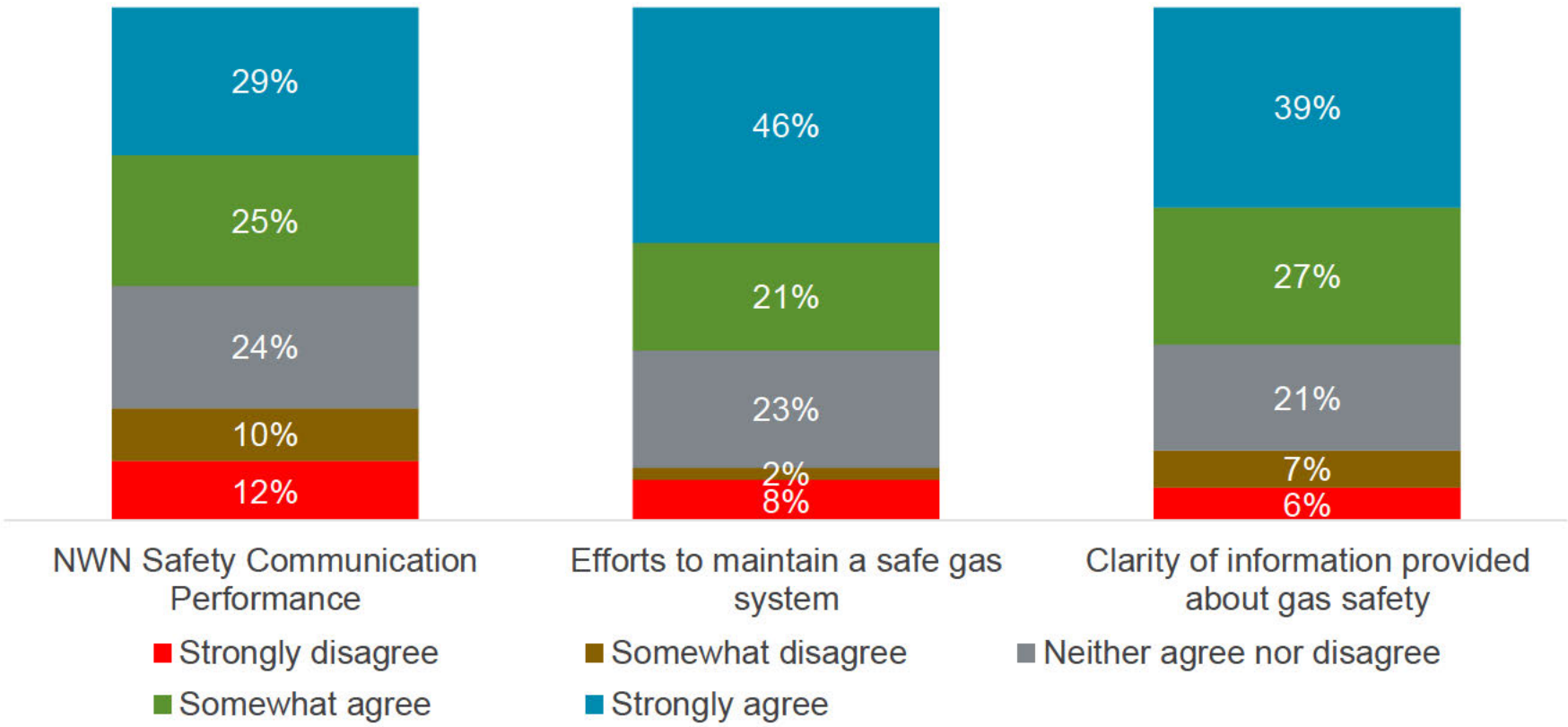
Have you seen or heard the ads outlining the steps you should take if you suspect a gas leak?



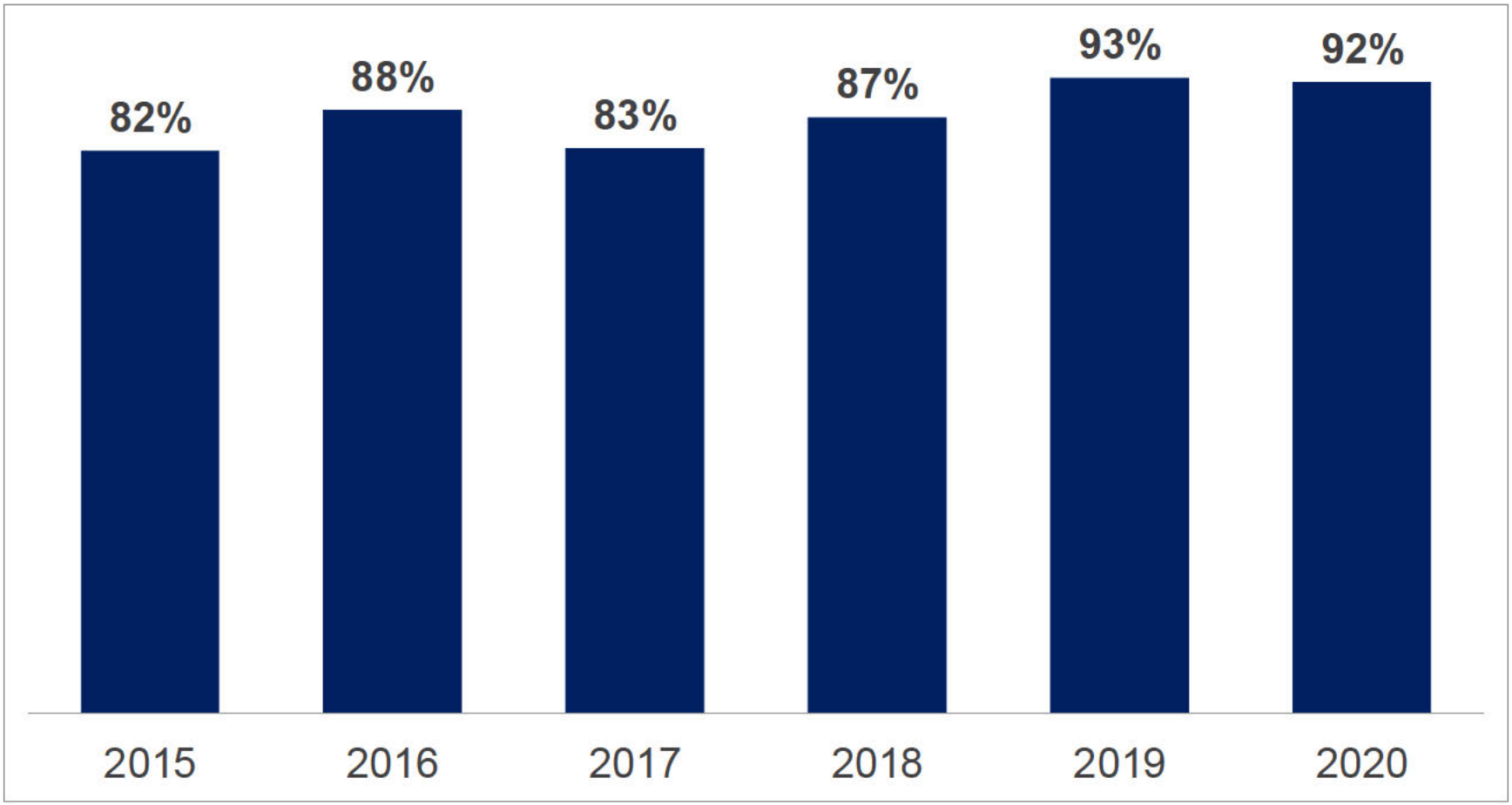
CUB/116
Jenks/27

NW Natural Safety Communication Ratings

How would you rate NW Natural on the following?

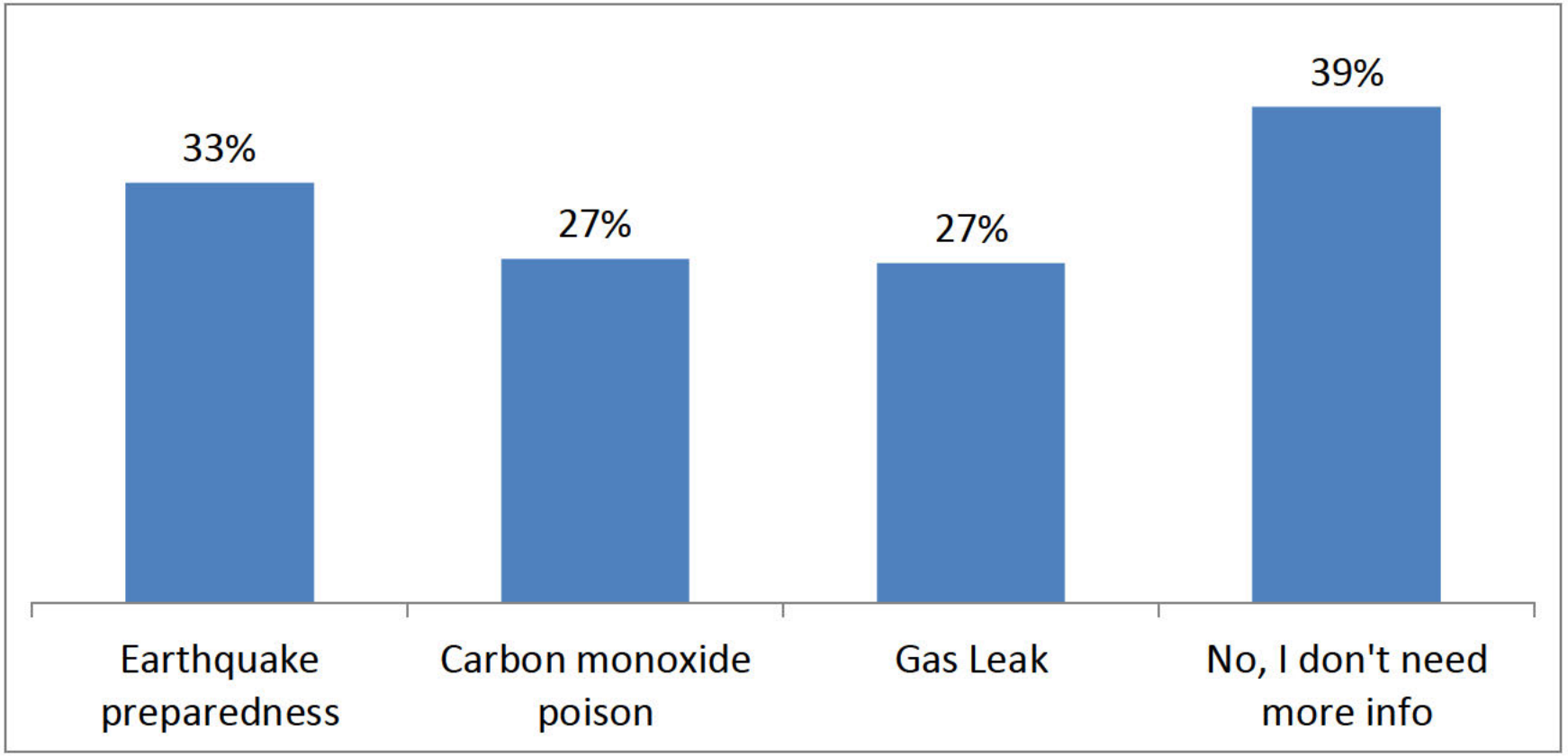


Awareness of Call Before You Dig



More Safety Information Needed

Would you like to receive more information about any of the following topics?



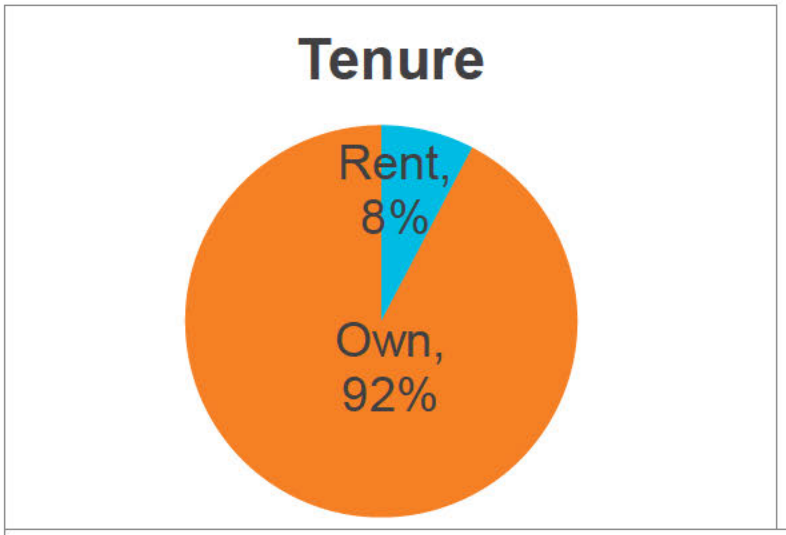
CUB/116
Jenks/30

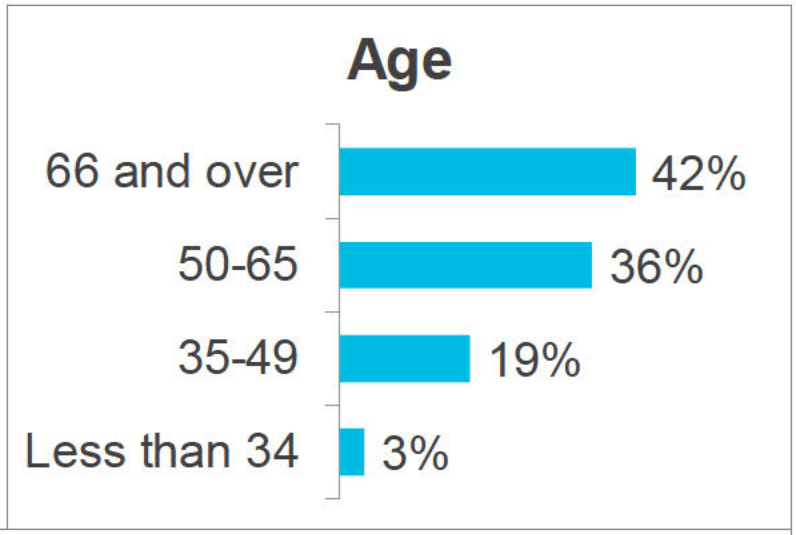
Importance of News Sources

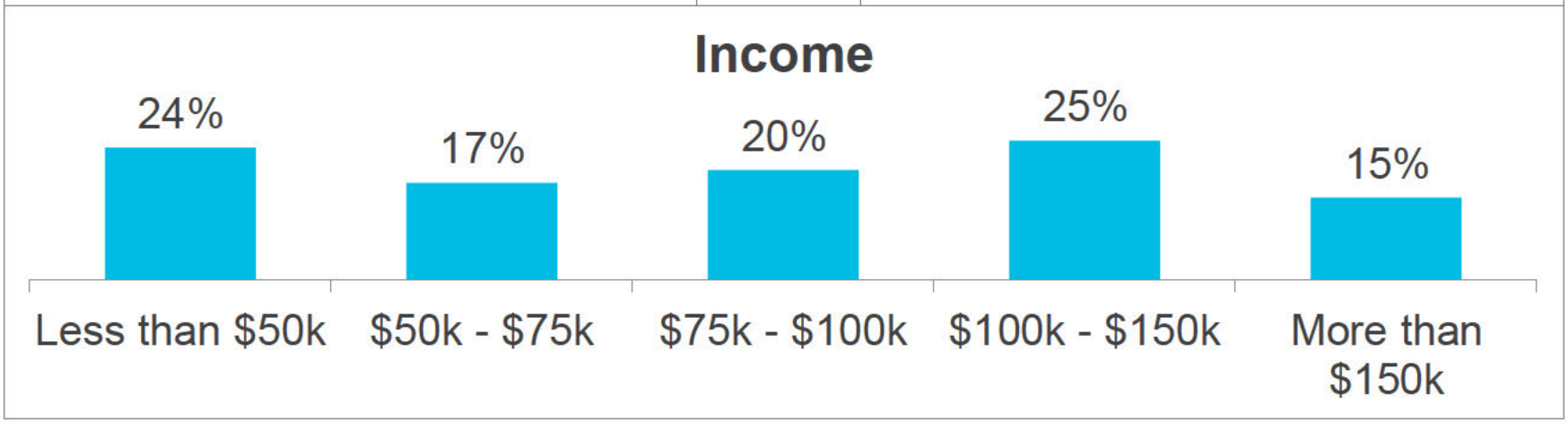
please rate how important the following sources of news and information are to you on 5 point scale. (5 – extremely important, 1 – not at all important)

CUB/116
Jenks/31

Demographic Information







2021 Natural Gas Safety Customer Survey

Market Intelligence, Strategic Planning
January 2022

Research Background

Methodology: Online Survey fielded in December 2021

Sample: 4,000 emails are randomly drawn from gas customer database.

Completion: 254 completed the survey.

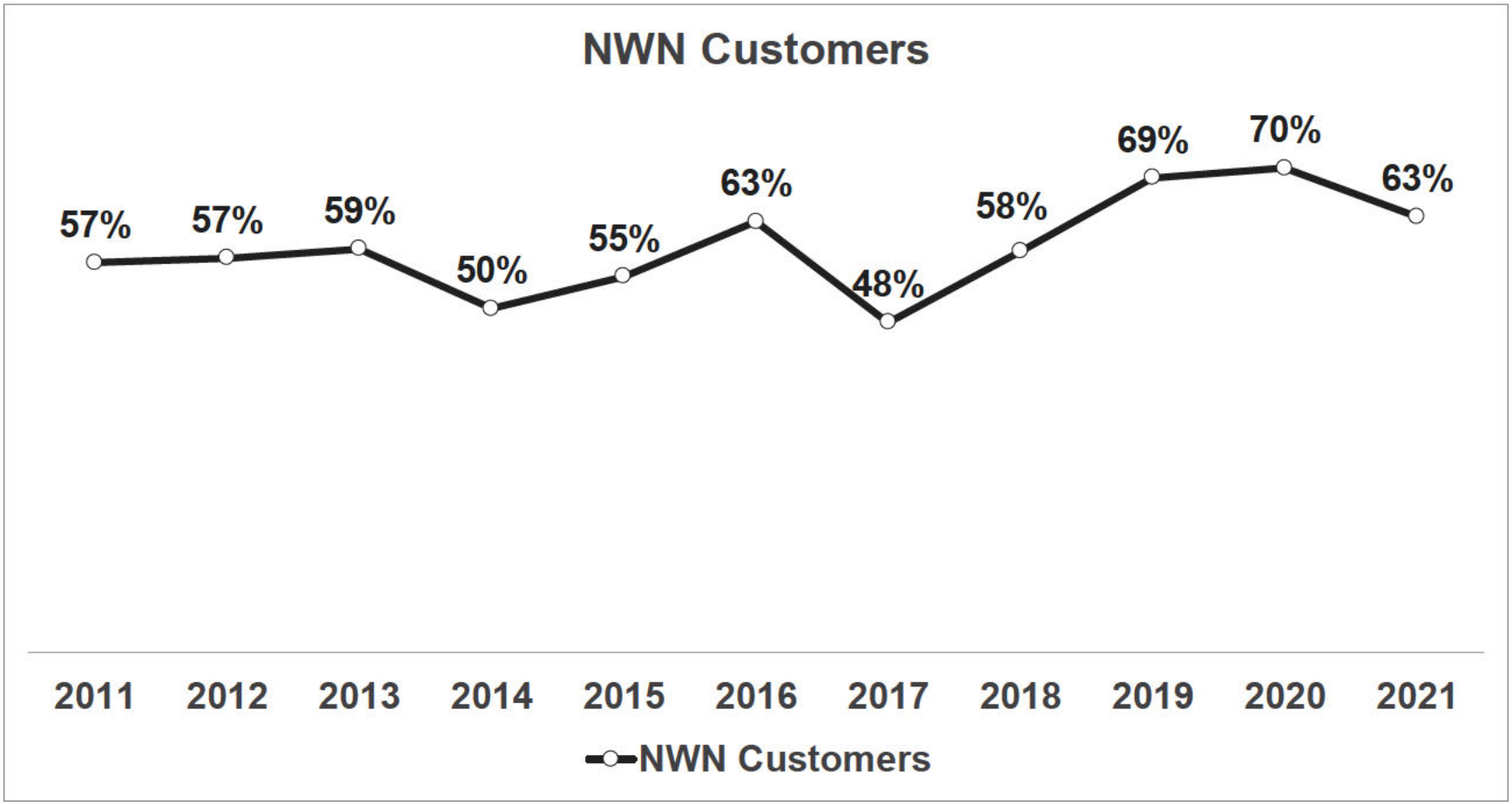
Confidence level: 95%

Margin of error: +/-6%

CUB/116
Jenks/34

Awareness of Natural Gas Safety

In the past year, have you seen or heard any information relating to natural gas safety?



CUB/116
Jenks/35

What Did the Safety Information Say

	Customers
Gas smells like rotten eggs/Company made it smell bad	43%
If you smell gas, leave	37%
Call the gas company if you smell gas	44%
Safety instructions/Be careful/Check pilot is lit	6%
Call before you dig/Locate pipelines/Care digging	12%
What to do with leak/Turn off gas/Know shutoff	7%
Other (price/product info, annual check-up)	11%

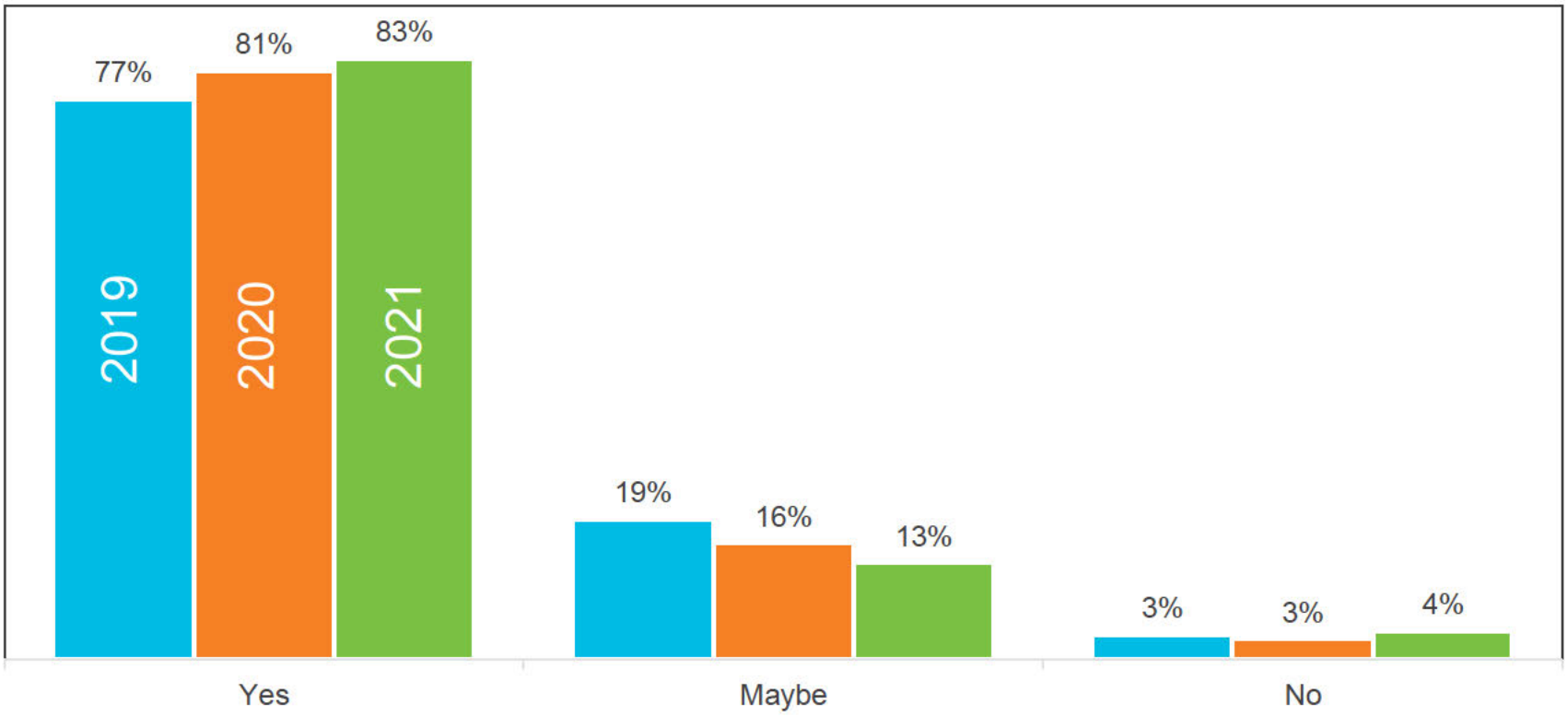
Where did you see or hear that information

Media Channel	Customers
Gas company brochure/ Handout / Mailer	44%
TV news, Commercial, General	39%
Newspaper or Magazine Ad/ Article	8%
Meeting/ Community Event/ Word of Mouth	5%
Radio Ad/ Item	4%

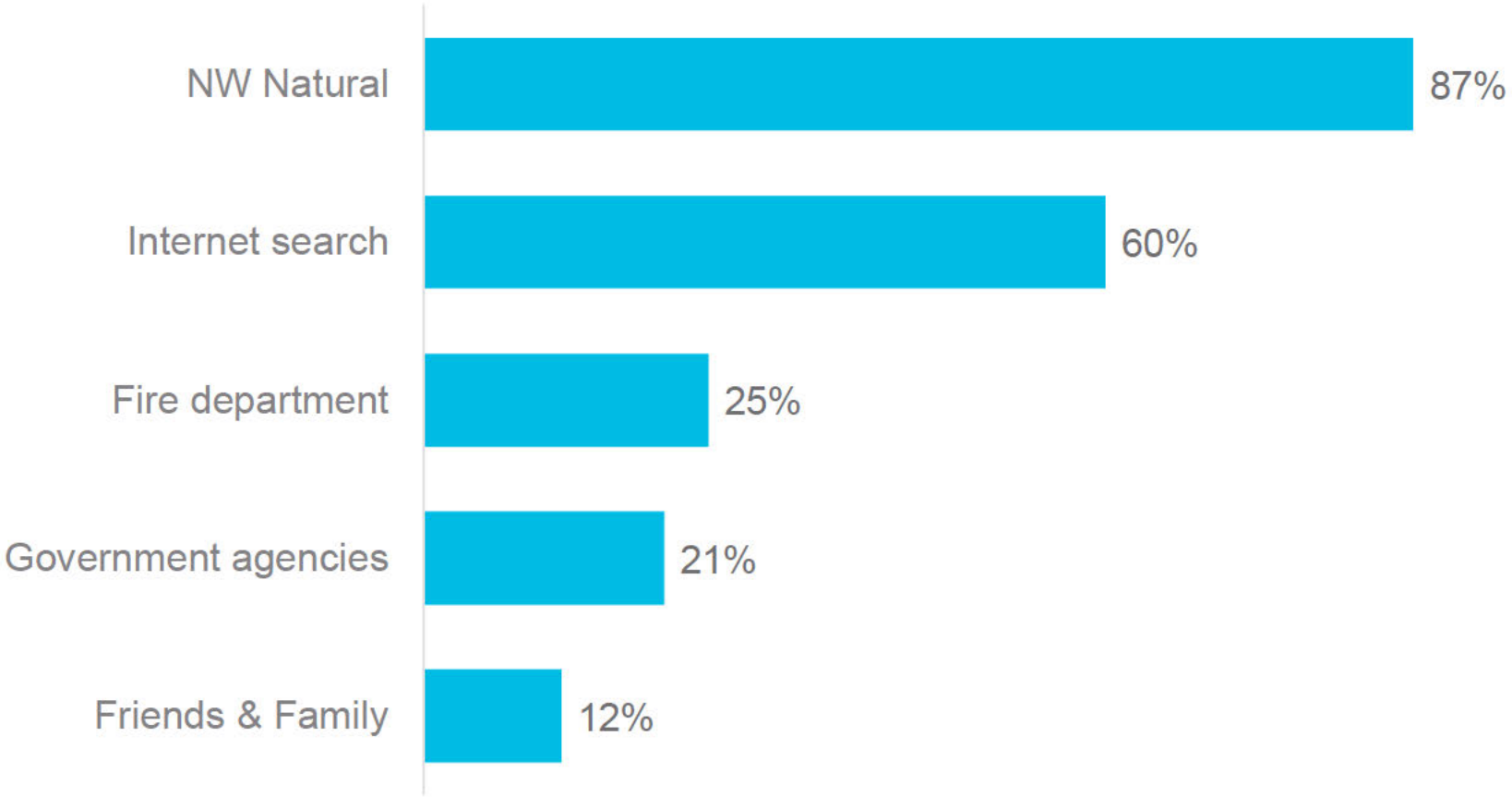
CUB/116
Jenks/37

Feel Safe around natural gas

Do you feel safe around natural gas?



Natural Gas Safety Message Preferred Source



What Does Natural Gas Smell Like to You

	Customers
Eggs/Bad, rotten eggs	85%
Sulphur	16%
I don't know, but have smelled it	3%
Butane/Propane/Gasoline/Gas	3%
Broccoli/Onions/Garlic/Cabbage	3%

CUB/116
Jenks/40

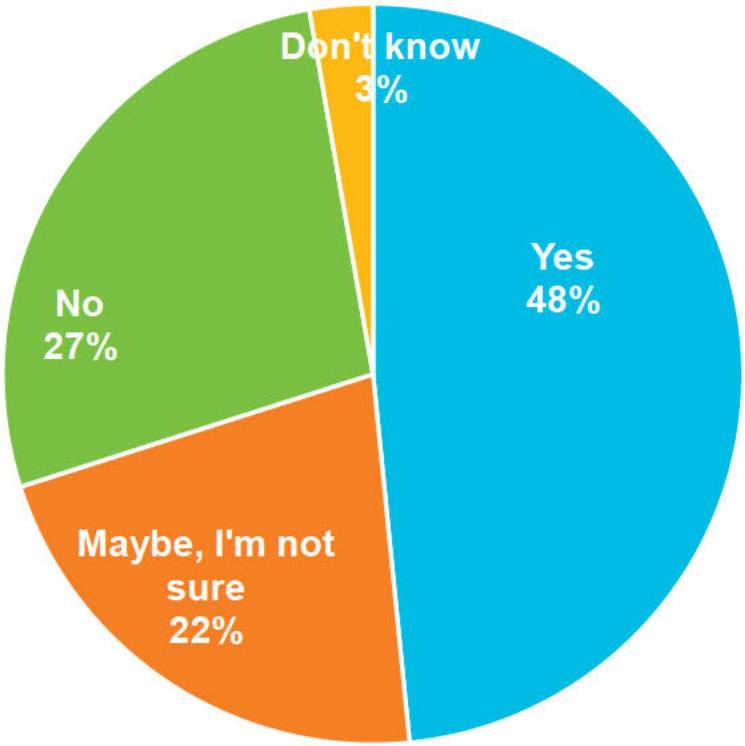
What Would You Do If You Smelled Natural Gas

	Customers
Call the utility/Gas Company	69%
Leave the area/Get kids out	56%
Call 911/Fire department	16%
Turn off the valve/Gas Source	18%
Check appliances/Look for source	13%
Open windows/doors	9%

CUB/116
Jenks/41

Smell, Go, Let Us Know Messaging

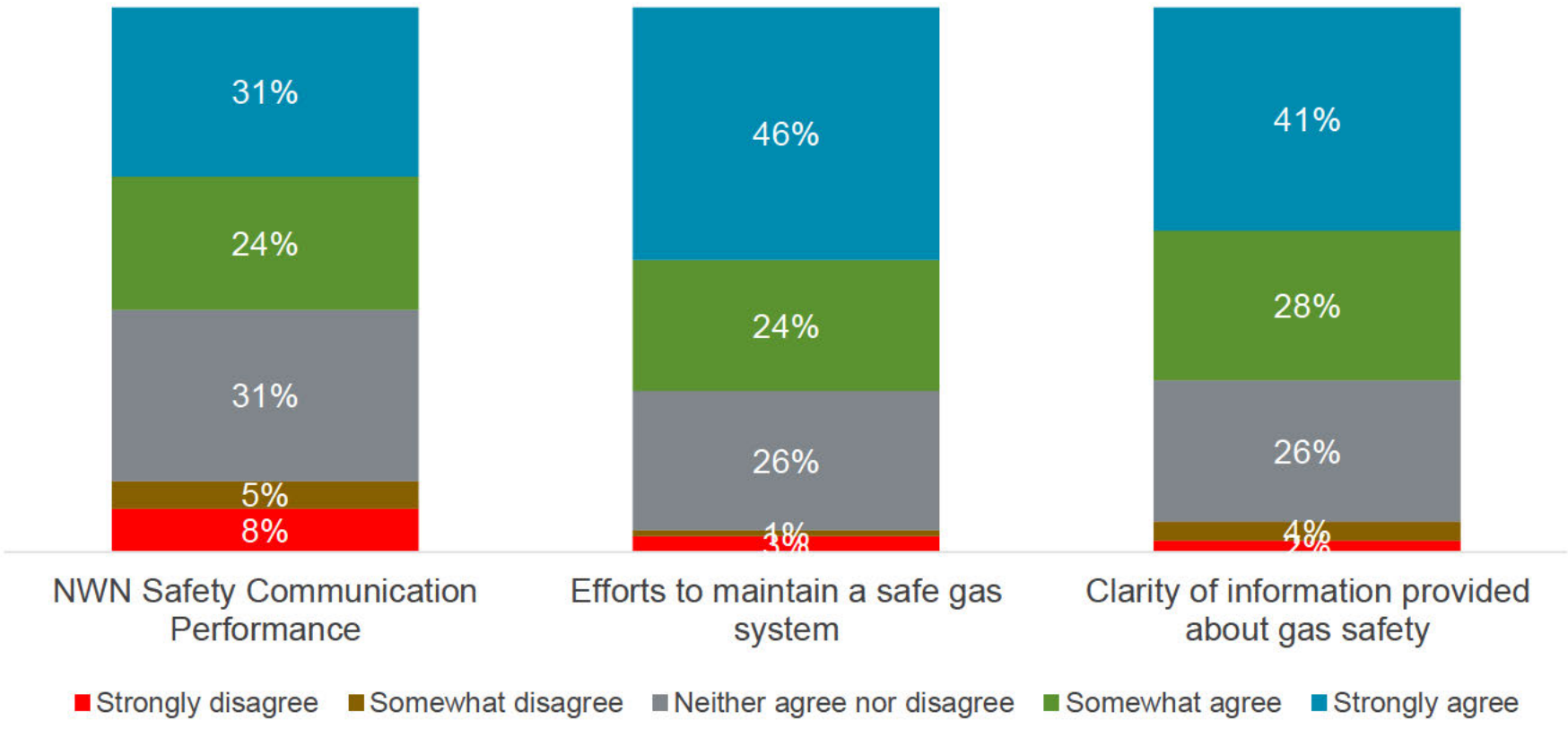
Have you seen or heard the ads outlining the steps you should take if you suspect a gas leak?



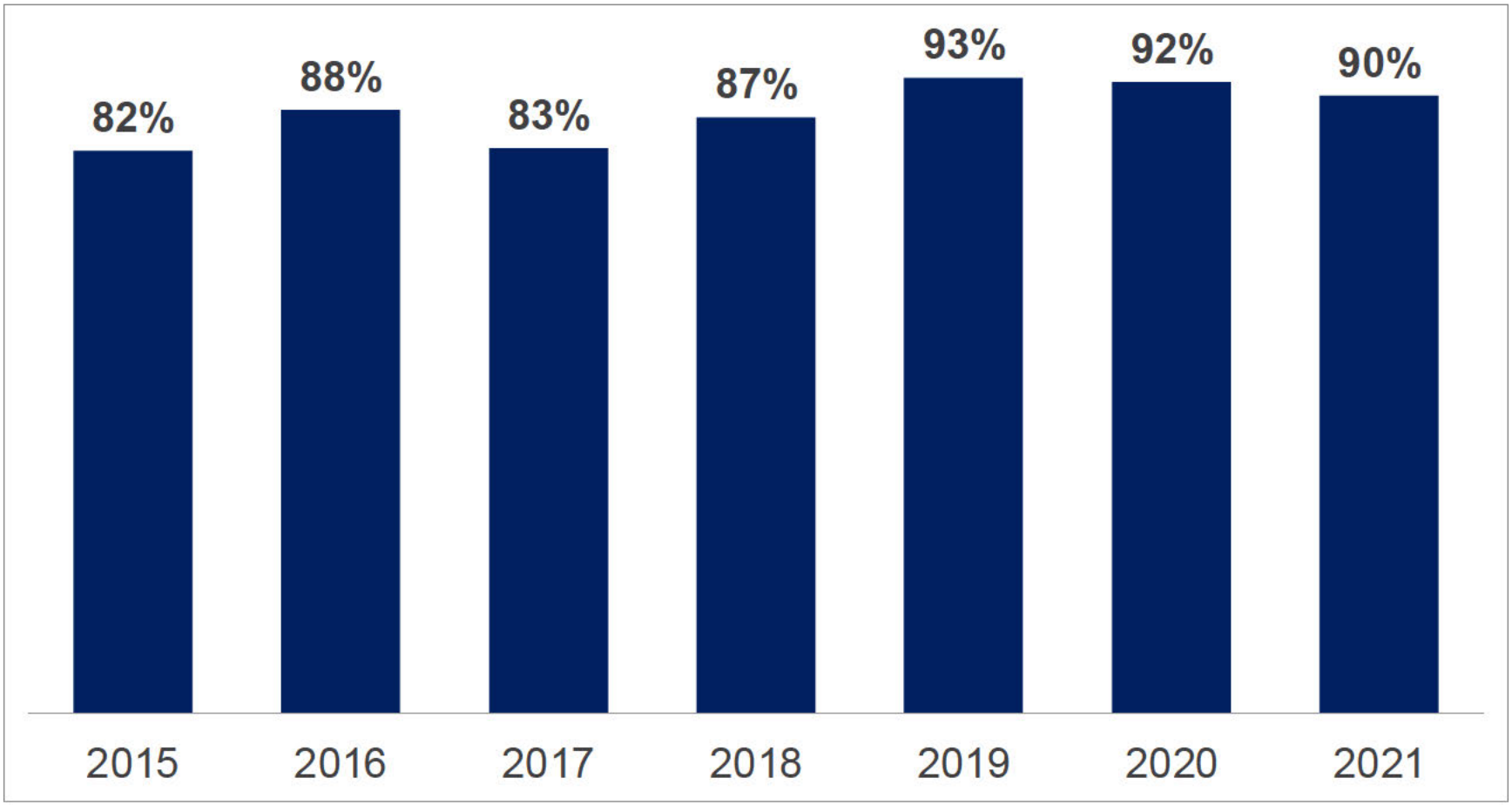
CUB/116
Jenks/42

NW Natural Safety Communication Ratings

How would you rate NW Natural on the following?

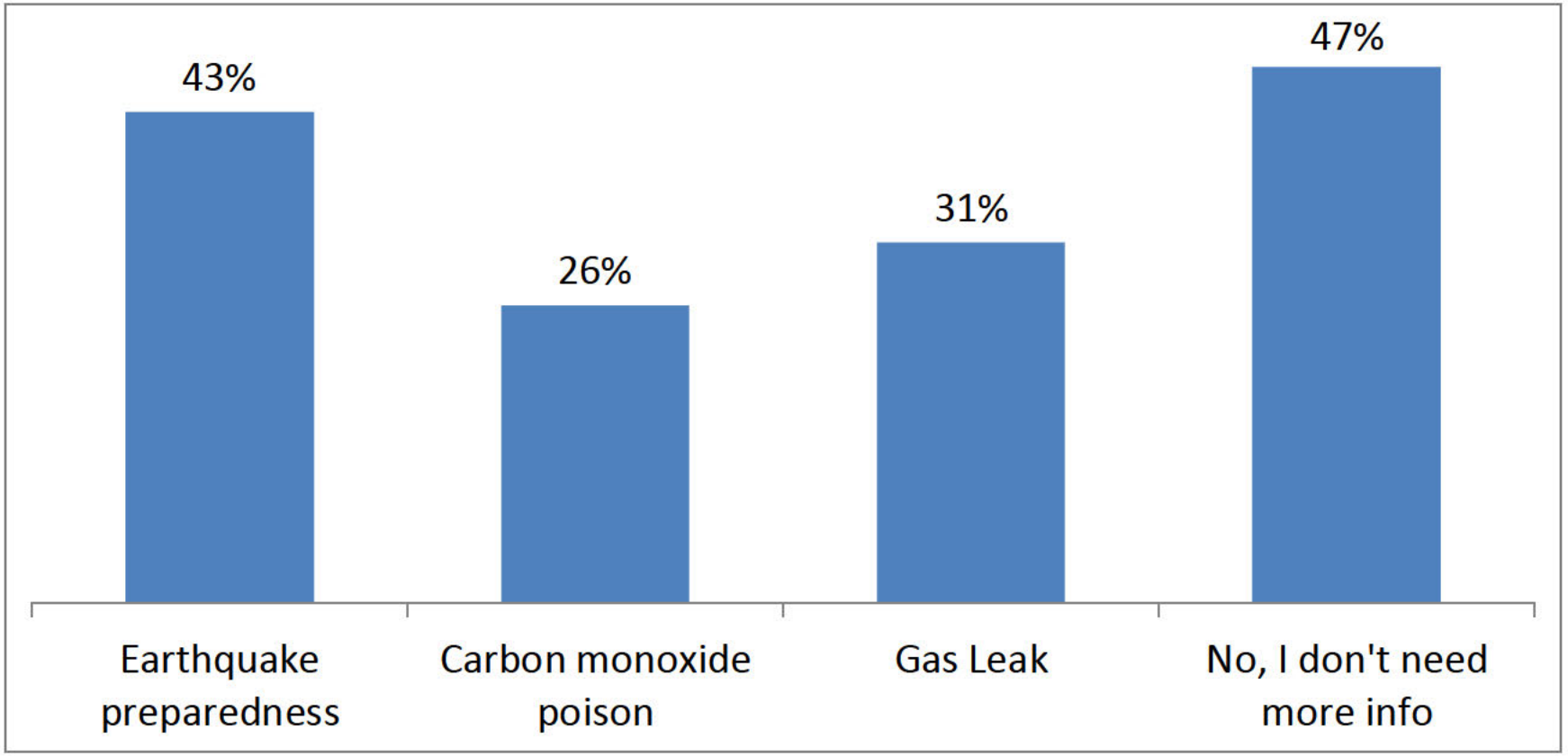


Awareness of Call Before You Dig



More Safety Information Needed

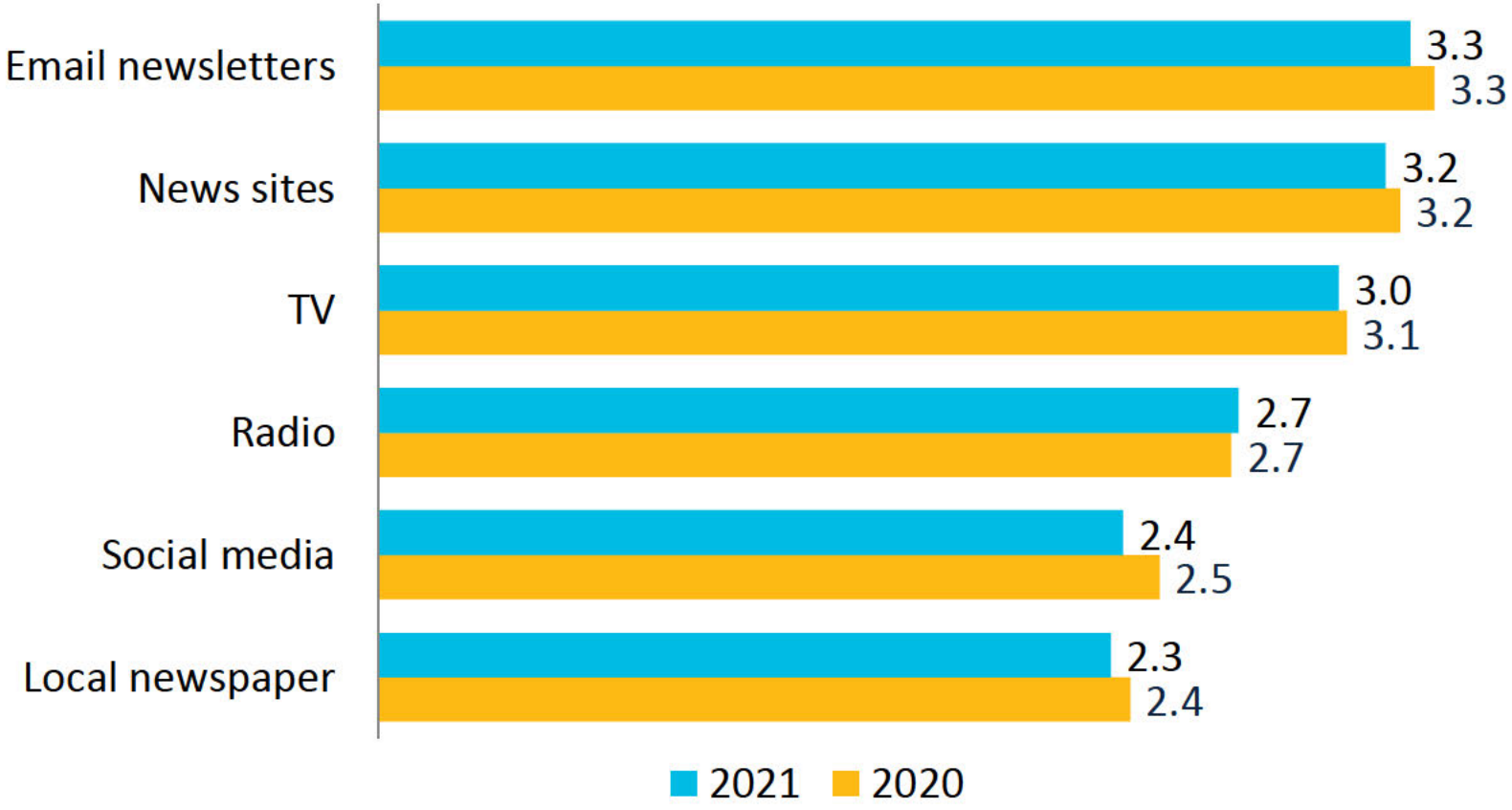
Would you like to receive more information about any of the following topics?



CUB/116
Jenks/45

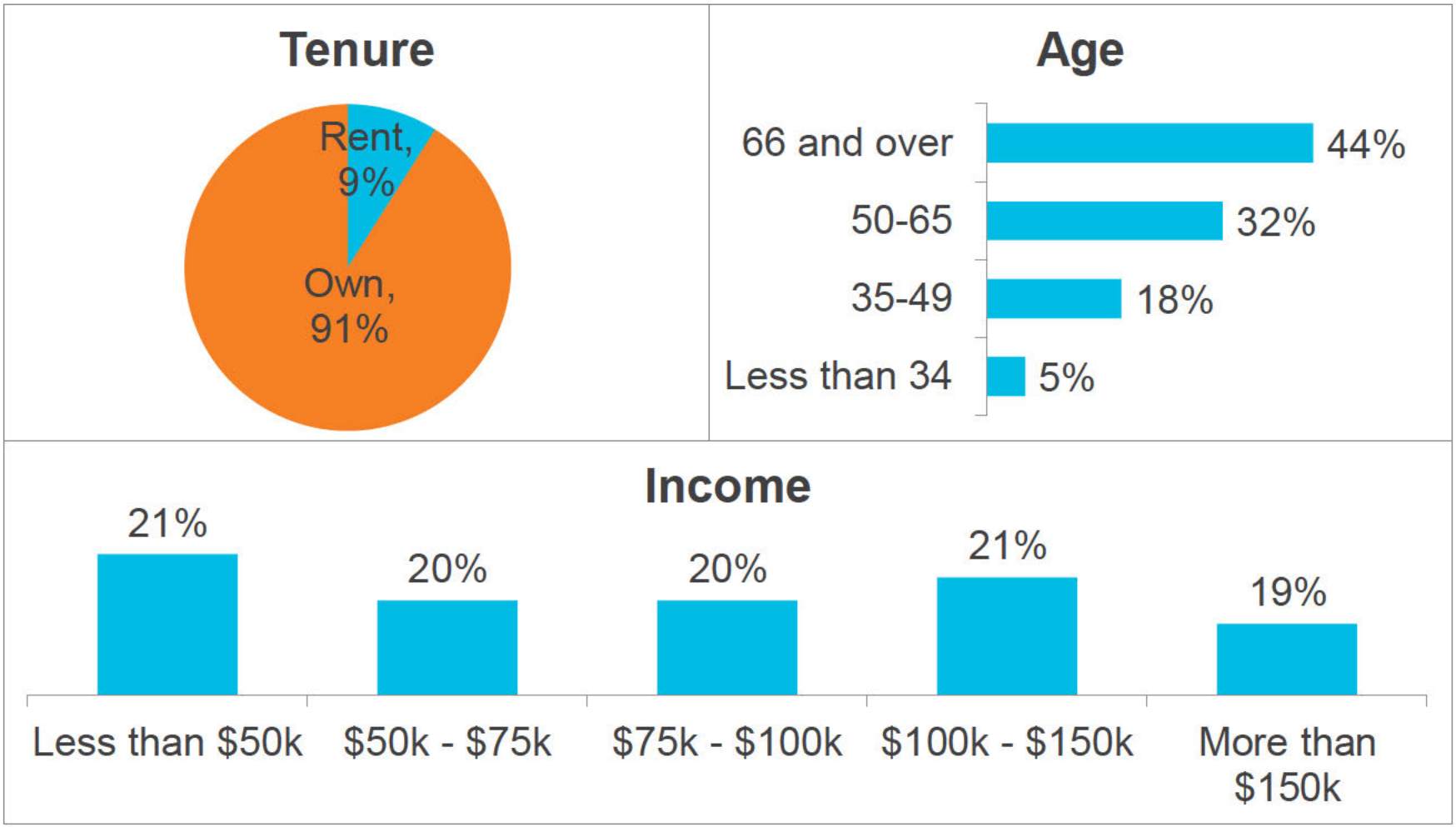
Importance of News Sources

please rate how important the following sources of news and information are to you on 5 point scale. (5 – extremely important, 1 – not at all important)



CUB/116
Jenks/46

Demographic Information



Screener

Are you currently a NW Natural customer?

- Yes
- No

Safety message

In the past year, have you seen or heard any information relating to natural gas safety?

- Yes
- Maybe, I'm not sure
- No
- Don't know

Safety message recall

What did the natural gas safety information say?

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Where did you see or hear the natural gas safety information? Please choose all that you remember.

- [ ] Radio
- [ ] Community Event
- [ ] Word of Mouth from relatives or friends
- [ ] TV
- [ ] Letter or brochure from NW Natural
- [ ] Newspaper
- [ ] I don't remember
- [ ] Other (please specify)

Safety perception

Do you feel safe around natural gas?

- ○ Yes
- ○ Maybe
- ○ No

Why do you feel unsafe around natural gas?

Safety message preference

If you wanted to get information on natural gas safety, where would you turn? Please check all that apply.

- [ ] NW Natural Gas Company
- [ ] Government agencies
- [ ] Internet search
- [ ] Friends or family
- [ ] Fire department
- [ ] Don't know
- [ ] Other (please specify)

By itself, natural gas has no odor. To help people detect its presence, utilities inject a “warning odor” into the gas. What have you heard the odor of natural gas smells like?

What would you do if you smelled natural gas?

Safety steps message

Have you seen or heard the ads outlining the steps you should take if you suspect a gas leak?

- Yes
- Maybe, I'm not sure
- No
- Don't know

What are those steps that you've seen or heard from the ads outlining what you should take if you suspect a gas leak?

Company performance

How much do you agree that your local gas company, NW Natural, is doing a good job of informing the public about natural gas safety?

- ○ Strongly disagree
- ○ Somewhat disagree
- ○ Neither agree nor disagree
- ○ Somewhat agree
- ○ Strongly agree

Why do you think that NW Natural does **not** do a good job of informing the public about natural gas safety?

Why do you think that NW Natural does a good job of informing the public about natural gas safety? (optional)

How would you rate NW Natural on the following?

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Efforts to maintain a safe gas system	○	○	○	○	○
Clarity of information provided about gas safety	○	○	○	○	○

Call before you dig

Are you aware of “Call Before You Dig” law?
The law requires you to call to have your underground utilities located 2 business days before you dig any hole or trench on your property.

- ○ Yes
- ○ No

Did you know the service to have your utilities located is free?

- ○ Yes
- ○ No

Safety Information

Would you like to receive more information about any of the following natural gas safety topics?

- [ ] Recognizing, reacting and reporting a potential natural gas leak
- [ ] Carbon monoxide poison awareness
- [ ] Earthquake preparedness for gas equipment
- [ ] No, I would not like to receive information
- [ ] Other (please specify) _____

Please rate how important the following information sources are to you.

	Extremely important	Very important	Moderately important	Slightly important	Not at all important
Newspaper	○	○	○	○	○
News sites	○	○	○	○	○
Radio	○	○	○	○	○
Email newsletters	○	○	○	○	○
Television	○	○	○	○	○
Social media	○	○	○	○	○

Demographics

For classification purposes, could you please tell me the following?

Do you own or rent your home?

- Own
- Rent

Which of these categories best describes your age?

- Under 21
- 21 - 34
- 35 - 49
- 50 - 65
- 66 and above

What's your approximate household income for the last 12 months?

- Less than $20,000
- $20,000 to $34,999
- $35,000 to $49,999
- $50,000 to $74,999

- ○ $75,000 to $99,999
- ○ $100,000 to $149,999
- ○ Over $150,000

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NW Natural®

Overall Satisfaction

Using a scale of 1 to 10, where 1 means poor and 10 means excellent, how satisfied are you with the total customer service provided by NW Natural?

1 ○

2 ○

3 ○

4 ○

5 ○

6 ○

7 ○

8 ○

9 ○

10 ○

Please share why you rate NW Natural customer service a ${q://QID1004/ChoiceGroup/SelectedChoices} of 10?

Contact type

What types of contact have you YOURSELF, recently had with NW Natural? (Choose all that apply)

- [ ] Called NW Natural
- [ ] Visited NW Natural website
- [ ] NW Natural called me
- [ ] No contact with NW Natural

Website

Did you visit the NW Natural website within the past 30 days?

- ○ Yes
- ○ No

What type of device did you use to access the NW Natural website?

- ○ Desktop
- ○ Laptop
- ○ Tablet
- ○ Mobile phone
- ○ I don't remember

Thinking of your most recent visit with NW Natural website, how would you rate the ...? Using a scale of 1 to 10, where 1 means poor and 10 means excellent.

	1	2	3	4	5	6	7	8	9	10
Clarity of the information provided	○	○	○	○	○	○	○	○	○	○
Ease of navigation	○	○	○	○	○	○	○	○	○	○

	1	2	3	4	5	6	7	8	9	10
Found the information I was looking for with ease	○	○	○	○	○	○	○	○	○	○
Overall website experience	○	○	○	○	○	○	○	○	○	○

Effort score

To what extent do you agree or disagree with the following statement:
NW Natural made it easy for me to resolve my issue.

- ○ Strongly agree
- ○ Agree
- ○ Somewhat agree
- ○ Neither agree nor disagree
- ○ Somewhat disagree
- ○ Disagree
- ○ Strongly disagree

President's verbatim

If you were talking with the President of NW Natural and he asked you what NW Natural could do to better serve your energy needs, how would you respond?

Phone contact type

When you contacted NW Natural, which of the following best describes your interaction? (please choose all the apply)

- ☐ I spoke with a person
- ☐ I used the automated phone system
- ☐ I used the NW Natural website
- ☐ I don't remember / don't know
- ☐ Others, please specify

CSR

Please rate the performance of the CUSTOMER SERVICE REPRESENTATIVE who handled your telephone call:

	1	2	3	4	5	6	7	8	9	10
Treated you in a courteous and friendly manner	○	○	○	○	○	○	○	○	○	○
Had the skills and knowledge to handle the inquiry	○	○	○	○	○	○	○	○	○	○
Communicated with you in a clear and informative manner	○	○	○	○	○	○	○	○	○	○

	1	2	3	4	5	6	7	8	9	10
Had the authority to take charge and handle your contact	○	○	○	○	○	○	○	○	○	○
Handled your request in a timely and effective manner	○	○	○	○	○	○	○	○	○	○
Overall satisfaction with the way this interaction was handled	○	○	○	○	○	○	○	○	○	○

IVR

Did the automated phone system ...?

	Yes	No	Not applicable
Have your correct account information	○	○	○
Have prompts covering all relevant areas	○	○	○
Have a feature/button to transfer you directly to a representative	○	○	○
Recognize you based on your phone number	○	○	○

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Were the number of prompts needed to navigate the system...?

- ○ Fewer than expected
- ○ As expected
- ○ More than expected

Using a scale of 1 to 10, where 1 means poor and 10 means excellent, how satisfied overall were you with using the automated phone system?

1 ○

2 ○

3 ○

4 ○

5 ○

6 ○

7 ○

8 ○

9 ○

10 ○

Fieldwork performed

A NW Natural gas service technician may have come out to check your gas system, turn on or off your gas, or perform other service-related work.

Did NW Natural personnel perform any work at your residence?

- ○ Yes, by a NW Natural service technician
- ○ No
- ○ I don't know/was not present

Field technician

Using a scale of 1 to 10, where 1 means poor and 10 means excellent, please rate the performance of the SERVICE TECHNICIAN who handled your appointment in the following areas.

	1	2	3	4	5	6	7	8	9	10
Treated you in a courteous and friendly manner	○	○	○	○	○	○	○	○	○	○
Had the skills and knowledge to handle the service request	○	○	○	○	○	○	○	○	○	○
Communicated with you in a clear and informative manner	○	○	○	○	○	○	○	○	○	○

	1	2	3	4	5	6	7	8	9	10
Was neat in appearance	○	○	○	○	○	○	○	○	○	○
Treated your home with care and cleaning up	○	○	○	○	○	○	○	○	○	○
Overall satisfaction with the way this service appointment was handled	○	○	○	○	○	○	○	○	○	○

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2019 Gas Residential Customer Satisfaction Study

NW Natural

Carl Lepper, Director

October 2019

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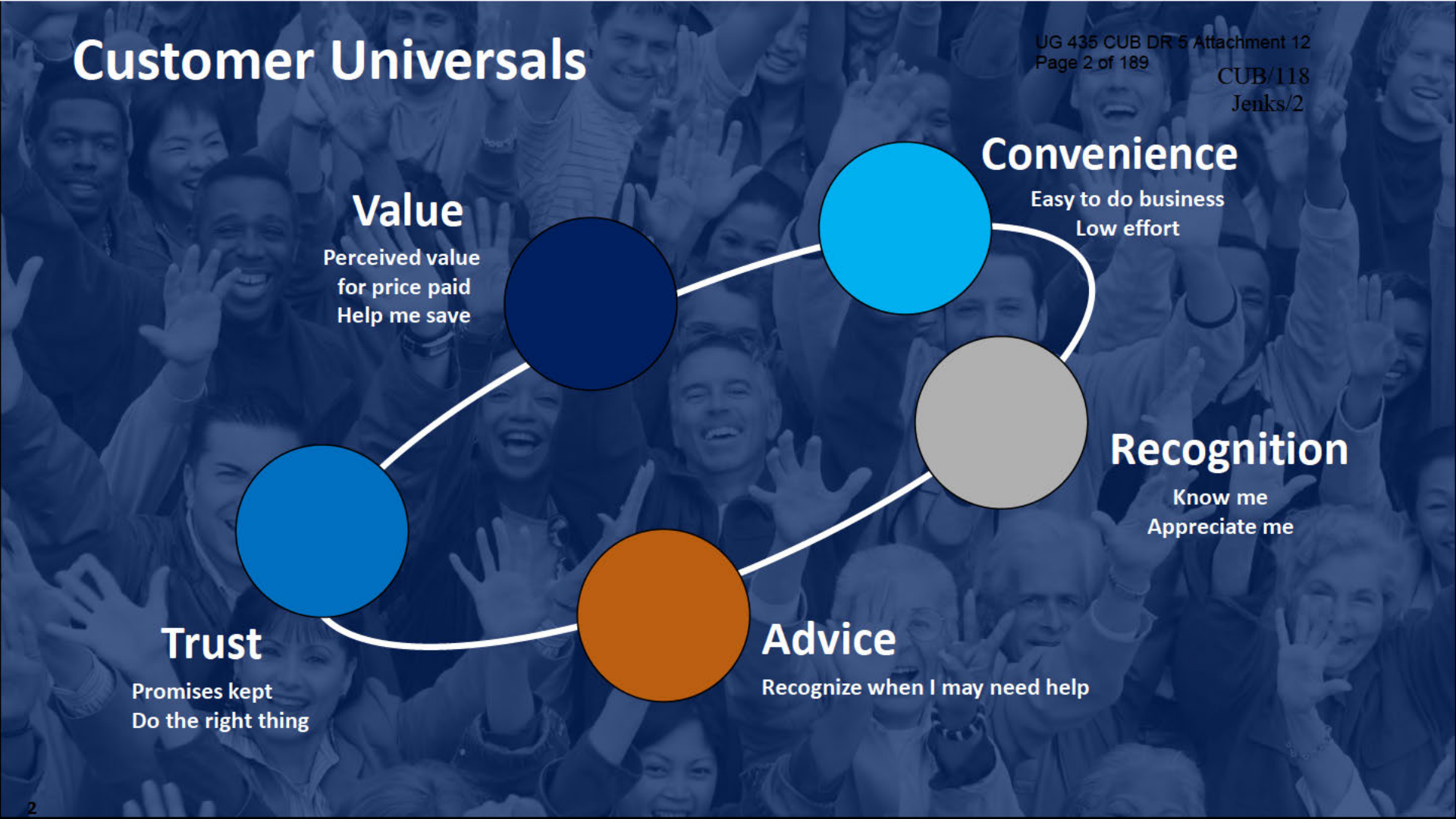
Jenks/2

Customer Universals



J.D. Power 2019 Gas Utility Residential Customer Satisfaction Study

57,879
TOTAL RESPONSES NATIONALLY

18TH
YEAR OF THE STUDY

84 BRANDS
WITH 125,000+ RESIDENTIAL CUSTOMERS

KEY INDEX FACTORS

SAFETY & RELIABILITY	BILLING & PAYMENT	PRICE	CORPORATE CITIZENSHIP	COMMUNICATIONS	CUSTOMER SERVICE
28%	21%	20%	13%	12%	6%

WHEN INTERACTION IS PRESENT
29%

NW Natural sample size:
1,031 total completes
179 customer service completes

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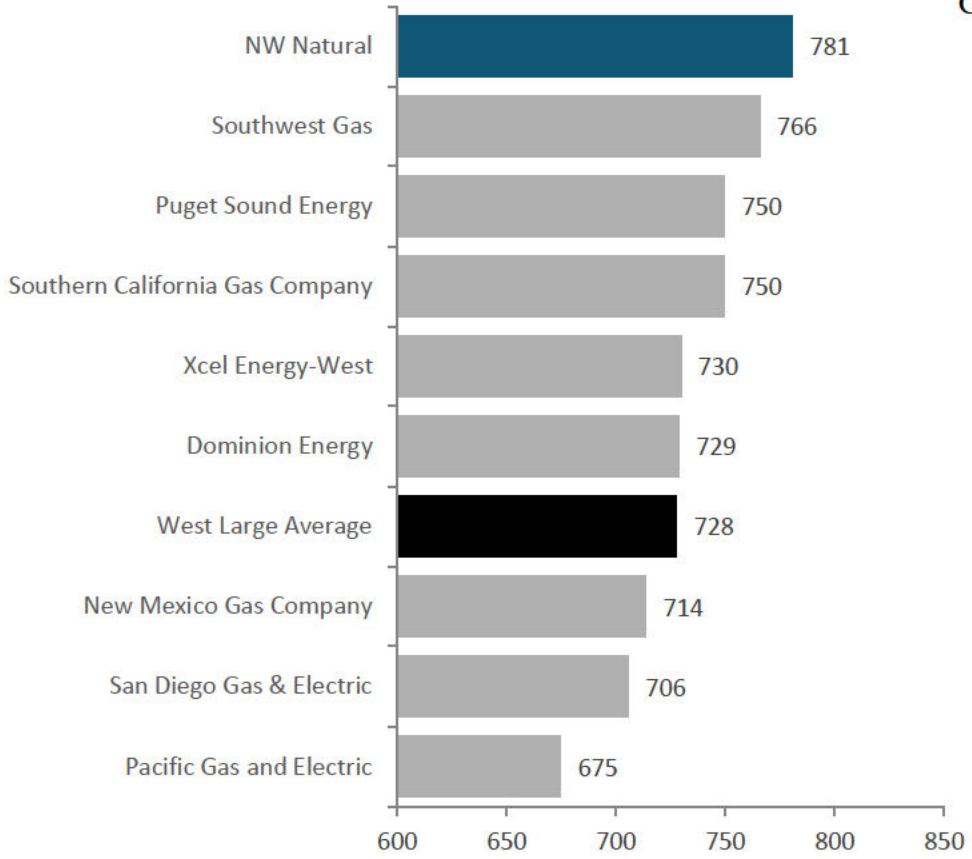
Jenks/4

Overall West Large Ranking

NW Natural ranks first in the West Large segment



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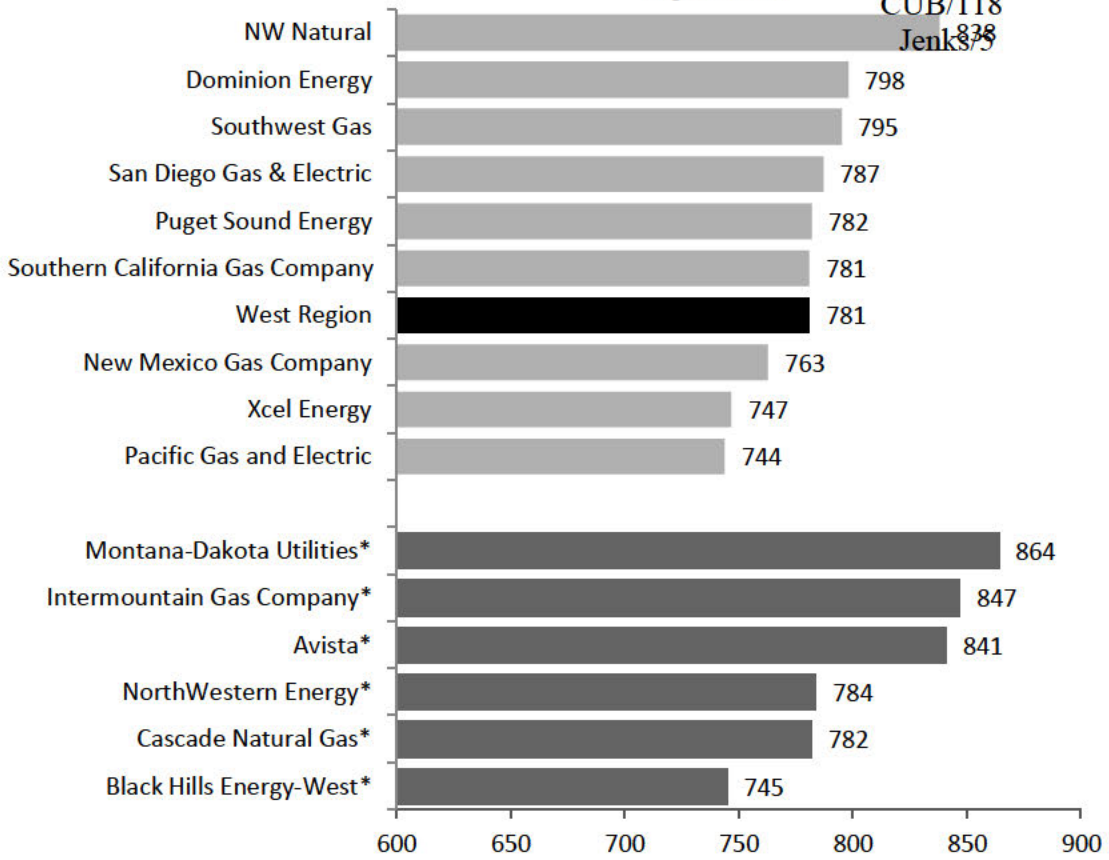
Gas Business Midpoint Results

Wave 1 Overall CSI Performance

West Region



*Note: Brand has less than 45 completes.

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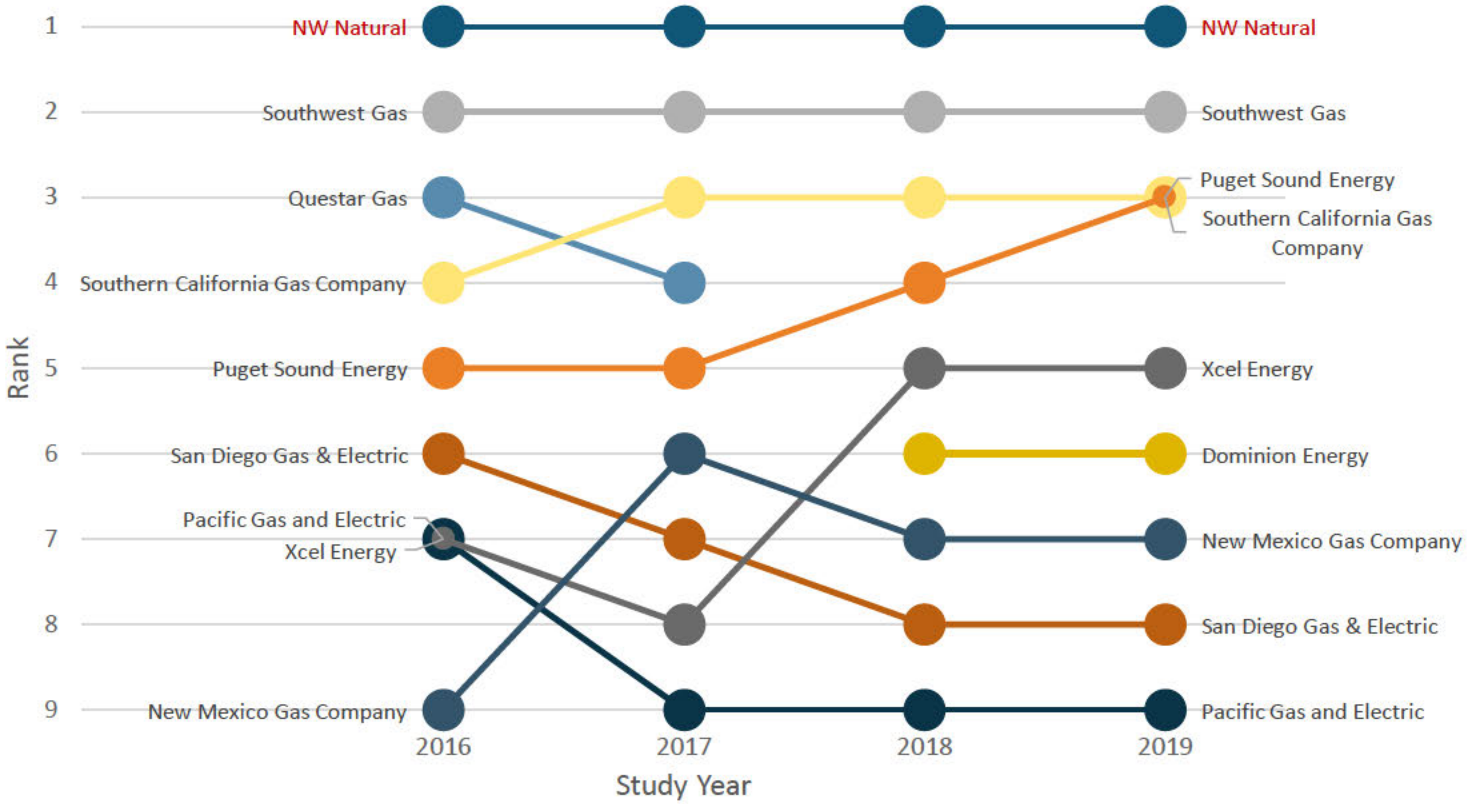
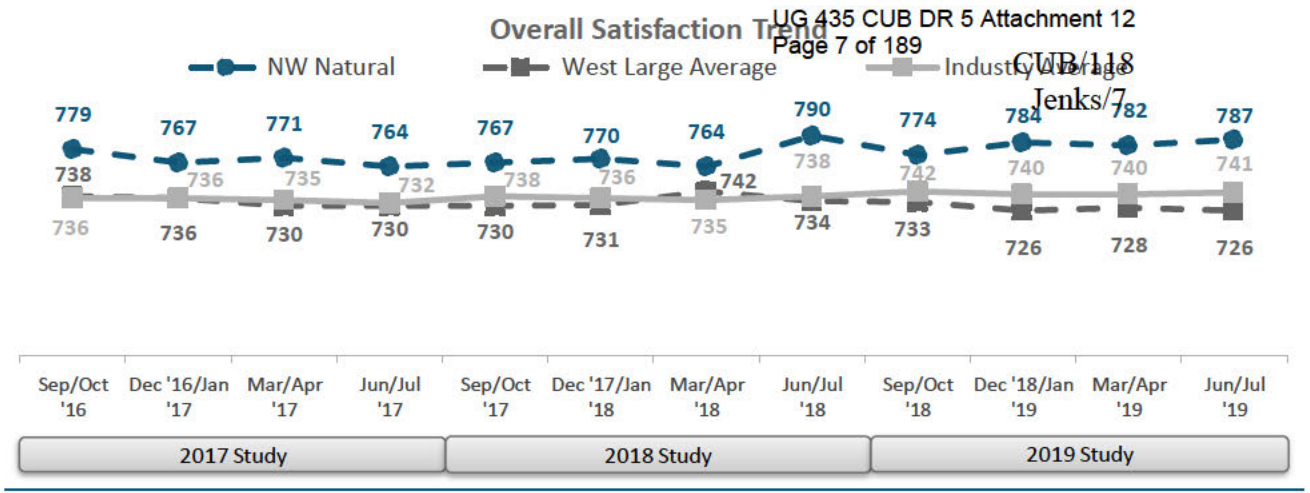
West Large Segment

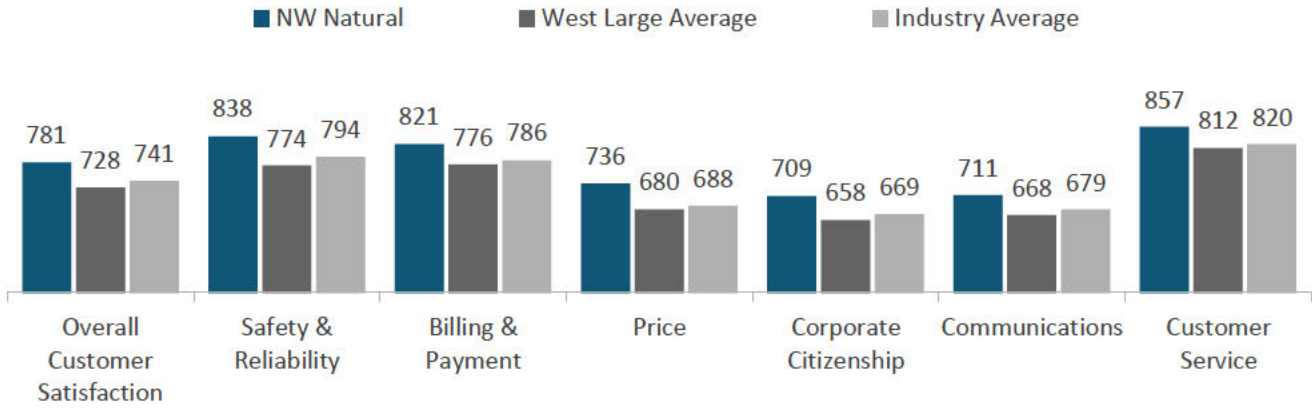
Ranking Trend



Index and Factor Trend

Industry satisfaction remains stable over the past three years

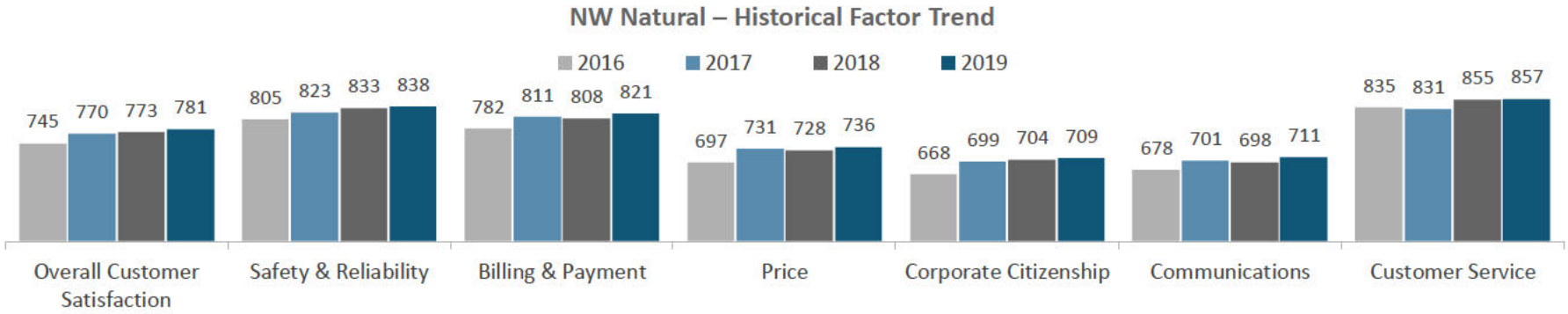




"I think both the promptness of getting a human response, as well as the ease to pay the bills has been great. I also know that NW Natural has reached out to the company to help the less fortunate pay their bills. Awesome."

Ranking Compared to Industry

NW Natural increased 8 in overall satisfaction, and the industry ranking increased 1 out of 84 brands



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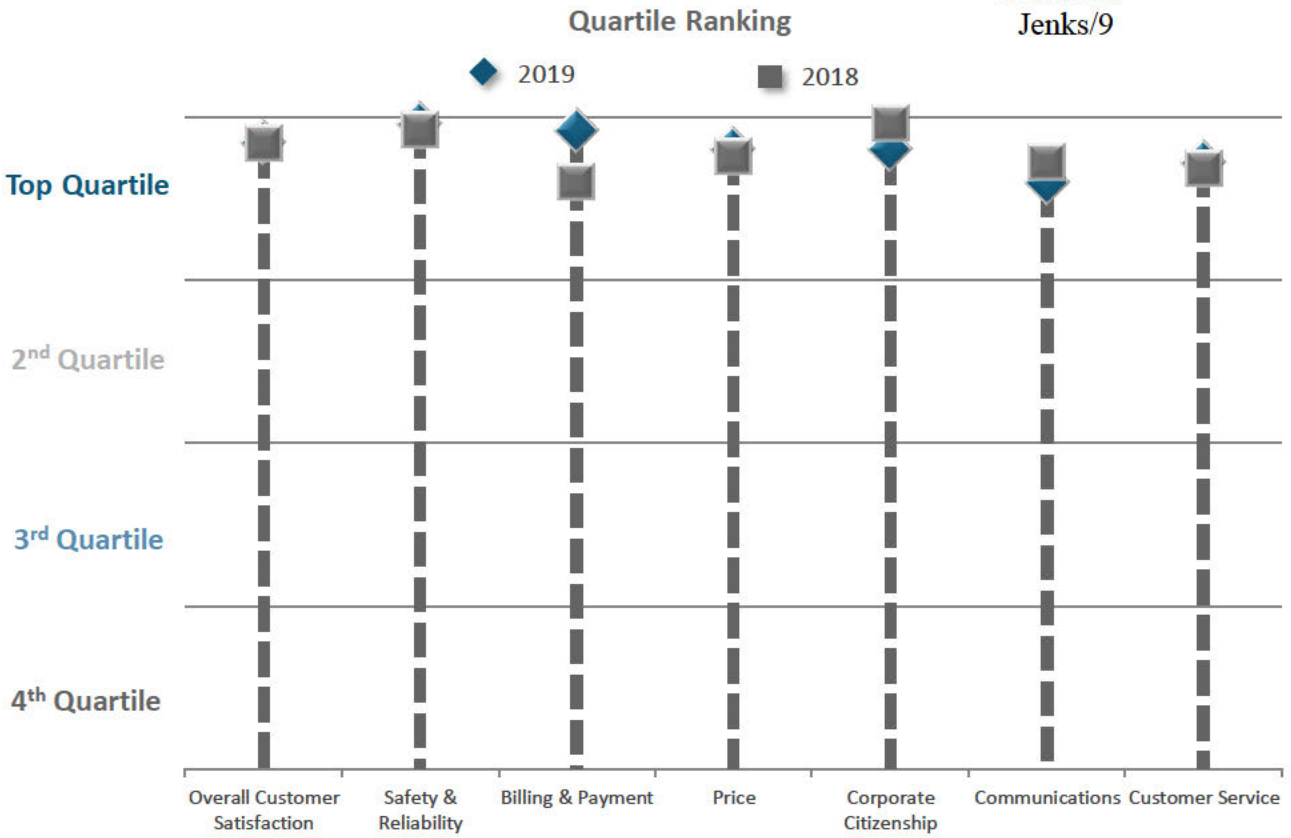
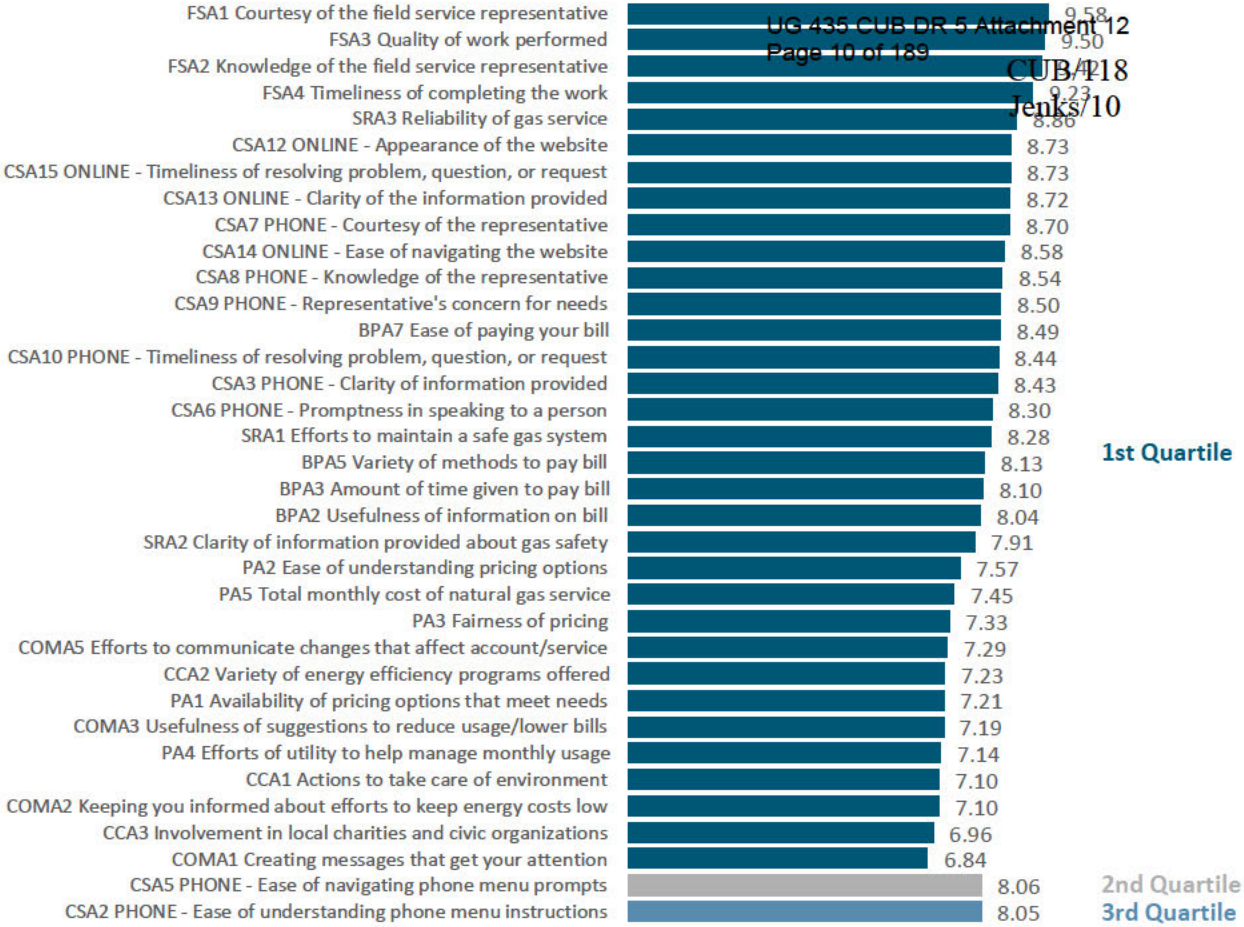
Quartile Comparison to the Industry

Ranking this year compared to last for overall satisfaction and the factors driving satisfaction



Attributes compared to industry shown by quartile ranking

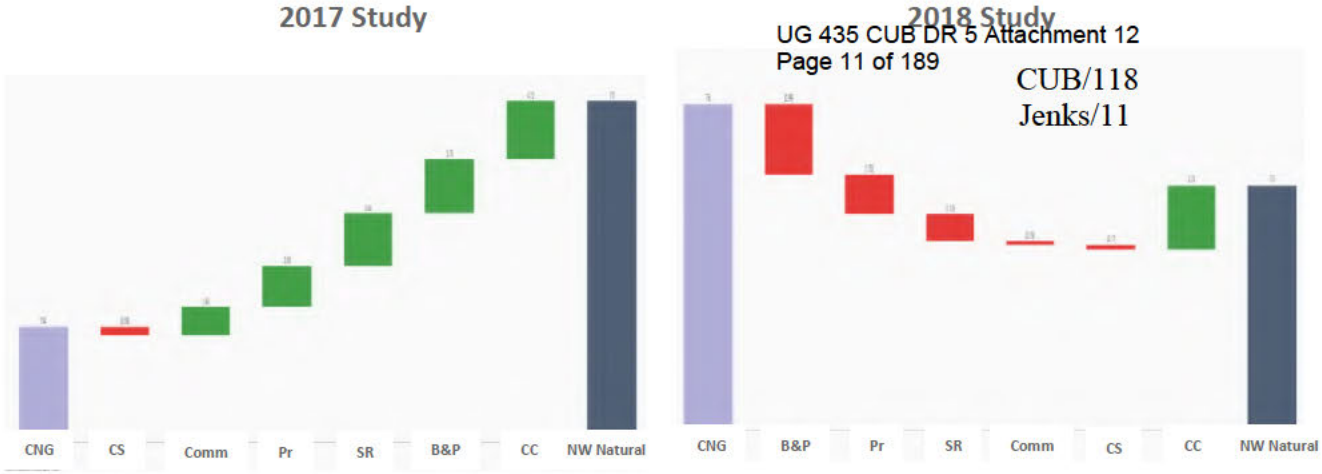


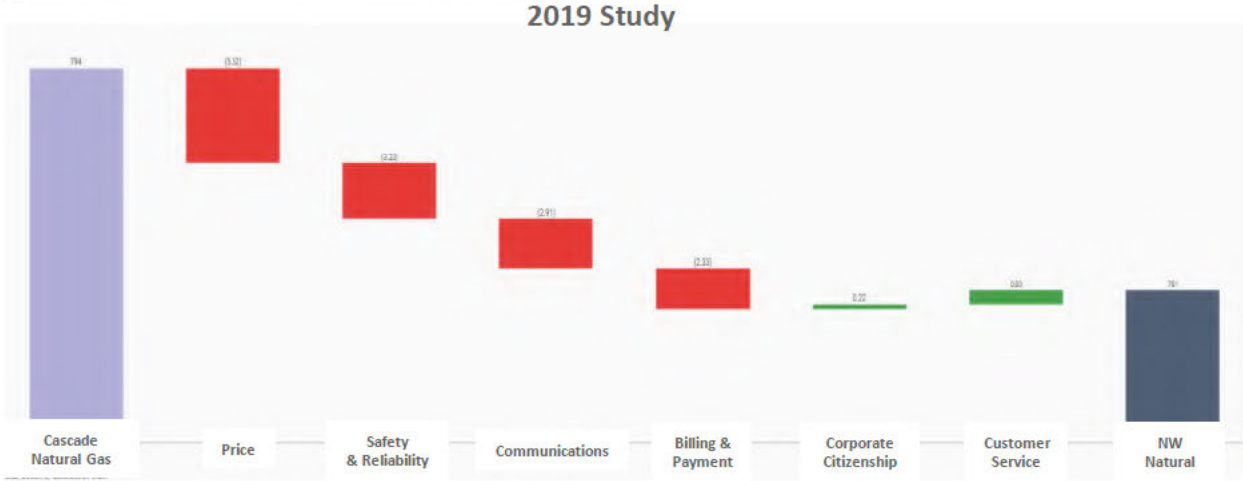
NW Natural Gap to Cascade Natural Gas – Last Three Years

In the last three studies the gap to CNG average has been +16, -3 and -13.

Since 2017, Cascade Natural Gas performance has increased +40 from 754 to 794; NWN's performance improved +11 from 770 to 781.

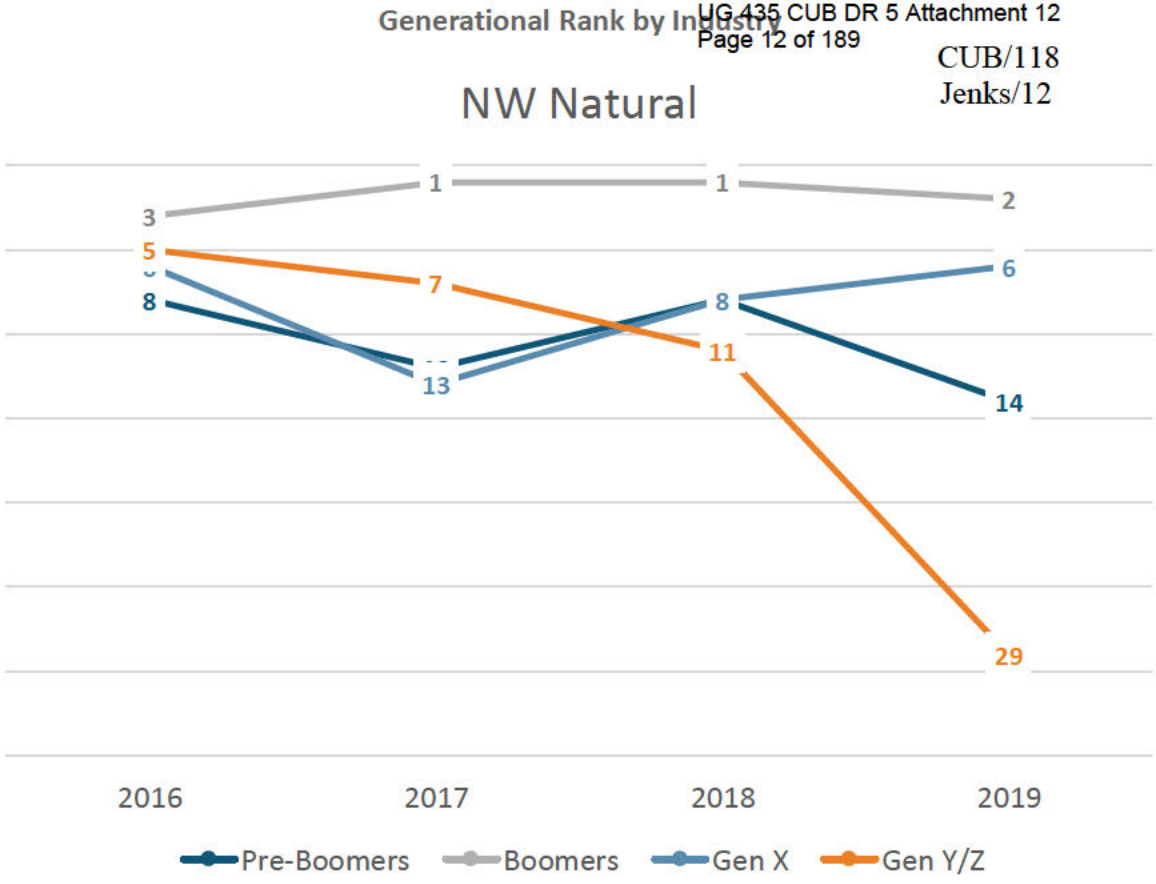
In the 2019 study the factor contributing the most to the gap is Price satisfaction.





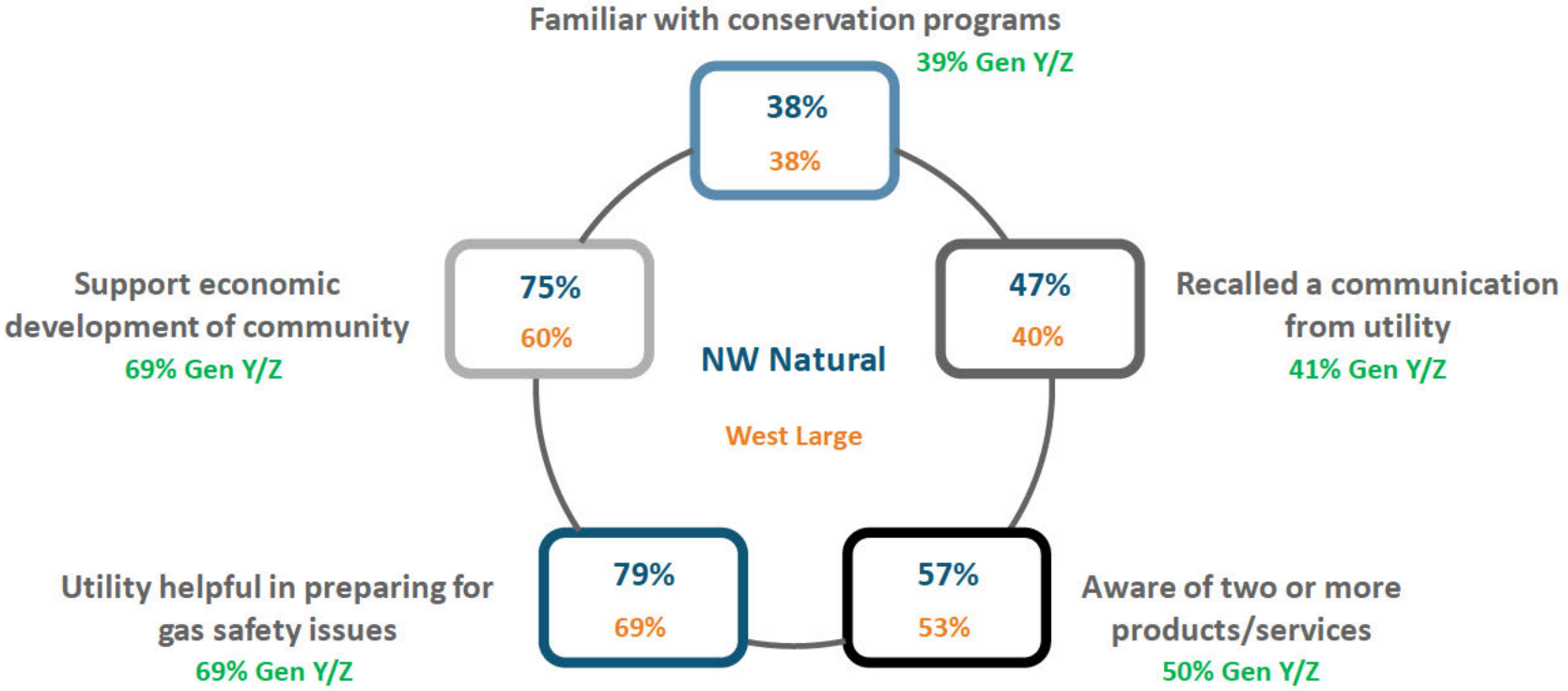
Generational Trend

NW Natural continues to provide boomers with an exceptional experience. However, the younger respondents are becoming less aware and rankings have dropped.



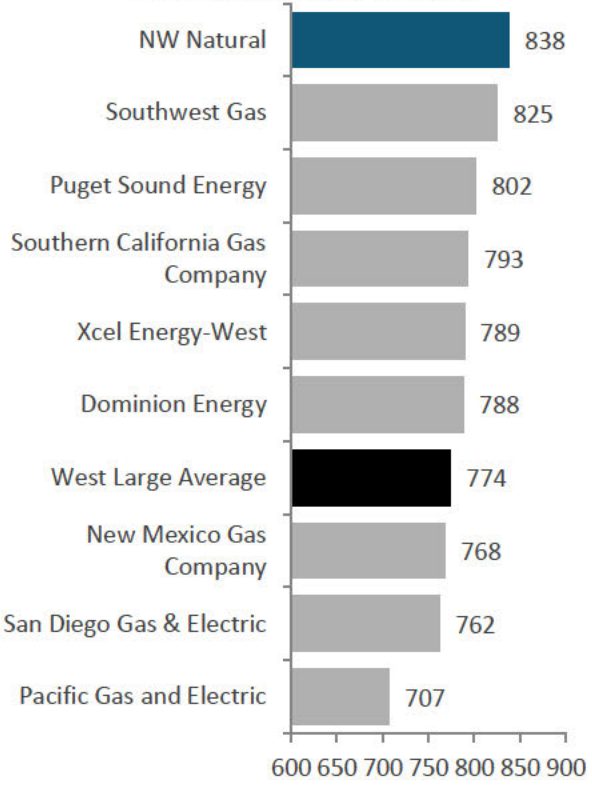
Key Performance Indicators

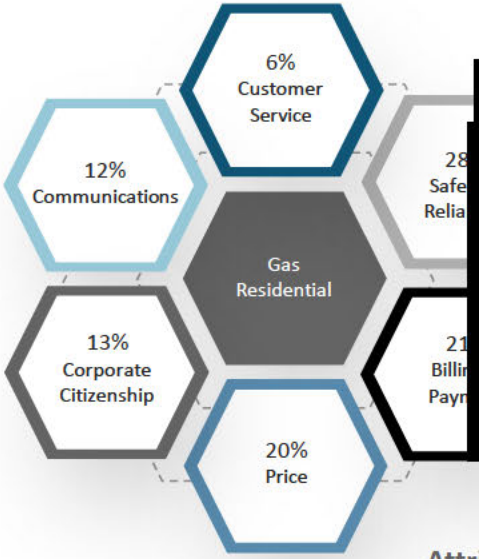
These are the diagnostics that are deemed the most impactful on overall customer satisfaction



Safety & Reliability

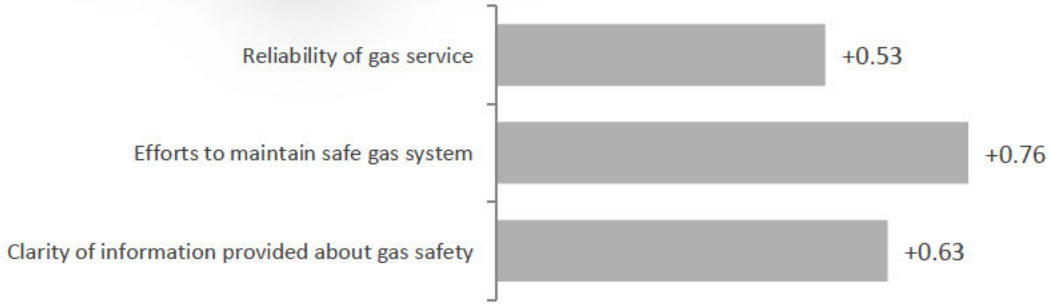
West Large Safety Ranking





[redacted]
Clarity of information provided about gas safety 30%

Attribute Gap to West Large



Safety & Reliability – Index and Attributes

"natural gas has always kept my family safe I have had no major problems with any leaks. They have been courteous and kept my gas on even if I was a bit late"

"To provide more educational information on safety and reduction of gas usage"

	Safety & Reliability Index	Efforts to maintain a safe gas system	Clarity of information provided about gas safety	Reliability of gas service
Score	838	8.28	7.91	8.86
Rank	2	2	2	3
Quartile	1	1	1	1
Significant Change to LY	No	No	No	No

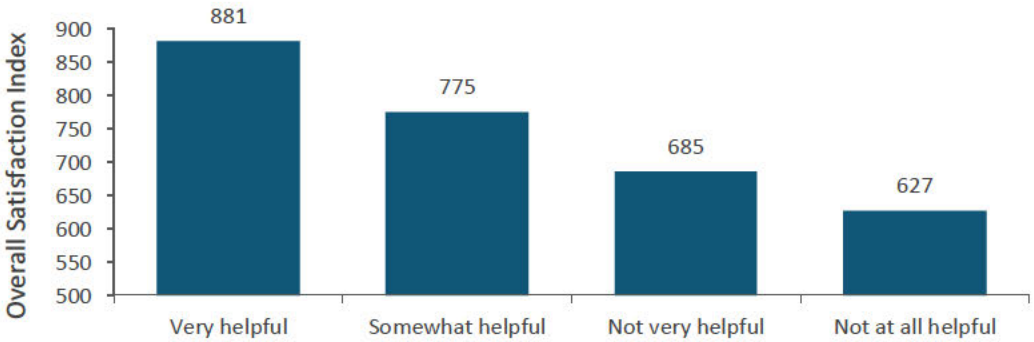
Note: Significance test is using a 90% confidence interval, Rank is out of 84 brands, Quartile is using whole numbers for index scores and rounded to 0.00 for attributes scores.

Impact of Safety Preparation

"They are a good brand, I love that one time they told us we had a gas leak and took care of it for us and gas is cleaner than oil heat."

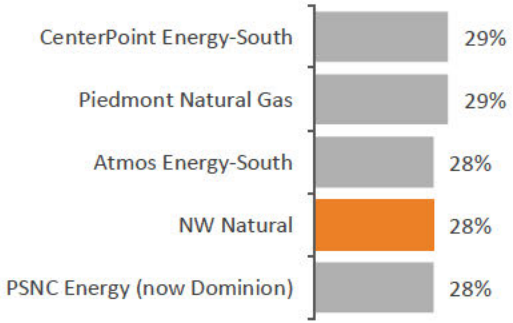
NW Natural	Very Helpful	Not at All Helpful
Frequency	**28%**	**7%**
Efforts to maintain a safe gas system	9.35	6.76
Had safety inspection done	43%	4%
Utility comm. topic: Consumer safety around natural gas	41%	1%

Helpfulness of Utility to Prepare You for a Safety Issue – NW Natural

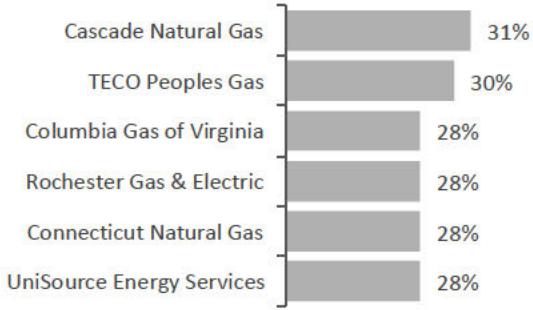


Very Helpful at Preparing You for a Safety Issue

Top Large Brands



Top Midsize Brands



Best Practice Examples – Very Helpful at Preparing Customers for Safety Issues

https://youtu.be/I5ckG_kHIJM

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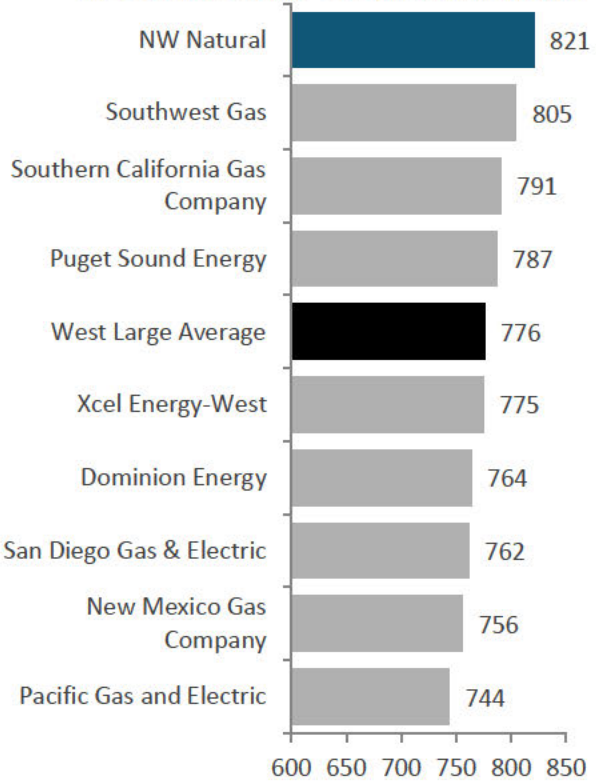
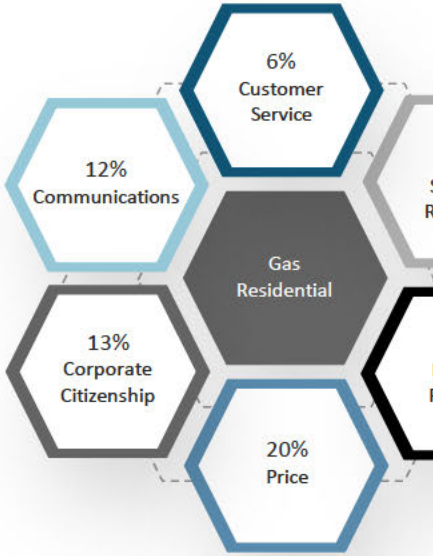
Billing & Payment

West Large Billing & Payment Ranking

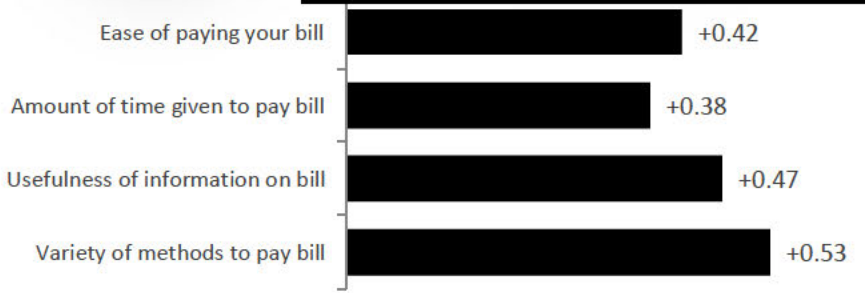




Ease of paying your bill 30%

Usefulness of information on bill 23%

Variety of methods to pay bill 22%



Billing & Payment – Index and Attributes

"They make it easy to pay my bill, know how much gas i'm using and understand my bills and my options."

"Their inserts are constant but it is always too much...yet, on a lot of the questions asked I don't notice as I'm at the website to pay my bill."

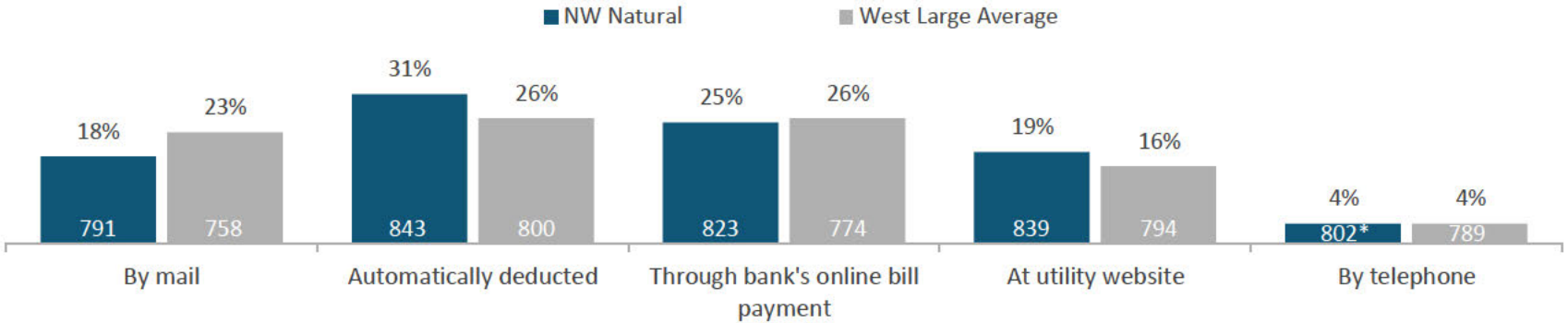
	Billing & Payment Index	Usefulness of information on your bill	Amount of time given to pay your bill	Variety of methods to pay your bill	Ease of paying your bill
Score	821	8.04	8.10	8.13	8.49
Rank	3	4	4	2	3
Quartile	1	1	1	1	1
Significant Change to LY	Yes	Yes	No	No	Yes

Note: Significance test is using a 90% confidence interval, Rank is out of 84 brands, Quartile is using whole numbers for index scores and rounded to 0.00 for attributes scores.

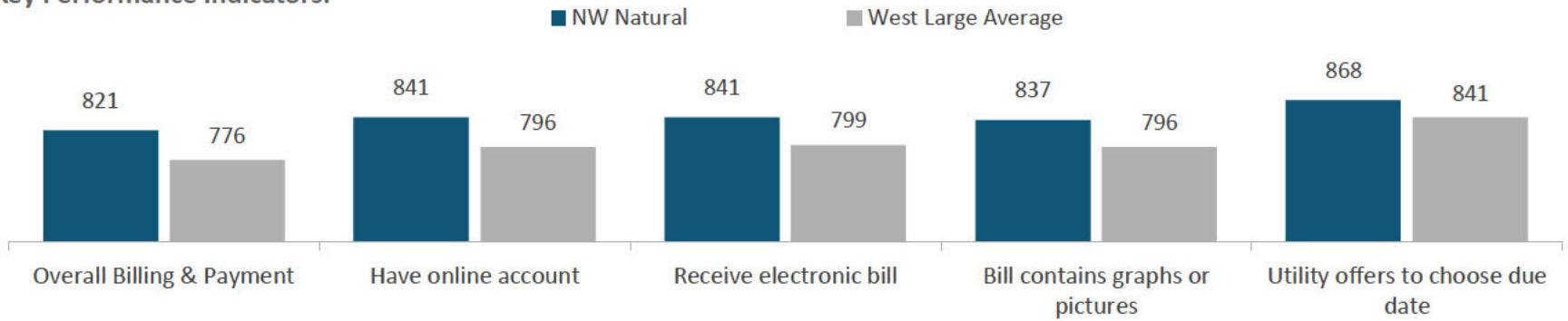
Ways to Pay Your Bill

"Statements are clear, extra info is informative and interesting, paying by internet is very convenient."

Bill Payment Method



Key Performance Indicators:



Note: *Small sample size (n=30-99).

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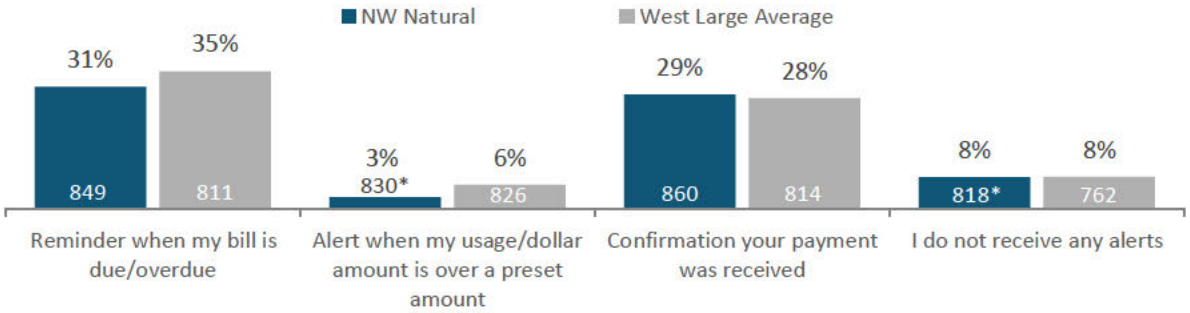
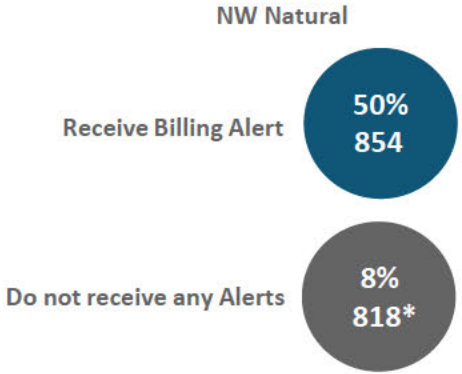
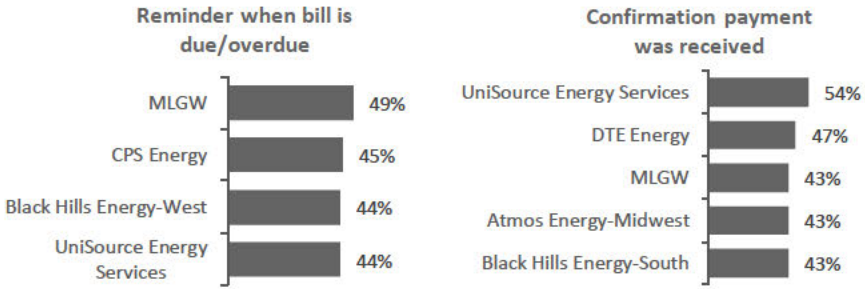
Billing & Payment Alerts – NW Natural

Alerts Received

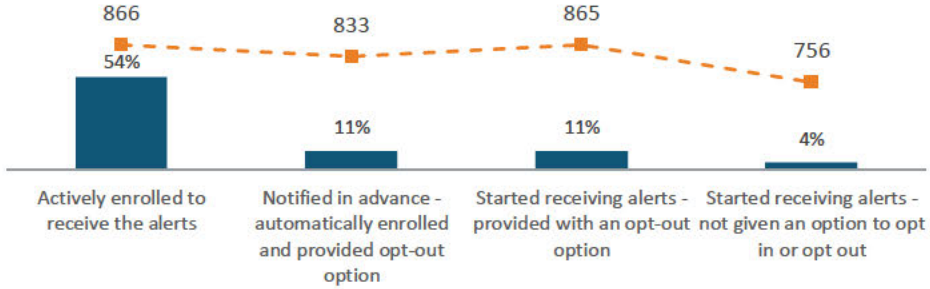




Top Brands by Alert Received:



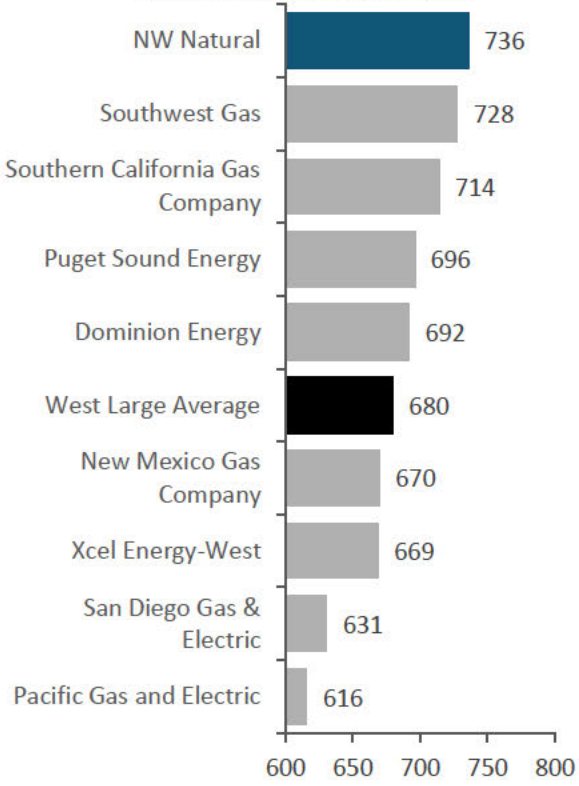
Billing & Payment Index by How Signed-up for Alerts – NW Natural

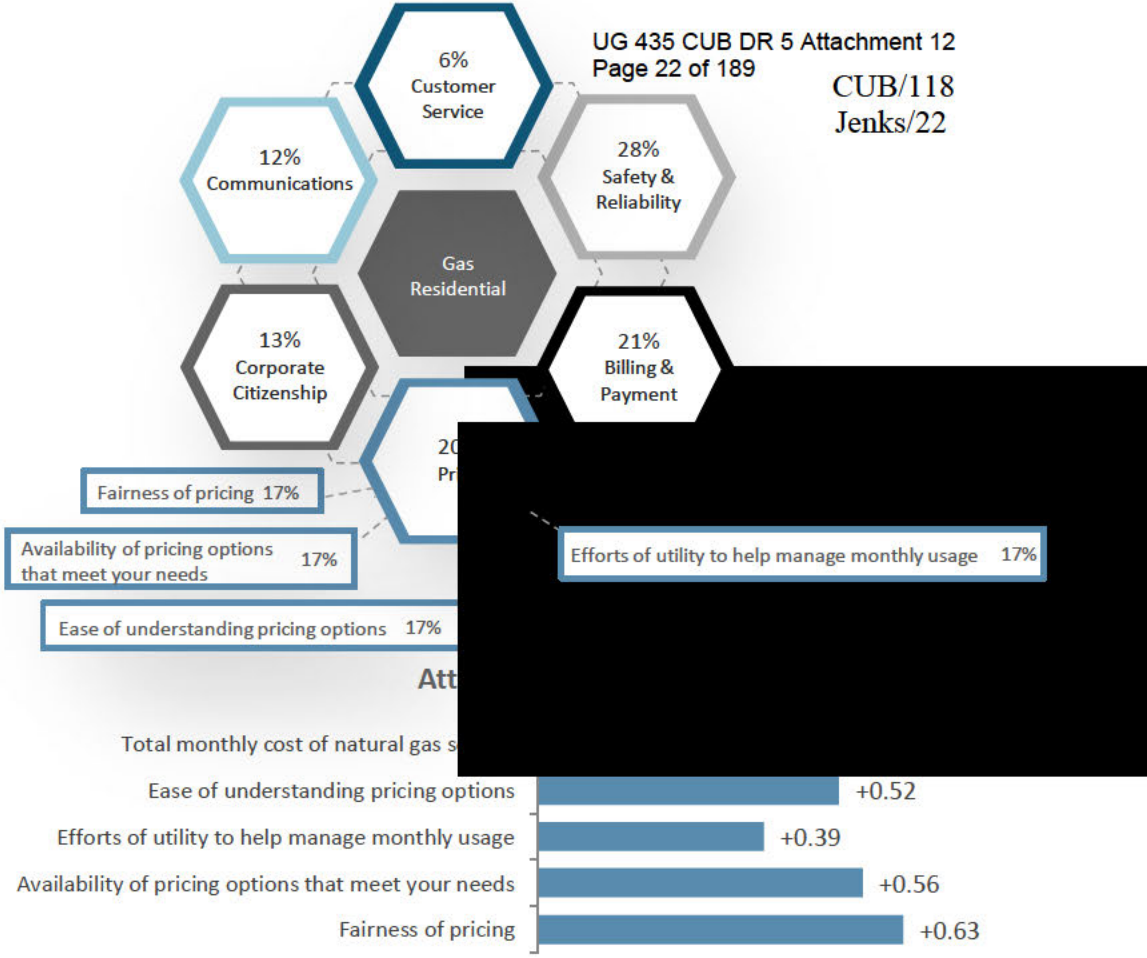


Note: *Small sample size (n=30-99); #Insufficient sample size (n<30).

Price

West Large Price Ranking





Price – Index and Attributes

"They have been reliable, with fair prices. Their employees are friendly. They offer payment options so that one can avoid high payments in winter months."

"become more innovative with ways to offer incentives to customers to use less natural gas"

	Price Index	Availability of pricing options that meet your needs	Ease of understanding your pricing	Fairness of pricing	Efforts of utility to help you manage your monthly usage	Total monthly cost of your electric service
Score	736	7.21	7.57	7.33	7.14	7.45
Rank	5	5	4	5	9	5
Quartile	1	1	1	1	1	1
Significant Change to LY	No	No	No	No	No	No

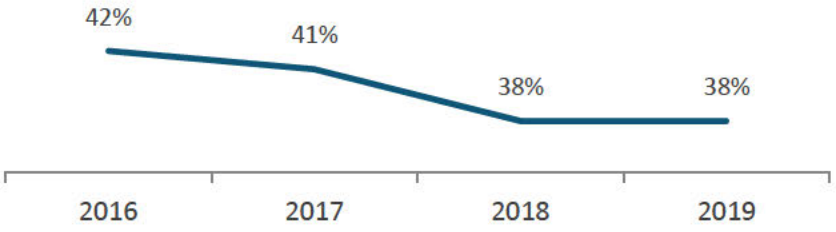
Note: Significance test is using a 90% confidence interval, Rank is out of 84 brands, Quartile is using whole numbers for index scores and rounded to 0.00 for attributes scores.

CUB/118
Jenks/24

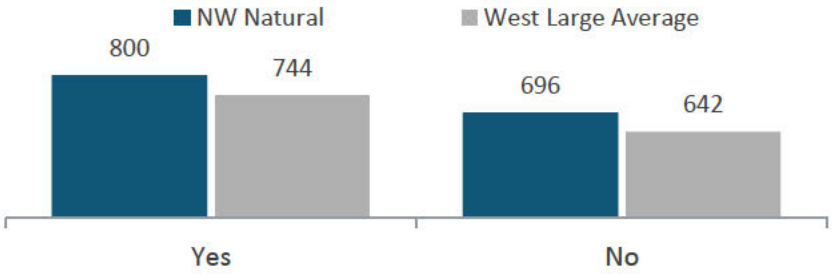
Conservation Awareness Impacts Many of the Factors and Attributes Driving Overall Satisfaction

Over the last 2 years less respondents recall programs to save.

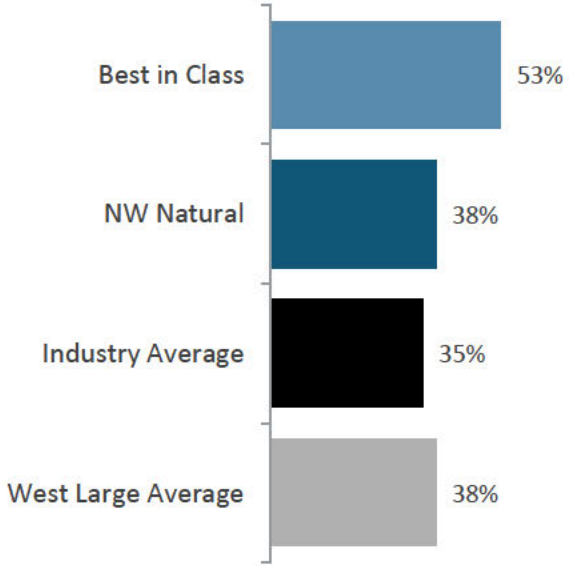
Familiarity with Conservation Programs – NW Natural



Impact of Conservation Awareness on Price Satisfaction

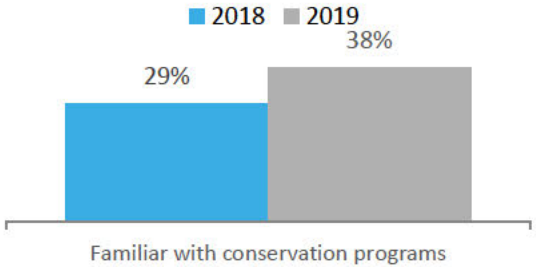


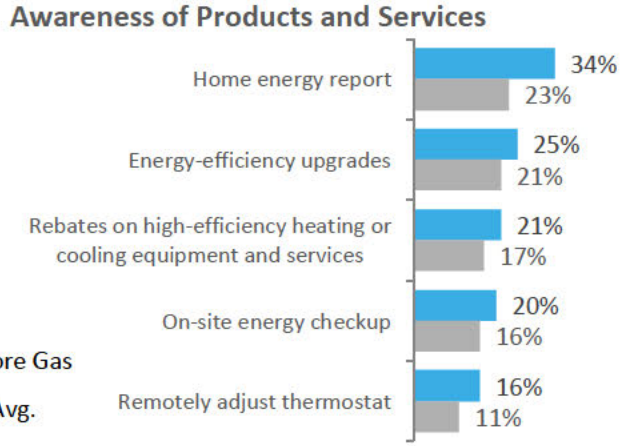
Familiarity with Conservation Programs

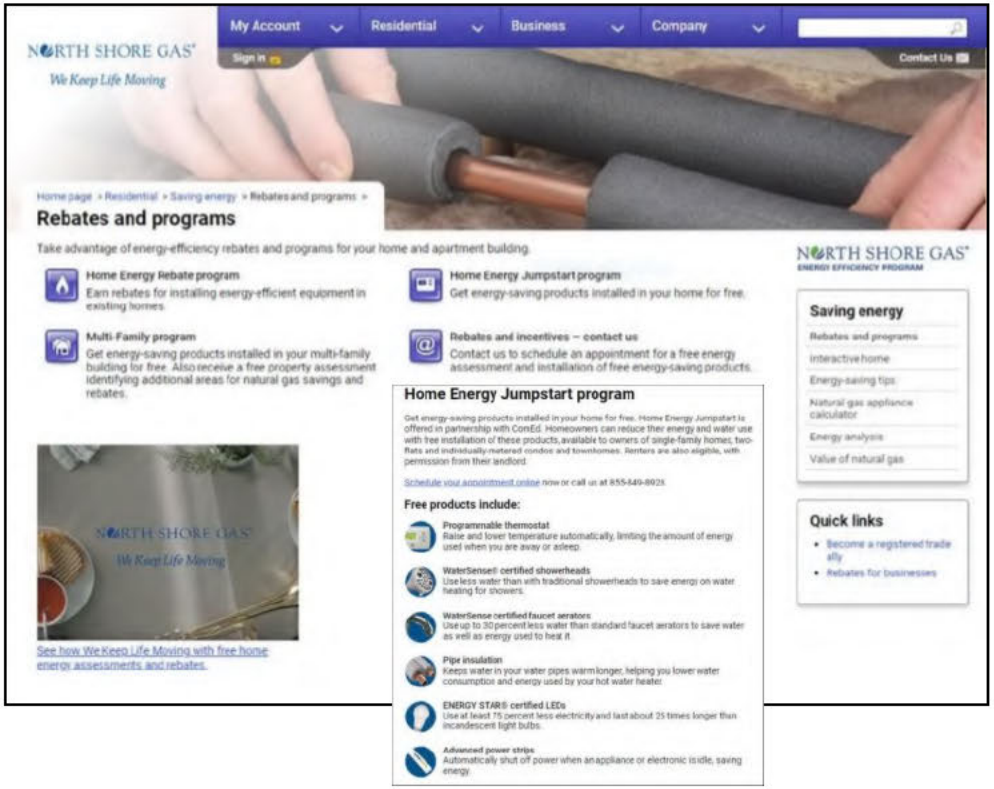


Price – Most Improved Brand

North Shore Gas improved significantly on Price (+61); EE program awareness has also increased

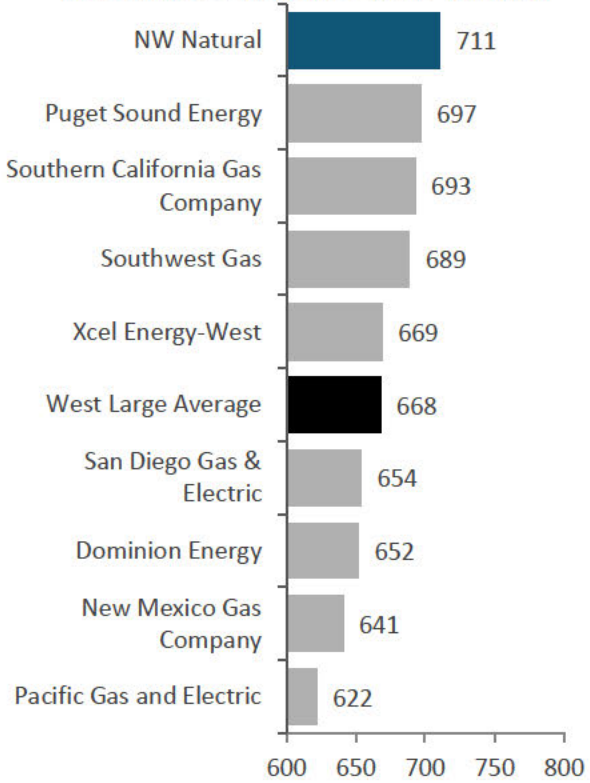


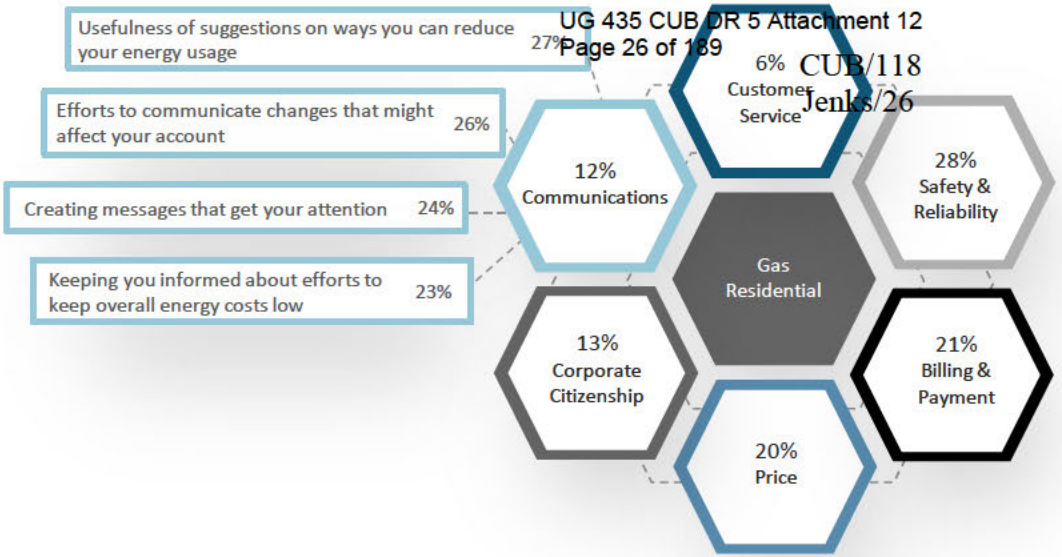




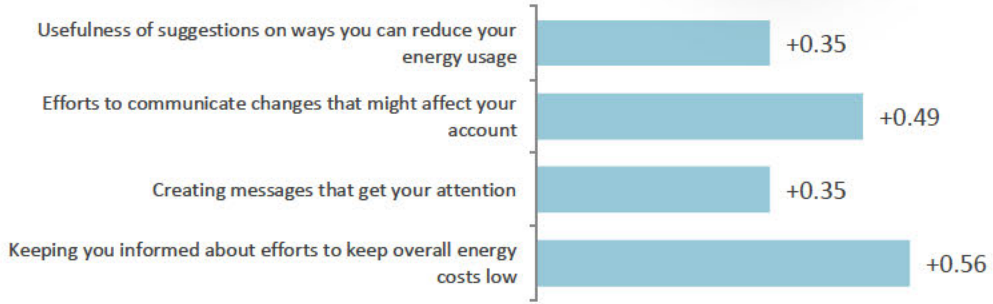
Communications

West Large Communications Ranking





Attribute Gap to West Large



Communications – Index and Attributes

"Ease of on-line info for everything. Make newsletter more local-friendly/ Jenks."

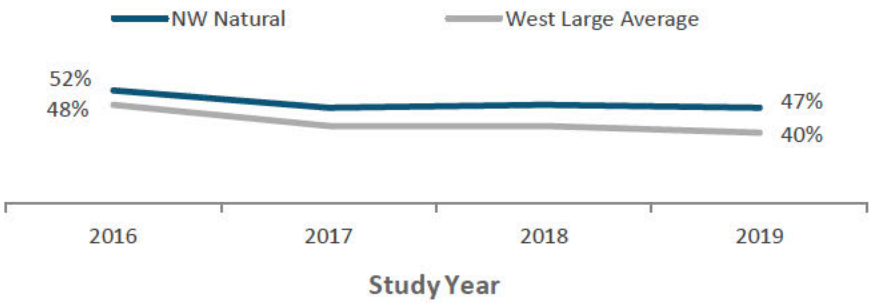
	Communications Index	Creating messages that get your attention	Keeping you informed about what utility is doing to keep overall energy costs low	Usefulness of suggestions on ways you can reduce your energy usage and lower your monthly bills	Efforts to communicate changes that might affect your account or service
Score	711	6.84	7.10	7.19	7.29
Rank	9	12	5	11	4
Quartile	1	1	1	1	1
Significant Change to LY	No	No	Yes	No	No

Note: Significance test is using a 90% confidence interval, Rank is out of 84 brands, Quartile is using whole numbers for index scores and rounded to 0.00 for attributes scores.

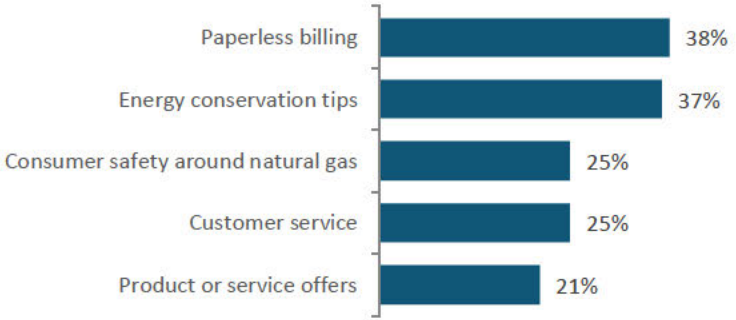
CUB/118
Jenks/28

Communications and Media Recall

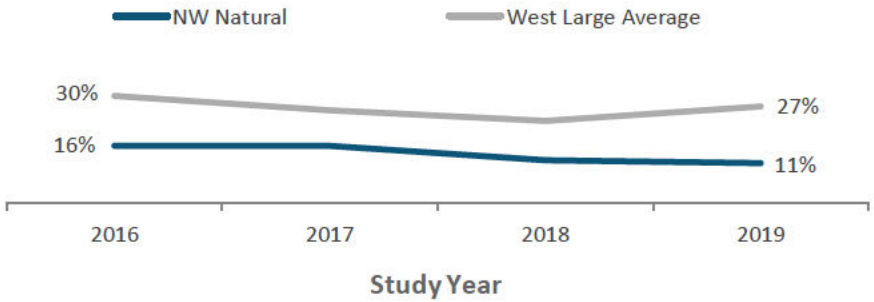
Recall Utility Communication (% yes)



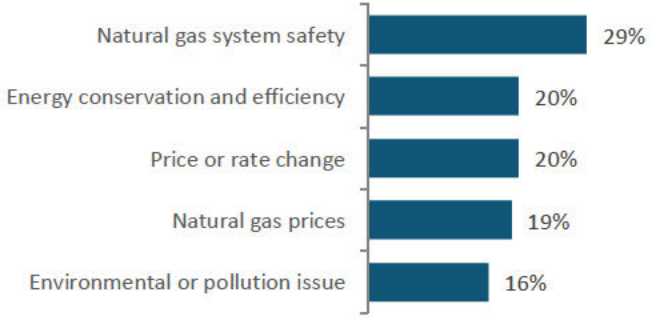
Top Utility Communication Topics Recalled – NW Natural



Recall Media Communication (% yes)

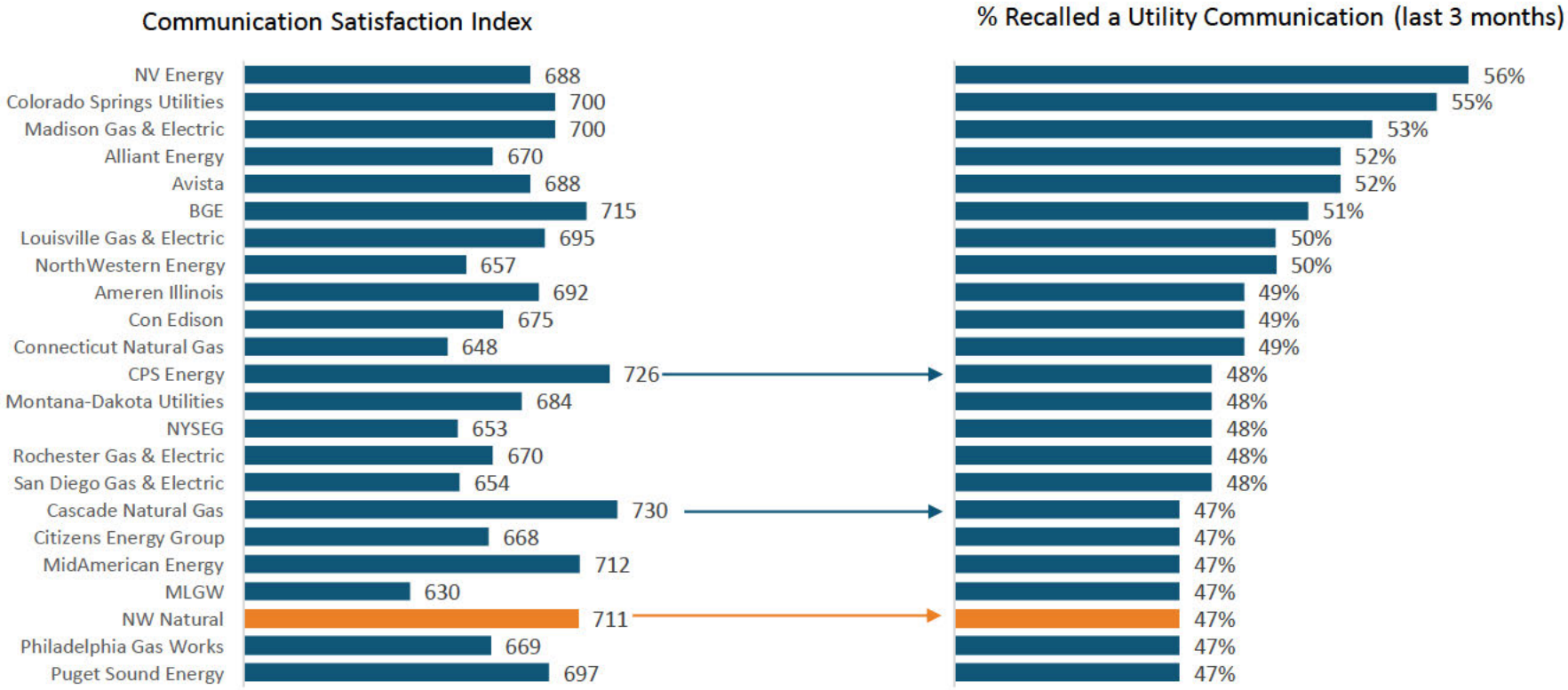


Top Media News Story Topics Recalled – NW Natural



Analysis of Communication Satisfaction

Communication satisfaction varies among the brands with high recall of utility communications



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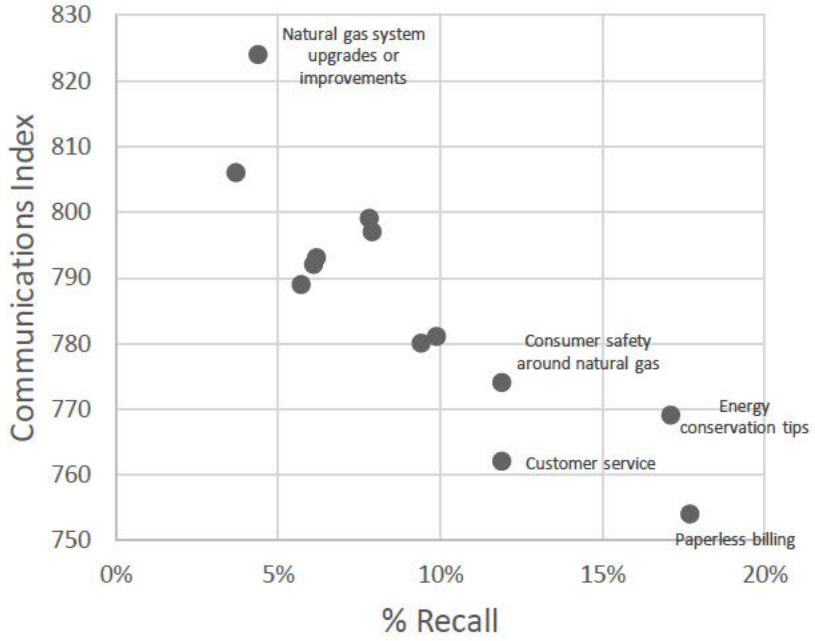
Jenks/30

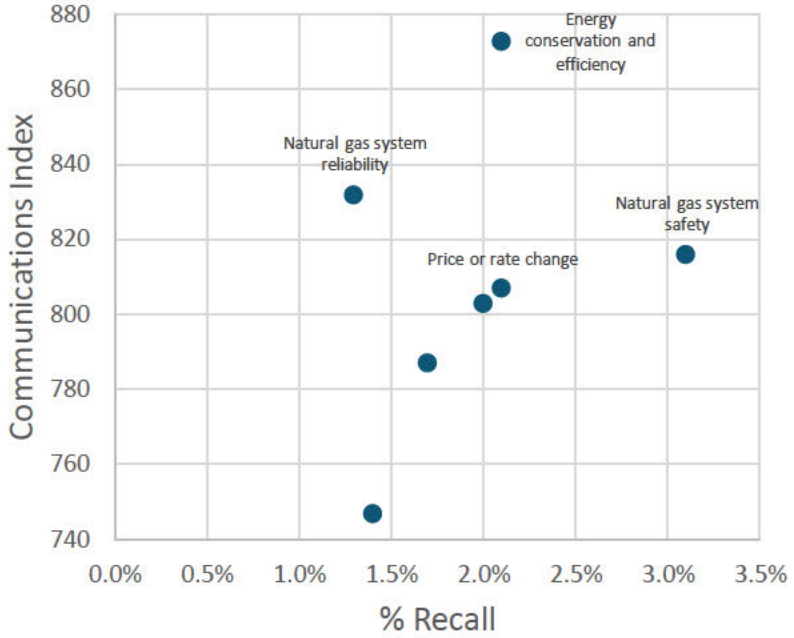
Communication Recall and Impact

NWN's communications about system upgrades is the most satisfying message.

Utility Communications



Media Recall



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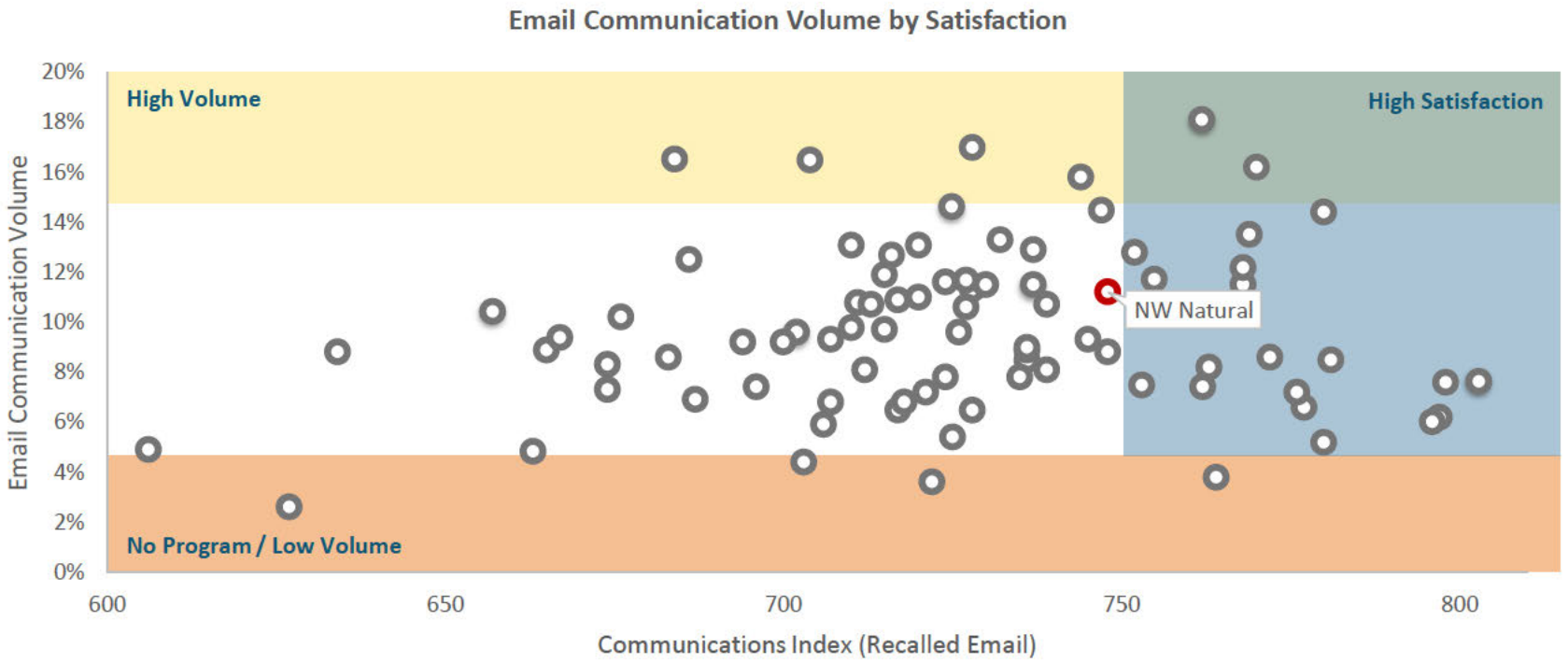
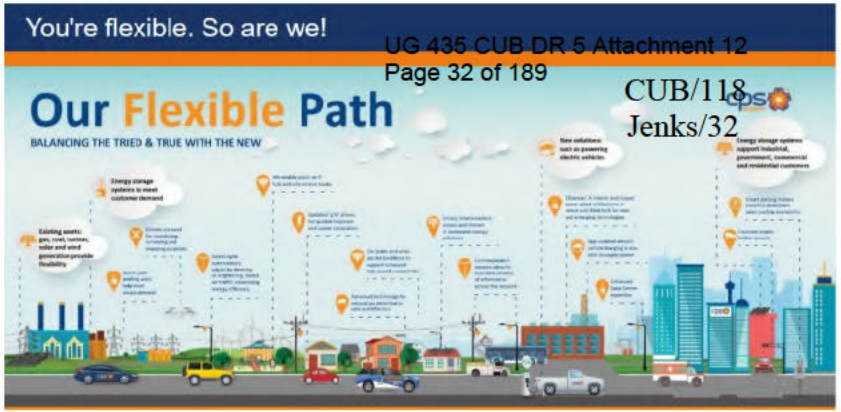
Jenks/31

Satisfaction with Email Communications

NW Natural has opportunities to improve email communications



CPS Energy makes communications simple, visual, and personal



https://www.cpsenergy.com/en/about-us/environment/flexpath.html?cid=new-mainhero

https://c2.cpse.news/u/CPS-Energy/BRMZTCld1dZTOGFkA/CEO-Newsletter-Vol2-Issue2.htm

https://newsroom.cpsenergy.com/ceo-corner/

BGE
An Exelon Company

BGE focused on reliability of natural gas, and gas system upgrades, emergency preparedness in their communications

Natural Gas Pipeline Safety

BGE is committed to the safety & integrity of its natural gas network.

Carbon Monoxide Safety

Learn the signs of carbon monoxide and what you can do to prevent buildup.

Gas Appliance Flexible Connector

BGE alerts customers to a possible safety hazard with gas appliance connectors.

Weather Related Gas Outages

Learn how gas service may be interrupted by storms, floods and more.

Captain Mercaptan

BGE's Natural Gas Safety Hero! Visit BGEGasHero.com to learn more.

Spring Gardens

Spring Gardens has been the center of BGE's gas operations since 1855.

https://www.bge.com/SafetyCommunity/Safety/Pages/NaturalGasSafety.aspx

65% of CSU recall came from their Bill insert/ newsletter

https://www.csu.org/CSUDocuments/connection201908.pdf

Benefits of Registering

My Account provides more information in an easy to understand format:

New features with My Bill Pay

- View current bill, amount due and due date
- Choose from a variety of payment options, including online using your bank account or credit or debit card
- Choose your payment date
- See billing and payment history
- Enable text notifications and pay your bill with our Text-to-Pay feature

Easily manage your account

- Sign up for paperless billing
- Sign up for or change AutoPay payments
- Sign up for or stop your Budget Payment Plan
- Sign up for Green Power Tomorrow or change your purchase level
- Give others access to view your billing, payment and energy use information

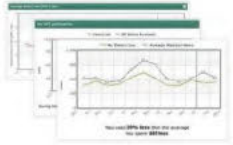


Chart your data

- Energy use summary and details
- Comparisons with other homes and businesses
- Green Power Tomorrow participation

https://www.mge.com/my-account/benefits-of-registering

MG&E has the highest satisfaction for the most communicated topic: Paperless billing

mge®
Madison Gas and Electric

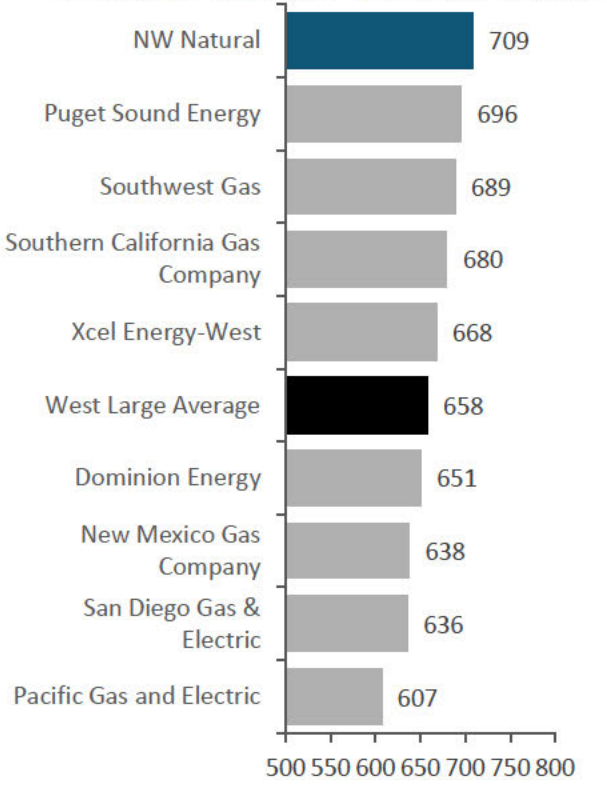
Go Paperless!

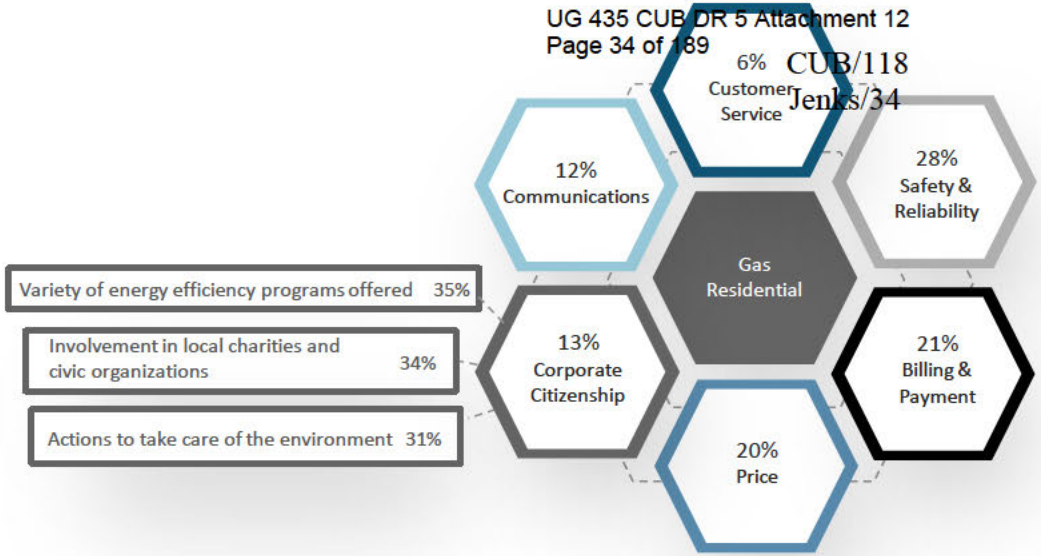
With My Bill Pay, you can sign up to receive your bill electronically, schedule automatic payments or pay online.

my bill pay ✓

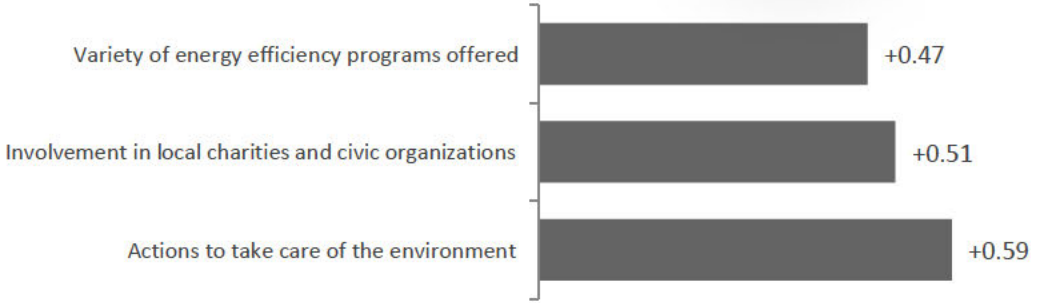
Corporate Citizenship

West Large Corporate Citizenship Ranking





Attribute Gap to West Large



Corporate Citizenship – Index and Attributes

"They come quickly when called. I have had remodel service, We are a close knit local community, they work well with the local municipality..."

"be more proactive in promoting how they are helping my family and the community in general"

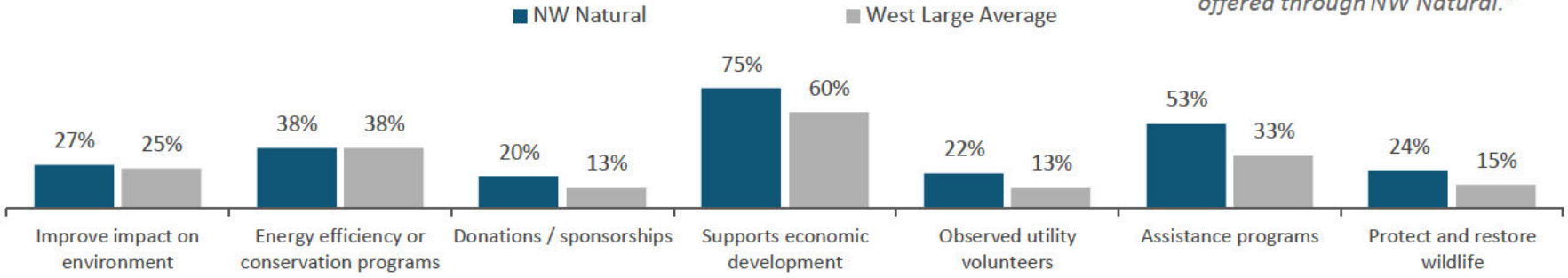
	Corporate Citizenship Index	Actions to take care of the environment	Variety of energy efficiency programs offered	Involvement in local charities and civic organizations
Score	709	7.10	7.23	6.96
Rank	4	5	5	4
Quartile	1	1	1	1
Significant Change to LY	No	No	No	No

Note: Significance test is using a 90% confidence interval, Rank is out of 84 brands, Quartile is using whole numbers for index scores and rounded to 0.00 for attributes scores.

Awareness of Utility Efforts On...

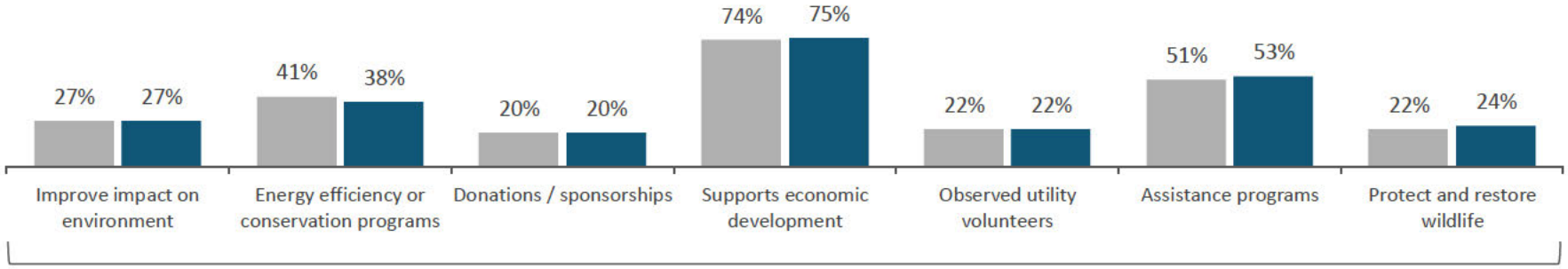
"Service is consistent and price is affordable. I participate in a program offered to reduce greenhouse gasses from dairies offered through NW Natural."

Corporate Citizenship Awareness (% Aware)



NW Natural Index Impact	+89	+90	+95	+106	+88	+79	+90

Historical Trend of Awareness – NW Natural



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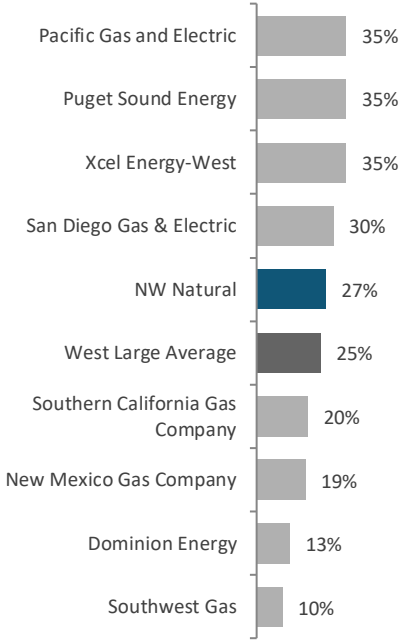
Jenks/37

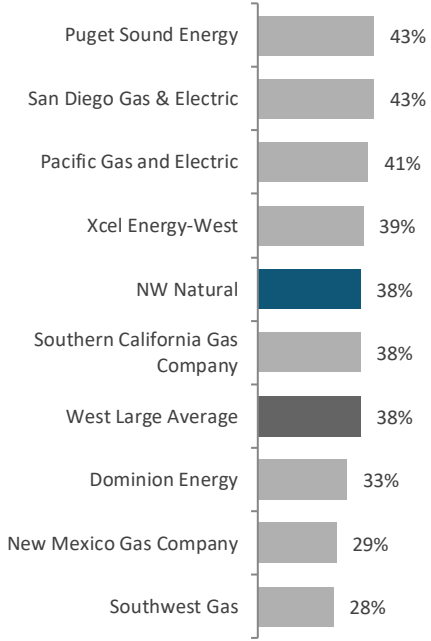
Corporate Citizenship Performance – West Large

Improve impact on environment



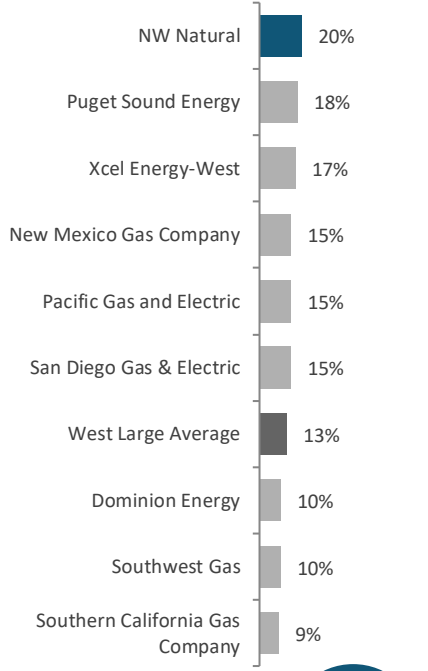
Industry **21%**

Energy efficiency or conservation programs



Industry **35%**

Donations / sponsorships



Industry **14%**

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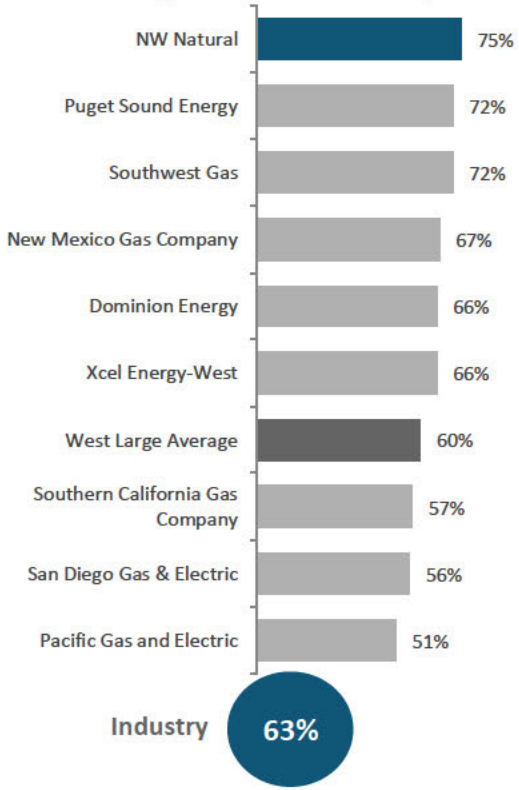
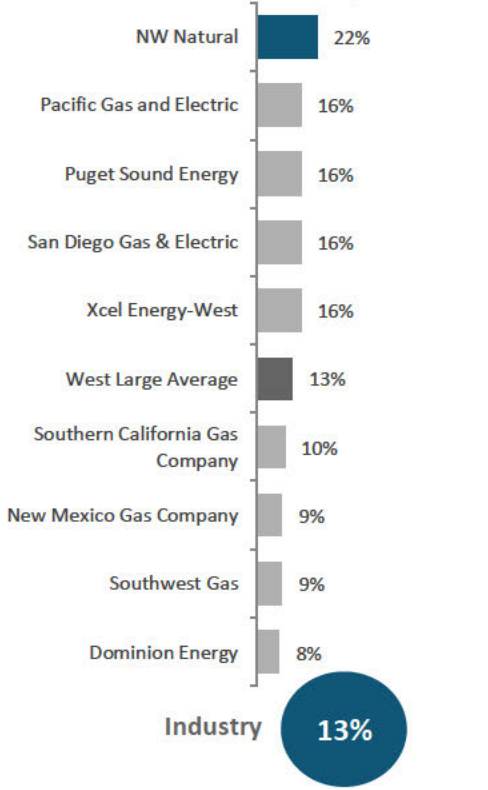
Jenks/38

Corporate Citizenship Performance Continued – West Large

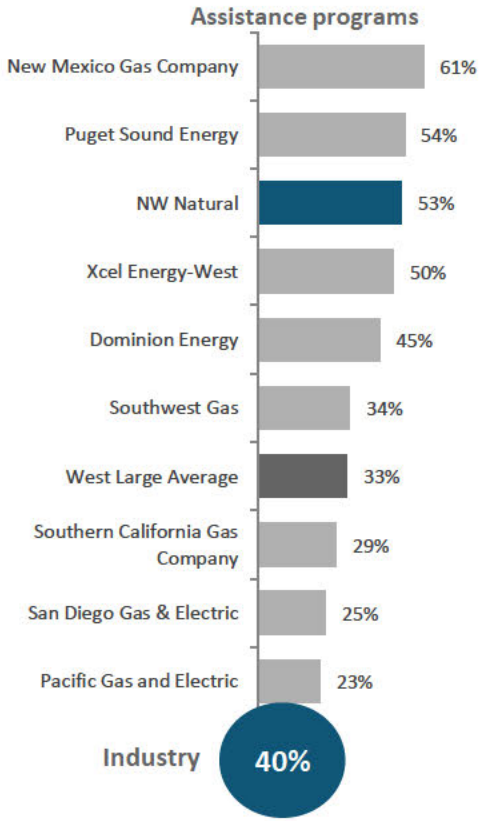
Supports economic development

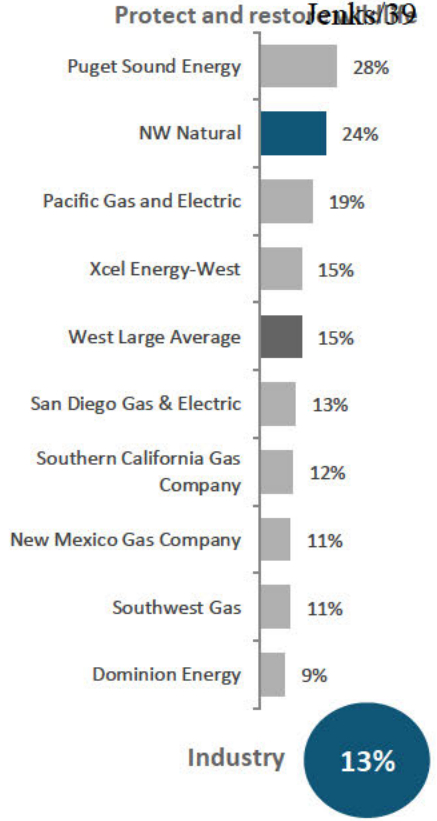


Observed donations/volunteers



Corporate Citizenship Performance Continued – West Large



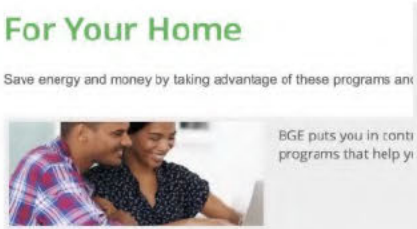


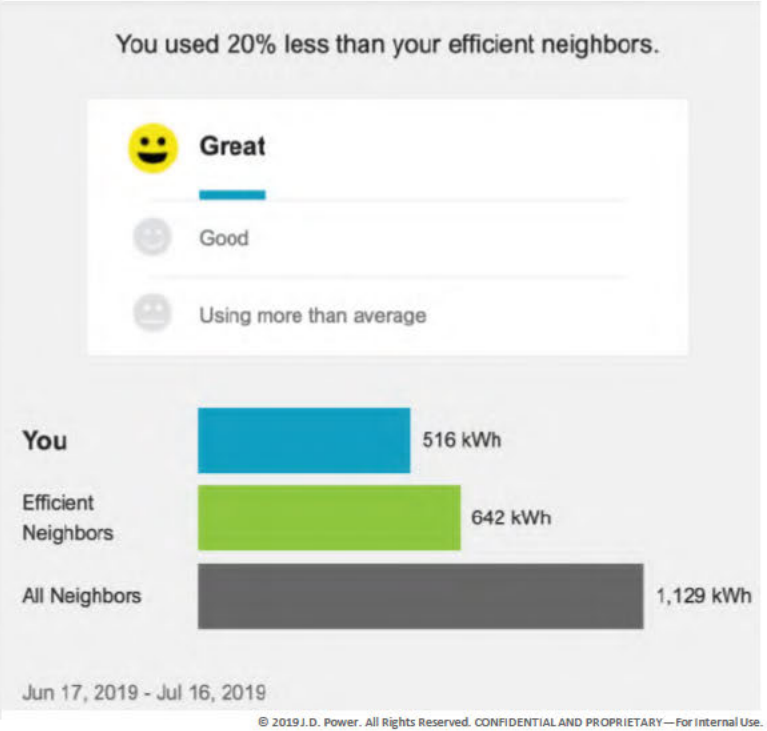
Corporate Citizenship

Familiarity with utility conservation programs

Very familiar (%): BGE 10%, Industry 5%, NW Natural 5%

An Exelon Company





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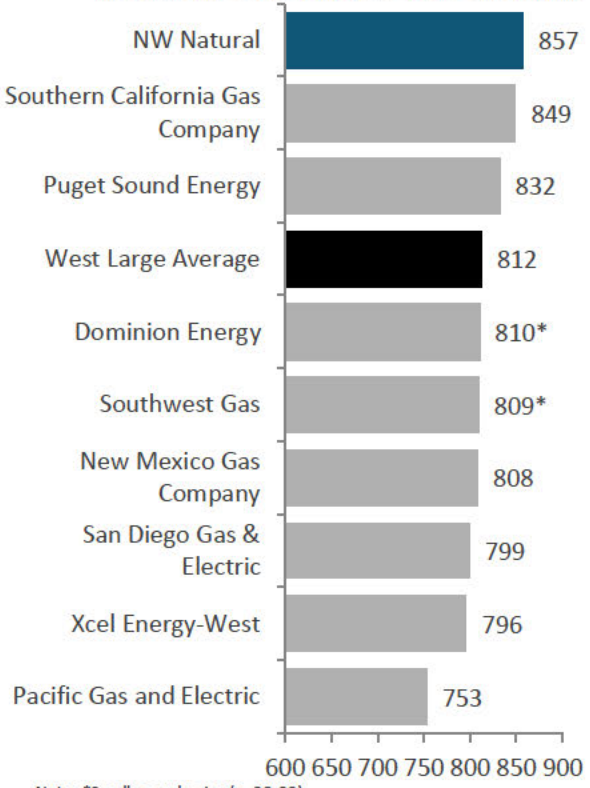
Jenks/41

6%
Customer Service

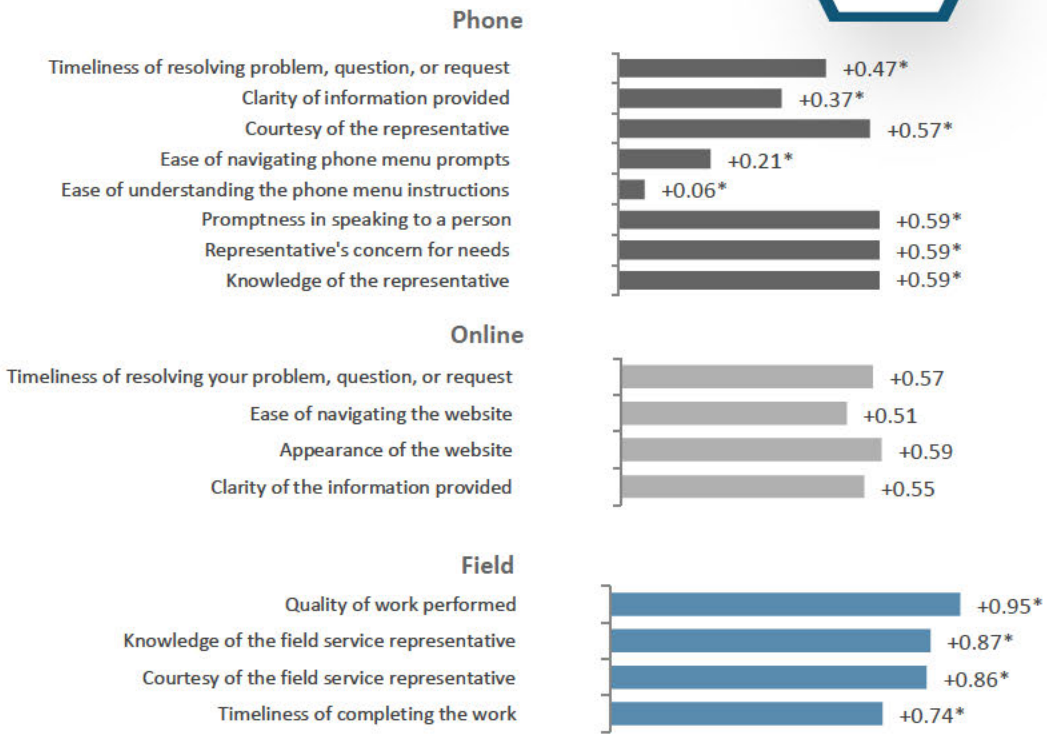
Customer Service

West Large Customer Service Ranking



Note: *Small sample size (n=30-99).

Attribute Gap to West Large



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Jenks/42

Customer Service Phone – Index and Attributes

	Customer Service Phone Index	Clarity of the information provided	Promptness in speaking to a person	Courtesy of the representative	Knowledge of the representative	Rep's concern for your needs	Timeliness of resolving your problem, question, or request	Ease of navigating through the phone menu prompts	Ease of understanding the phone menu instructions
Score	838	8.43	8.30	8.70	8.54	8.50	8.44	8.06	8.05
Rank	12	15	11	15	10	8	9	23	45
Quartile	1	1	1	1	1	1	1	2	3
Significant Change to LY	No	No	No	No	No	No	No	No	Yes ↓

Note: Significance test is using a 90% confidence interval, Rank is out of 84 brands, Quartile is using whole numbers for index scores and rounded to 0.00 for attributes scores.

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Jenks/43

Customer Service Online – Index and Attributes

	Customer Service Online Index	Appearance of the website	Clarity of the information provided	Ease of navigating the website	Timeliness of resolving your problem, question, or request
Score	869	8.73	8.72	8.58	8.73
Rank	6	3	7	11	4
Quartile	1	1	1	1	1
Significant Change to LY	No	No	No	No	No

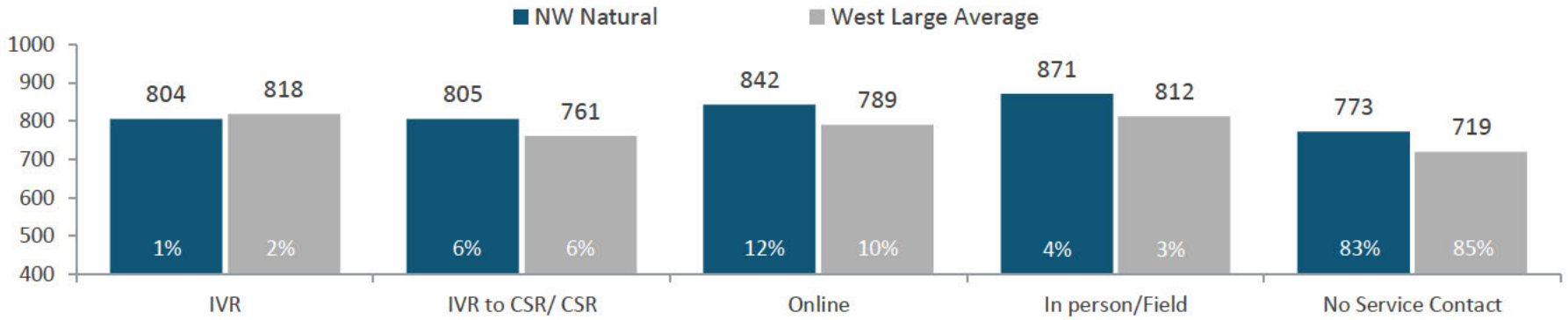
Note: Significance test is using a 90% confidence interval, Rank is out of 84 brands, Quartile is using whole numbers for index scores and rounded to 0.00 for attributes scores.

Customer Service Channels – National Rankings and Quartiles

NW Natural

Customer Service Channel	National Rank (out of 84 Brands)	Quartile
Phone	12	1
Online	6	1
Field	1	1

Overall CSI by Service Experience



Note: The sum of percentages may not equal to 100%, respondents may have had an online, phone, and In person experience.
Based out of the whole population.

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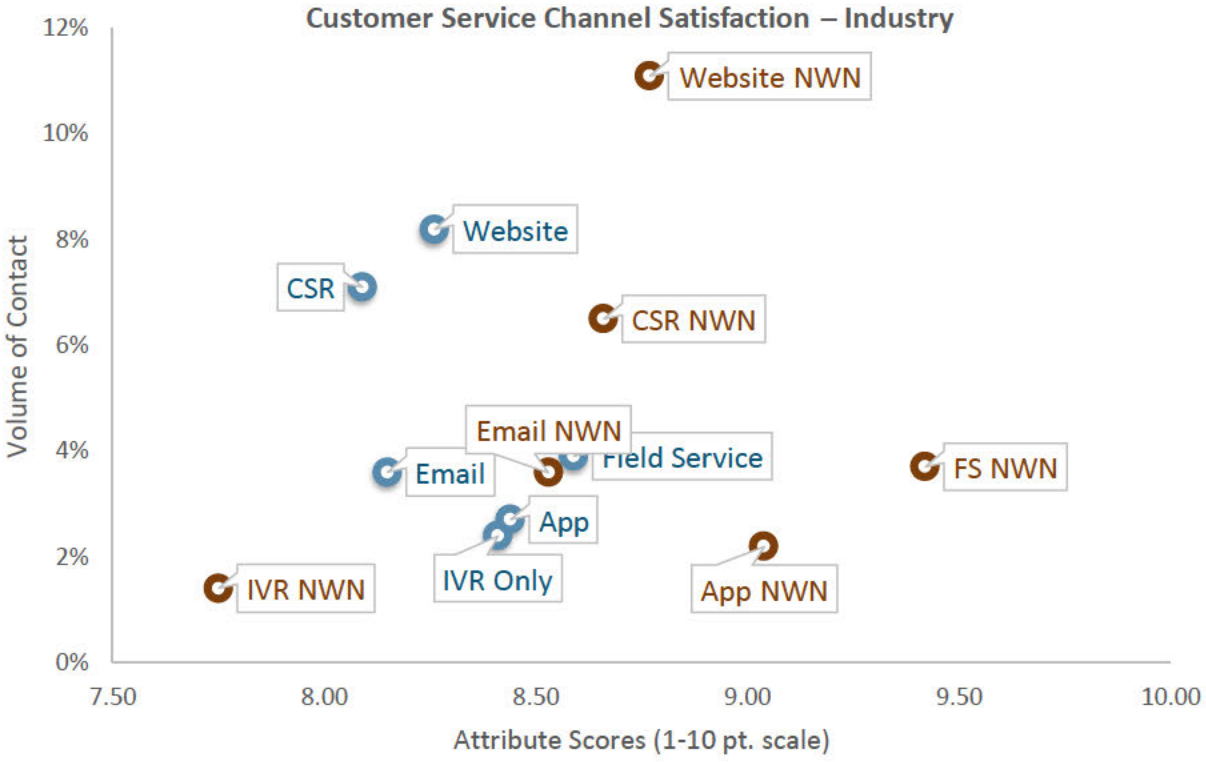
Satisfaction with Customer Service Channels

NW Natural has done a great job drawing customers to the website



Customer Service Channel Summary

NW Natural

Channel	% Used	% First Contact Resolution
App	2%	73%
CSR	6%	88%
Email	4%	76%
Field Service	4%	N/A
IVR Only	1%	80%
Website	11%	83%

+142 Top 2 box gap: Customer Focused

Image Semantic Differentials (Top 2 Box) – NW Natural

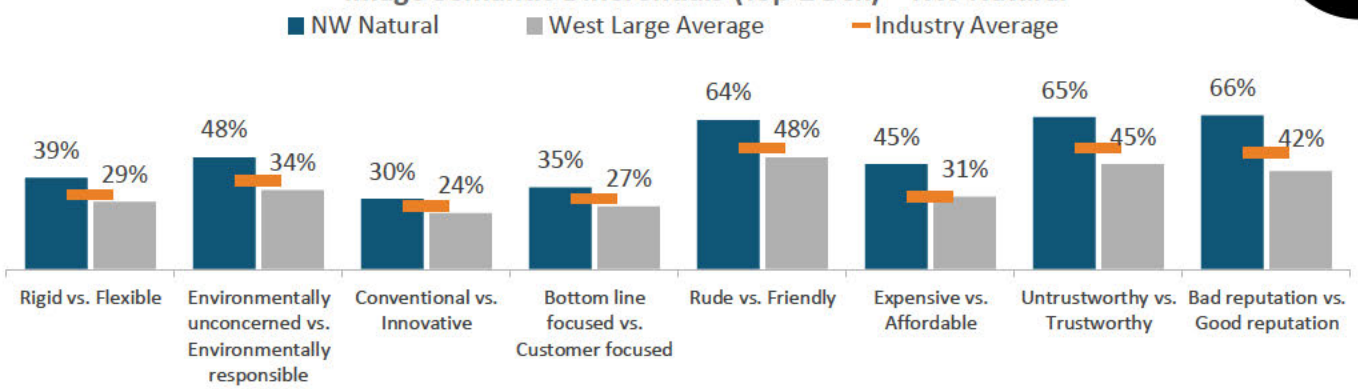
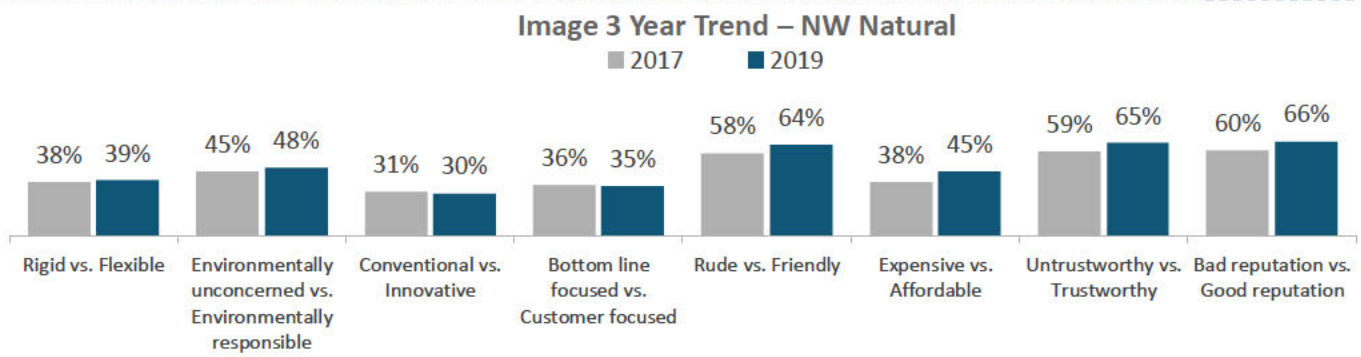
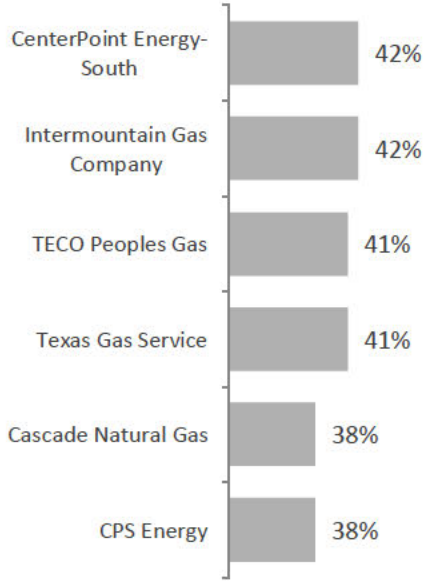


Image 3 Year Trend – NW Natural



Top Brands with Customer Focused



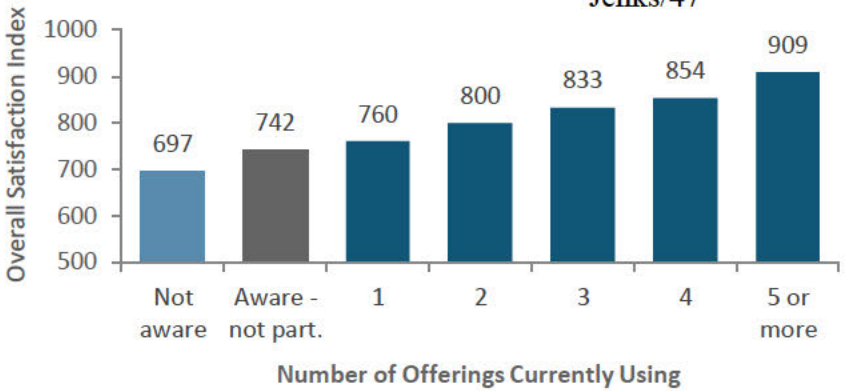
Note: 3 year trend (2017, 2018, 2019).

Impact of Products & Services

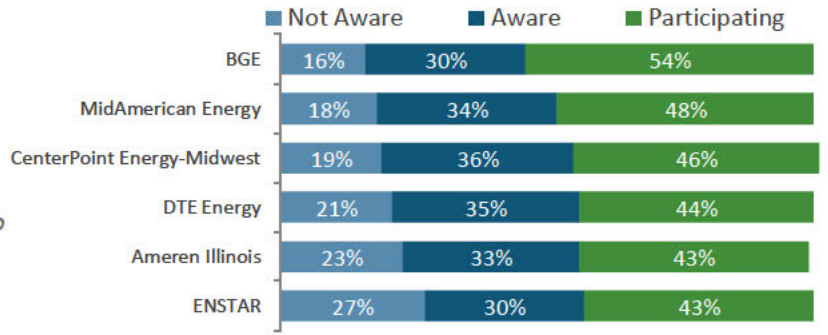
NW Natural	Not Aware	Aware – Not Participating	Participating
Average bill amount ($)	$69	$67	$70
Online account	54%	60%	76%
Effort to help you manage monthly usage	6.55	7.03	7.81
Price Index	681	733	788
Conservation awareness	18%	42%	52%

"I was a bit excited recently to learn that they sold gas appliances, but then I looked at their offerings and was underwhelmed. What's that about? Why do they even do that? I can see that deep discounts might drive overall gas consumption, but the prices didn't seem particularly competitive, so...???"

Impact on Overall Satisfaction – Industry



Top Participating Brands Products & Services



CUB/118
Jenks/48

THANK YOU!

CUB/118
Jenks/49

2020 Gas Residential Customer Satisfaction Study

NW Natural

Carl Lepper, Director

September 2020

Keys to Improving Customer Satisfaction

Don't Fight the Results

Hold Teams/People Accountable

Dig Deep into the Details

Learn/Borrow from Others

Have Public Satisfaction Goals

Create a Culture Focused on Customers

Communication is Critical Both with Customers but also Employees

J.D. POWER

J.D. Power 2020 Gas Utility Residential Customer Satisfaction Study

60,096
TOTAL RESPONSES NATIONALLY

19 TH
YEAR OF THE STUDY

83 BRANDS
WITH 125,000+ RESIDENTIAL CUSTOMERS

KEY INDEX FACTORS

SAFETY & RELIABILITY	BILLING & PAYMENT	PRICE	CORPORATE CITIZENSHIP	COMMUNICATIONS	CUSTOMER SERVICE
28%	21%	20%	13%	12%	6%

WHEN INTERACTION IS PRESENT
29%

Pair of rate hikes to hit NW Natural customers in Clark County

Natural gas rates going up for Oregon residents

NW Natural Can Now Bring Renewable Energy Directly to Its Customers

Get ready, your NW Natural gas bill's going up

Updated Nov 01, 2019; Posted Nov 01, 2019

NW Natural seeks $71M rate hike

Natural gas rates to increase in Washington on Nov. 1

Customer Comments

Asked of everyone who provides a rating of 8 – 10 on Overall Satisfaction

71%

Responded to this verbatim question

What does NW Natural do well to earn your satisfaction?

"Allows a budget plan, so monthly payments are the same every month. No guessing on what the bill will be. It makes it much easier to plan where my money needs to be allocated."

"Provide reliable service at a reasonable price. Offer sustainable options and continually working towards greater sustainability and less dependence on fossil fuels. Easy to navigate website with easy payment options."

"Whenever I have needed them they have provided excellent service in a timely manner. I have also never had a gas outage in my area. My gas service is something that I have never had to worry about."

"They are reliable, and the cost is fairly reasonable."

"They are very flexible with you and their service has always been consistent with quality."

CUB/118
Jenks/54

Customer Comments

Asked of everyone who provides a rating of 1 – 7 on Overall Satisfaction

29%

Responded to this verbatim question

What does NW Natural need to improve to earn your satisfaction?

"Be more transparent with what you are doing to help the community and how we can stay safe in case of an emergency."

"Provide information and any other equipment that is needed to shut off gas supply in case of a leakage."

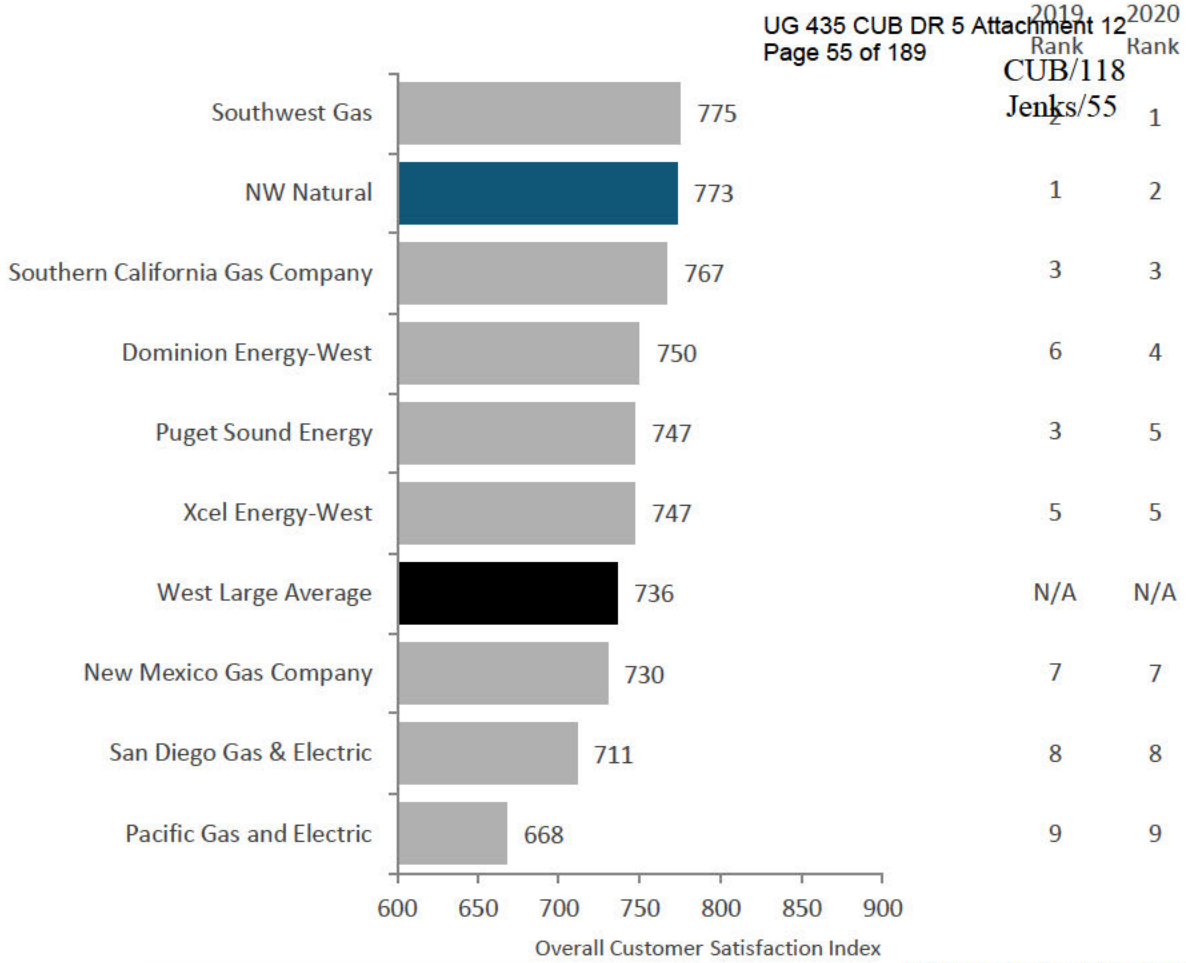
"Do more to offer ways for customers to reduce consumption on high demand days through peak time rebates."

"Educating the public regarding safety with natural gas."

"Keep price stable and minimal price increases."

Overall West Large Ranking

NW Natural Company ranks 2nd in the West Large segment



*Small sample size (n=30-99).

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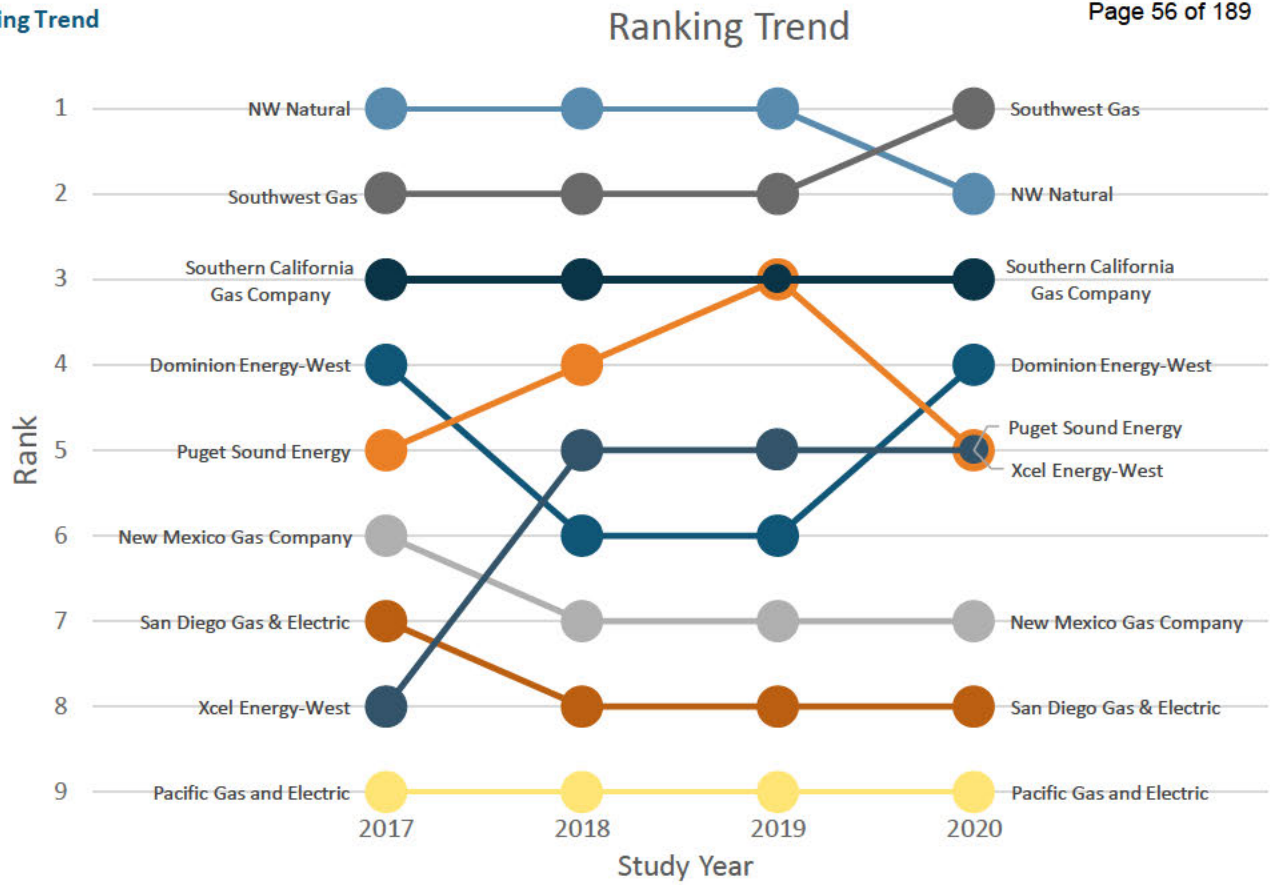
Jenks/56

West Large Ranking Trend



West Large Segment Performance

	Segment Rank	Factor Ranking by Segment					
		Safety & Reliability	Billing & Payment	Communi-cations	Corporate Citizenship	Price	Customer Service
Southwest Gas	1	1	1	3	2	1	6
NW Natural	2	1	2	2	1	2	3
Southern California Gas Company	3	3	3	1	3	3	2
Dominion Energy	4	4	4	6	6	4	1
Puget Sound Energy	5	6	6	4	4	6	7
Xcel Energy	5	5	5	5	5	5	5
New Mexico Gas Company	7	7	7	8	7	7	4
San Diego Gas & Electric	8	8	8	7	7	8	8
Pacific Gas and Electric	9	9	9	9	9	9	9

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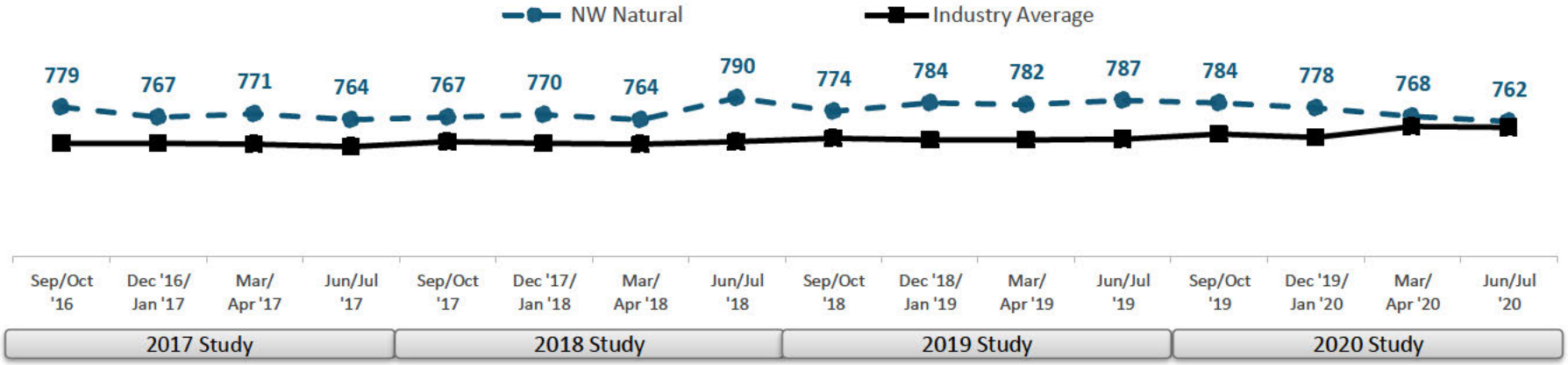
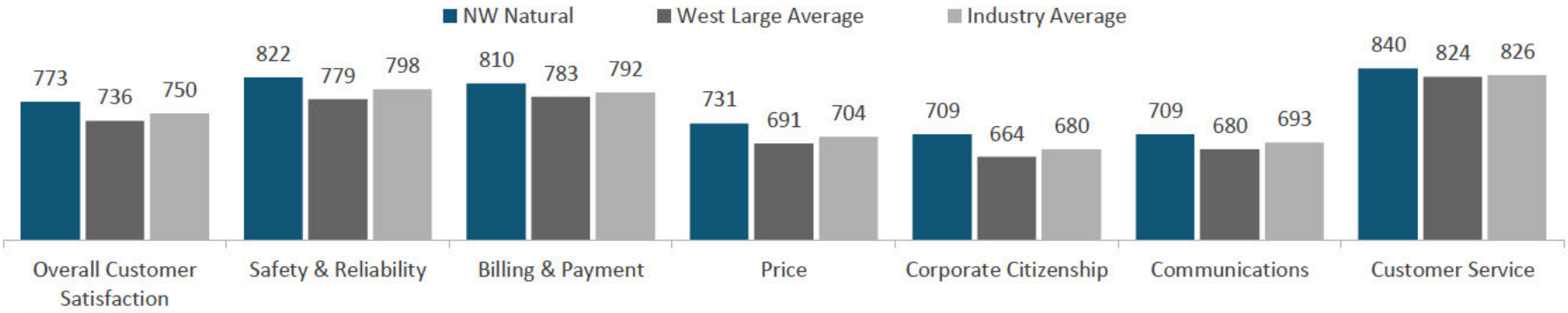
Jenks/58

Index and Factors Compared to Industry and Segment

Overall Satisfaction Trend





J.D. POWER

*Small sample size (n=30-99); #Insufficient sample size (n<30).

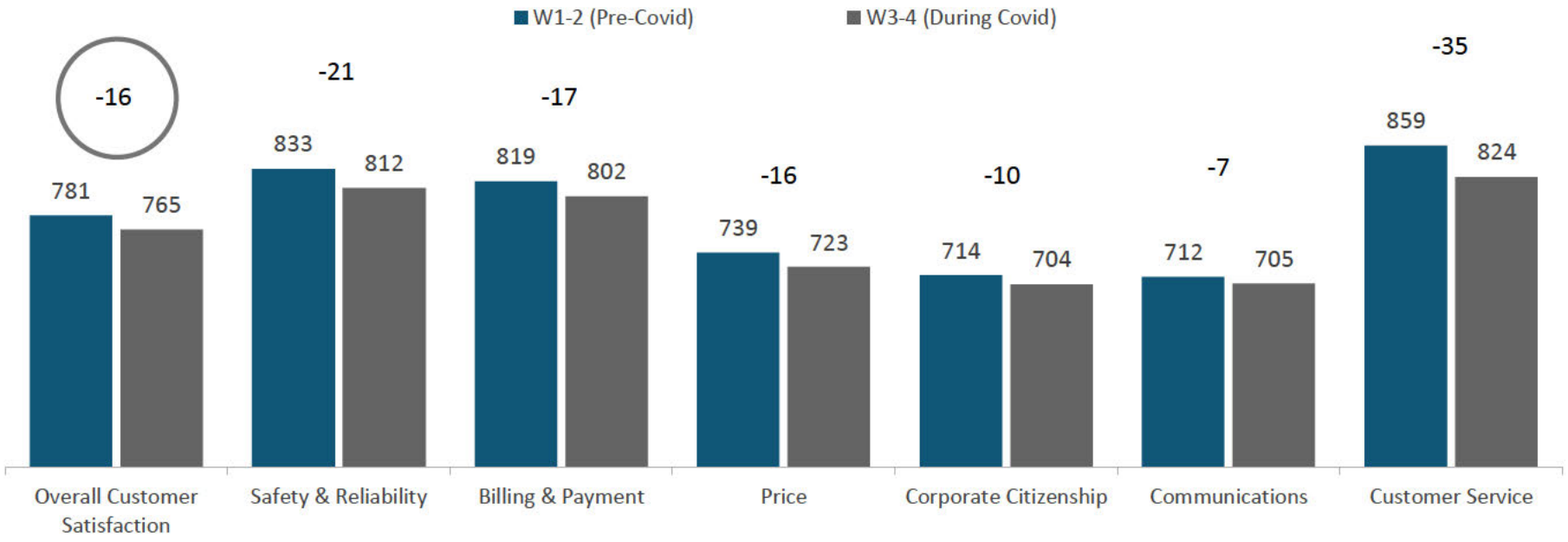
NW Natural Index and Factors

West Large
W1-2 to W3-4 Gap

+7

Industry
W1-2 to W3-4 Gap

+10



*Small sample size (n=30-99); #Insufficient sample size (n<30).

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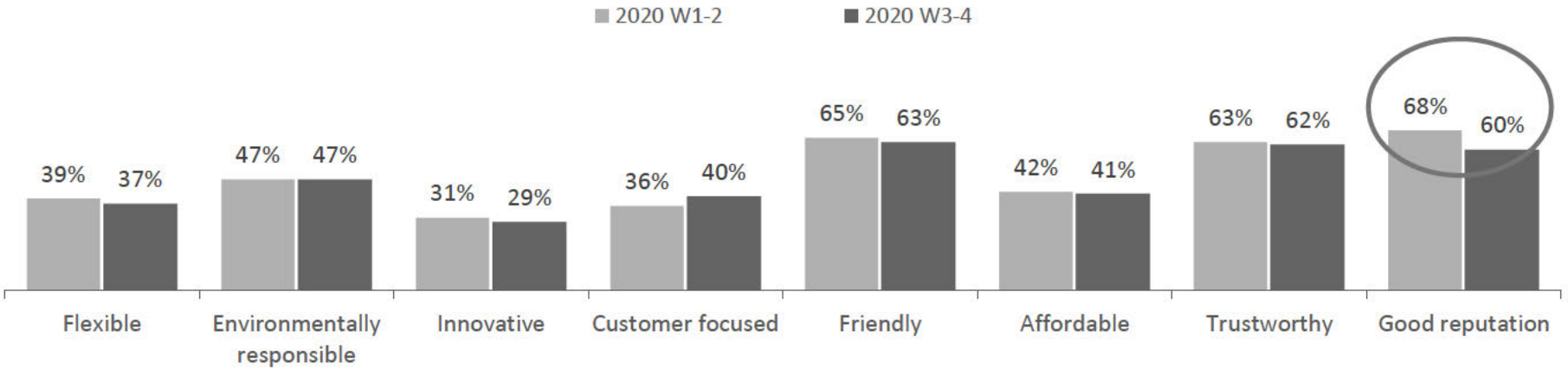
Jenks/60

Utility Image – NW Natural

Image Trend (Top 2 Box)



Over the last few months the industry has improved how residential customers feel about their utility.

Covid Observations

Internal:

- Stopped in home visits due to pandemic.
  - Initially, we heard negative feedback from customers who were at home and had hoped to get service.
- Pulled back on advertising
- Eugene Climate Action Plan, Vancouver City announced policy restrictions for natural gas
- Slow in launching our proactive outreach to past-due customers
- Cancelled all home shows, sponsored and community events during Waves 3-4 at which customer service, acquisition, and safety messaging is typically delivered to >300k people and 15k direct engagements with people.

External:

- Jordan Cove Project
- Portland Climate Strike
- Rising Tide in Portland

COVID-19 Questions

- Access to COVID full question set within spss
- Access to pre-run excel data (posted to PowerSource)
- SPSS data set will include COVID questions

COVID_1_B2C. How have you been personally impacted by the novel coronavirus (COVID-19) outbreak? Mark all that apply.

COVID_2. What, if anything, has UTILITY done in response to the novel coronavirus (COVID-19) outbreak? Mark all that apply.

COVID_3 How would you rate UTILITY'S response to the novel coronavirus (COVID-19) outbreak?

COVID_4 How has the response from UTILITY to the novel coronavirus (COVID-19) outbreak changed your impression of them?

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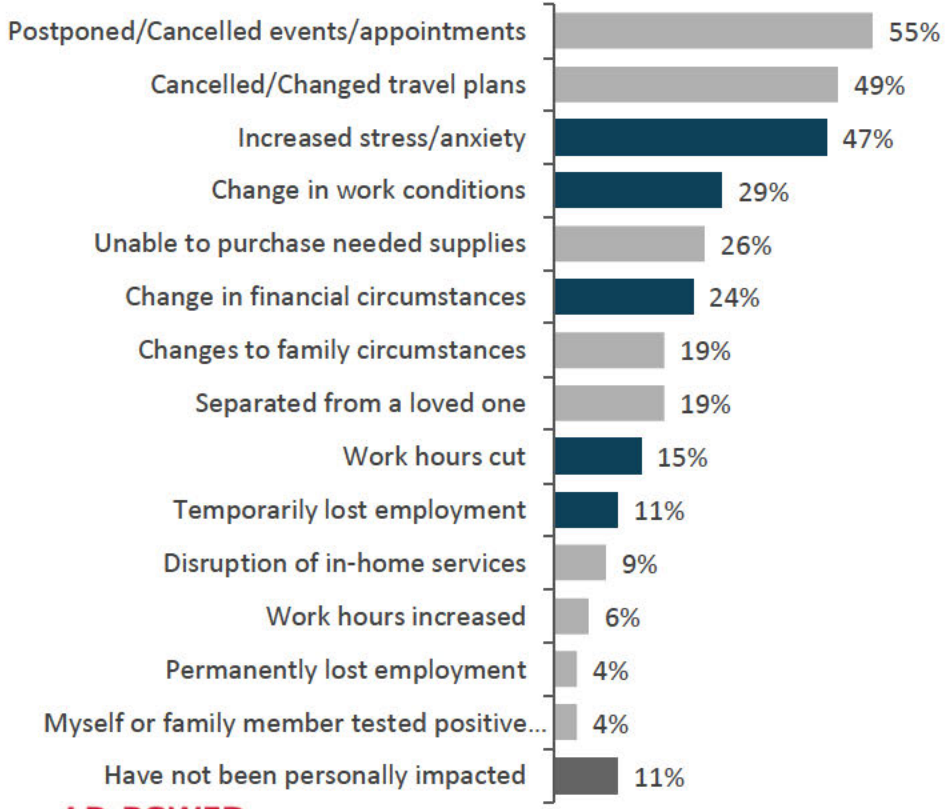
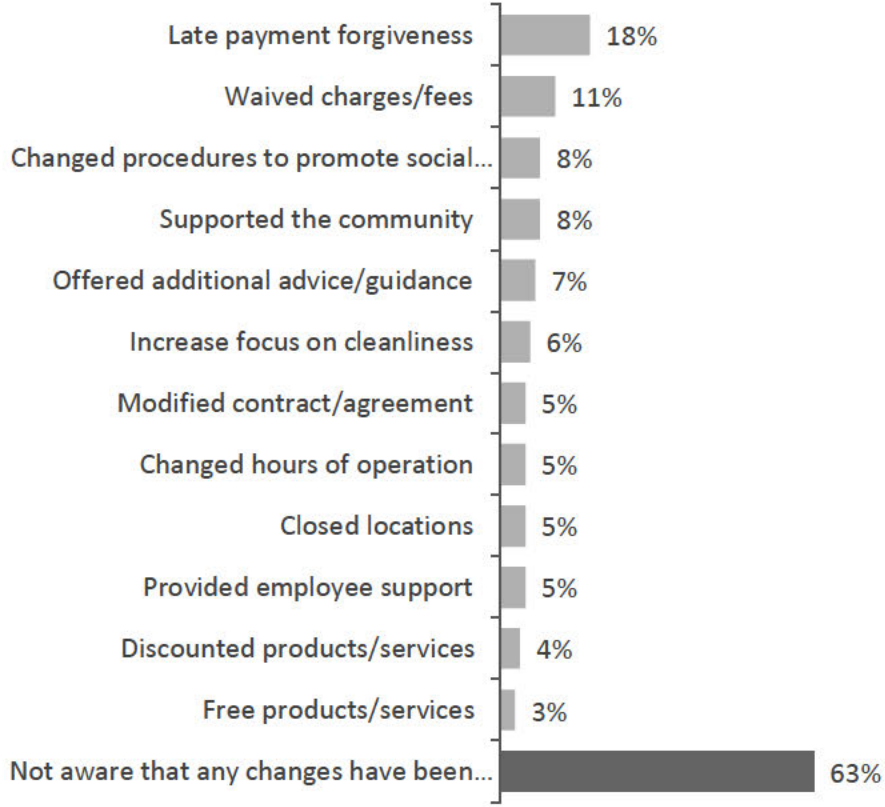
COVID-19 Summary

How Personally Impacted by the COVID-19 Outbreak

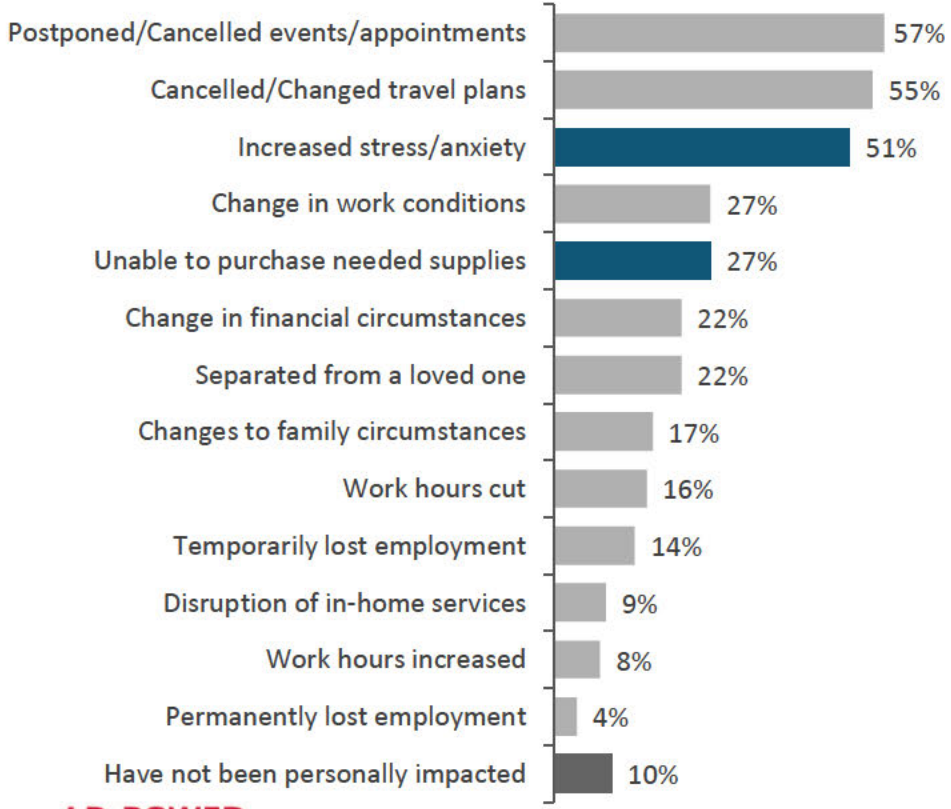


What has Utility done in response to the COVID-19 Outbreak

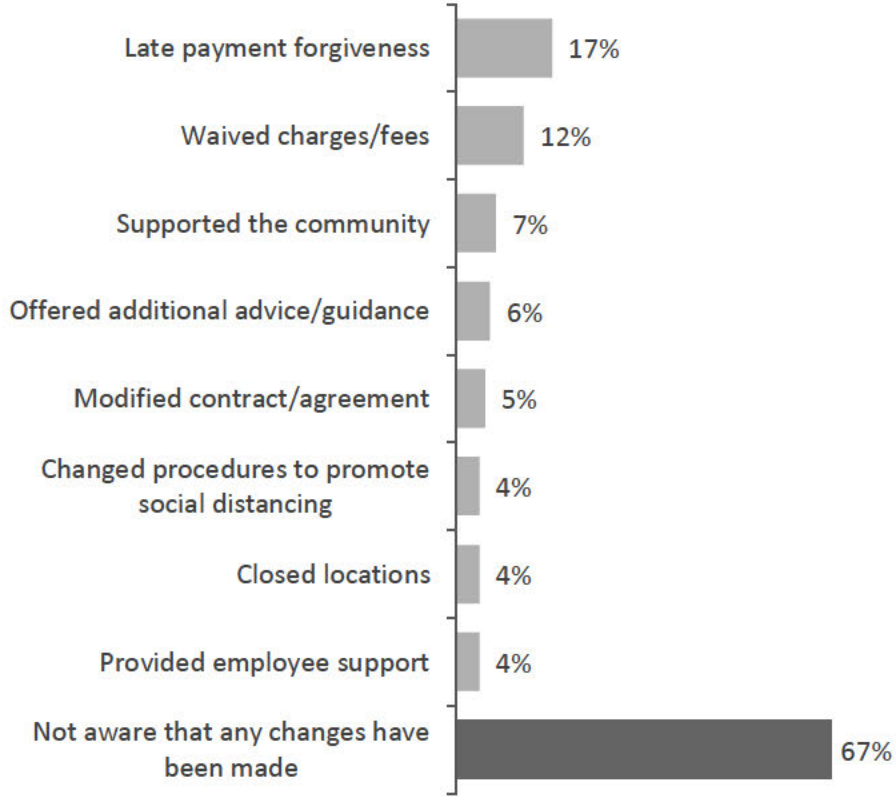


COVID-19 Summary – NW Natural

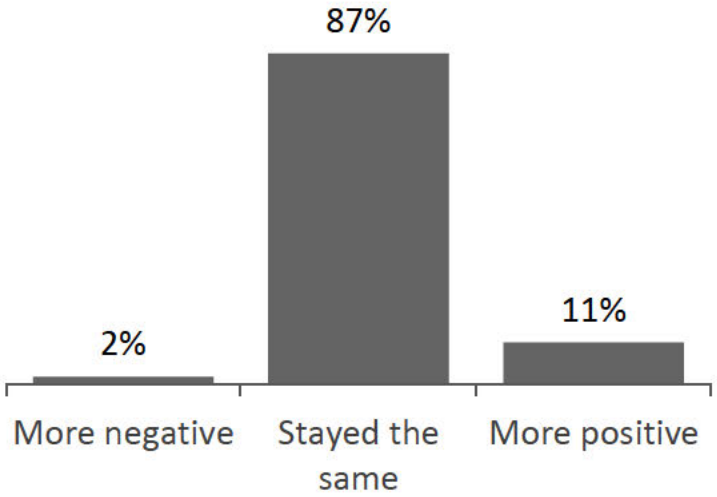
How Personally Impacted by the COVID-19 Outbreak



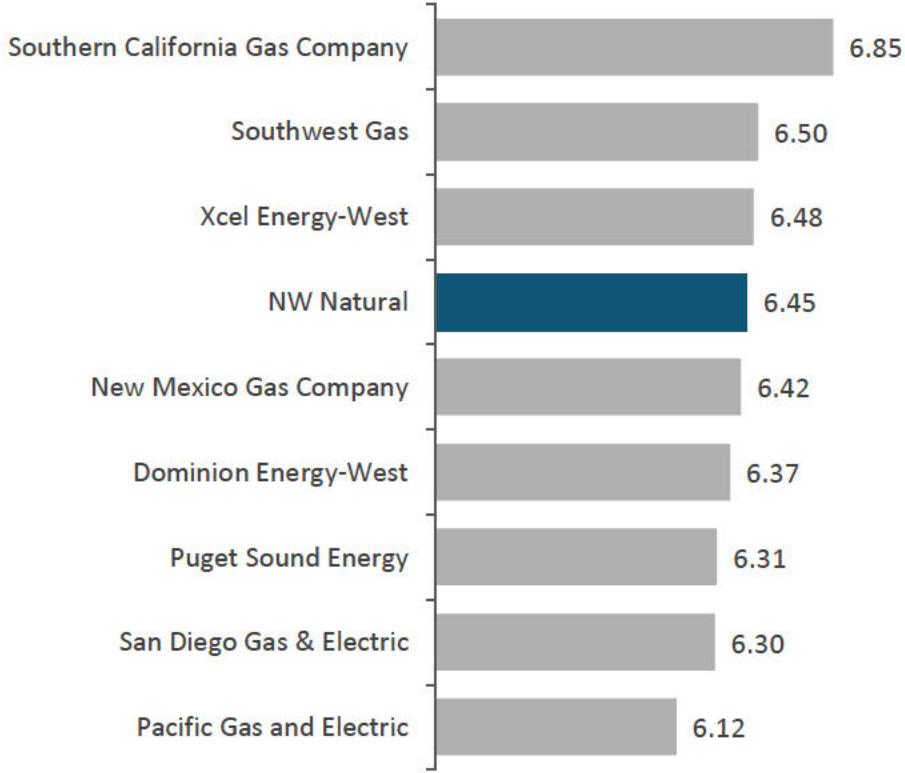
What has Utility done in response to the COVID-19 Outbreak



How Utility Response has Changed Impression of them



How would you rate UTILITY response to the novel coronavirus (COVID-19) outbreak?



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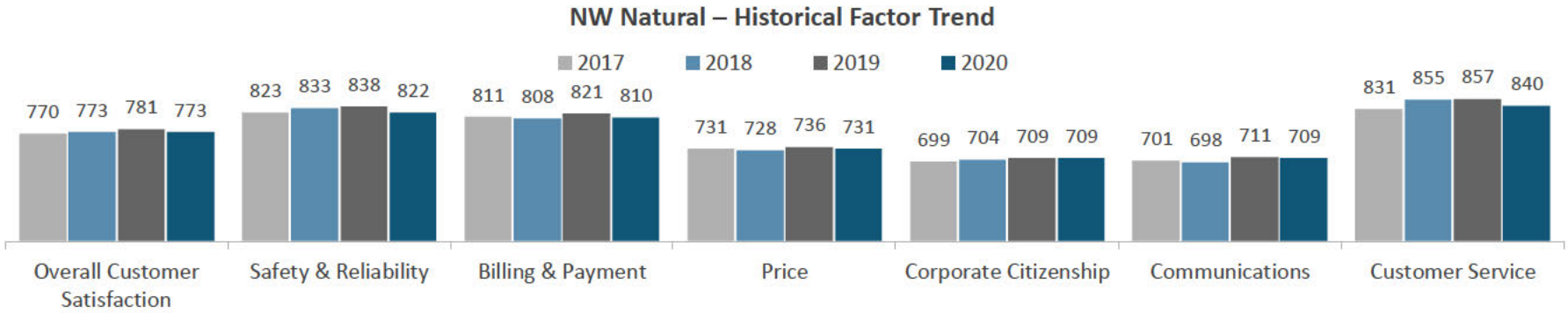
Ranking Compared to Industry



*Small sample size (n=30-99); #Insufficient sample size (n<30).

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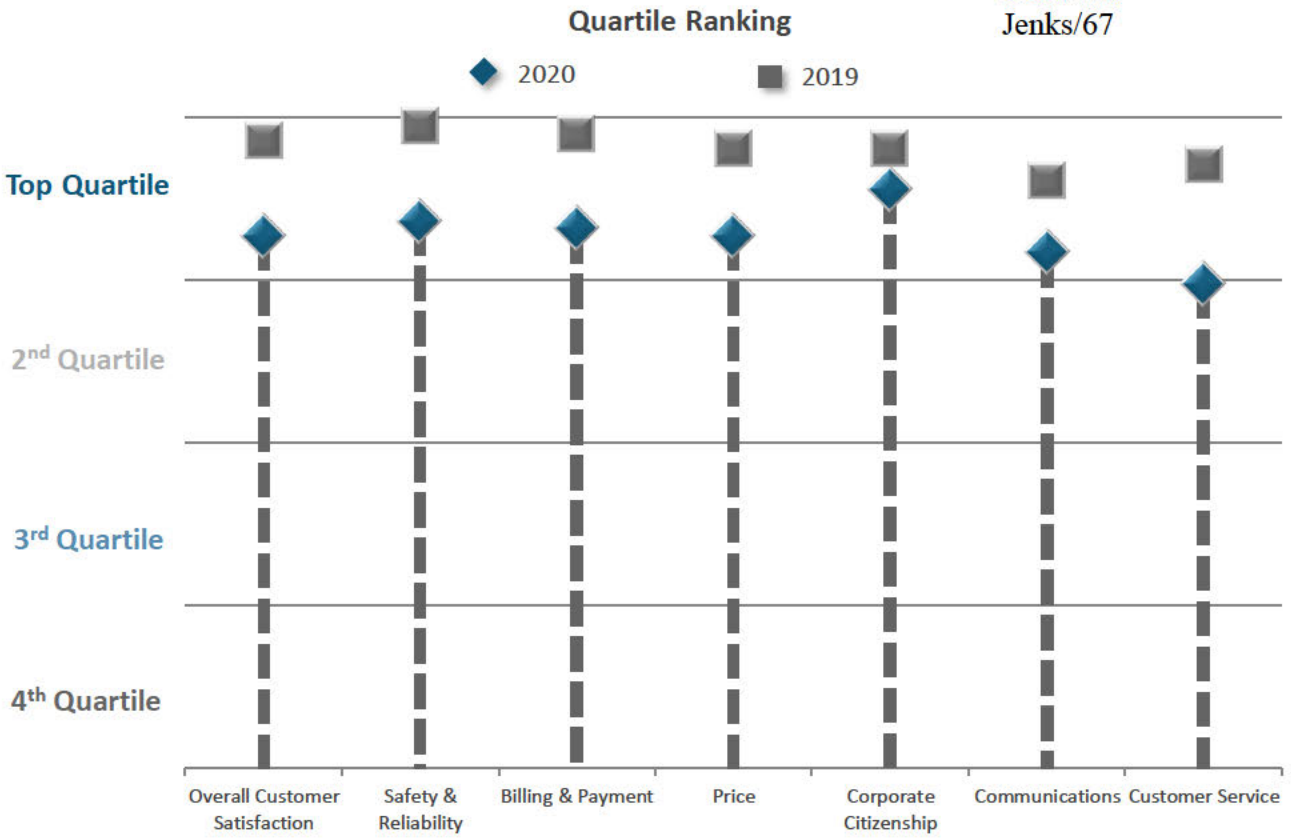
Jenks/67

NW Natural Quartile Comparison to the Industry

Ranking this year compared to last for overall satisfaction and the factors driving satisfaction



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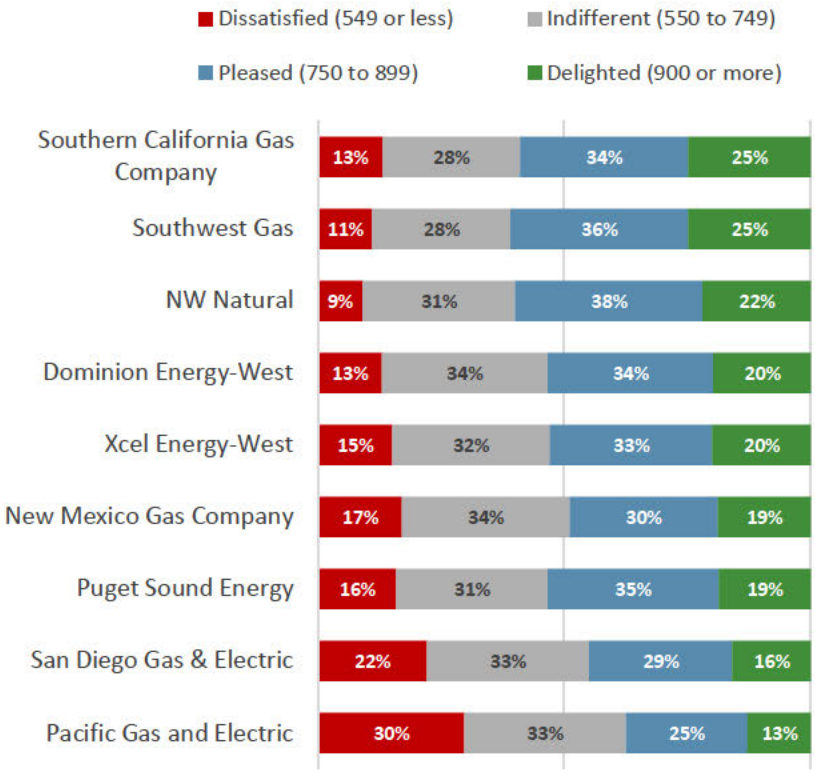
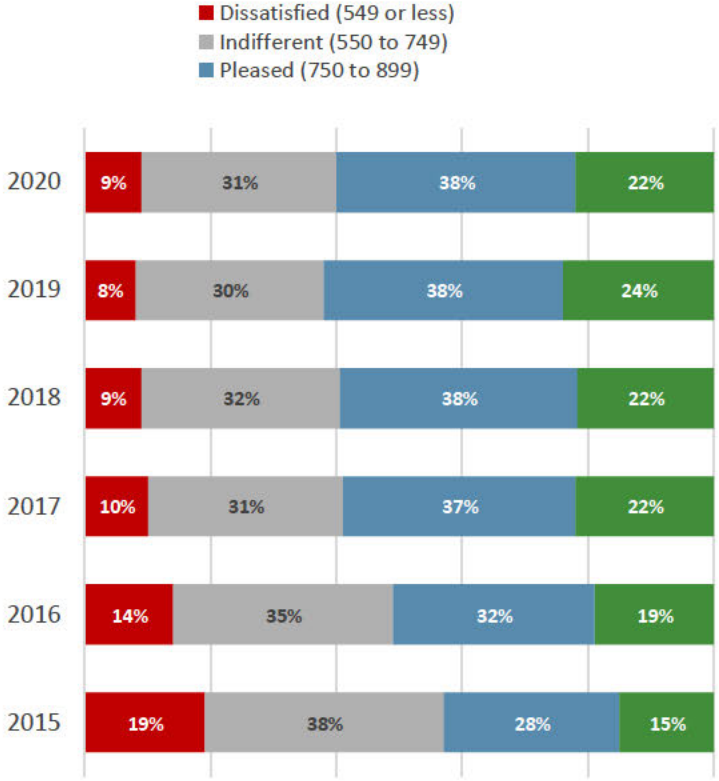
Overall Customer Satisfaction Index – Zones of Satisfaction

Zones of Satisfaction – West Large

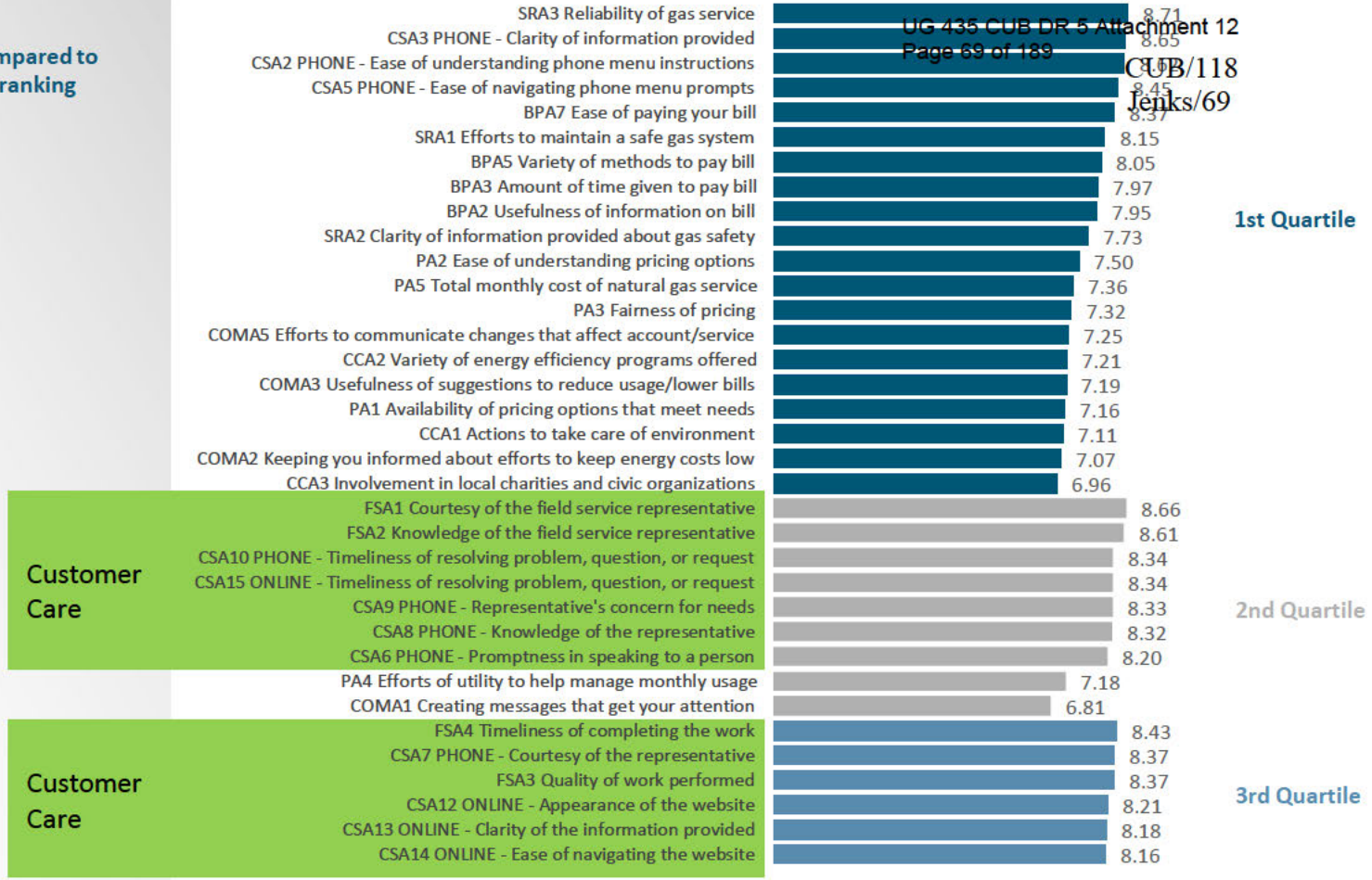


Zones of Satisfaction – Trend NW Natural



*Small sample size (n=30-99); #Insufficient sample size (n<30).

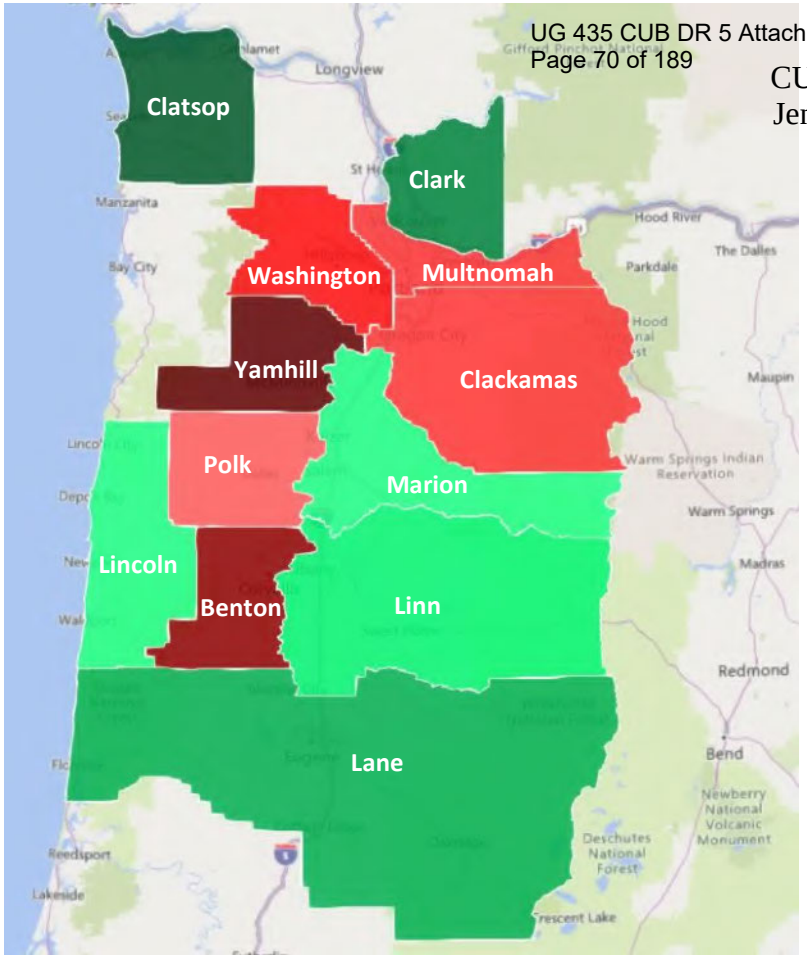
NW Natural - Attributes compared to industry shown by quartile ranking



Overall Customer Satisfaction by County – NW Natural

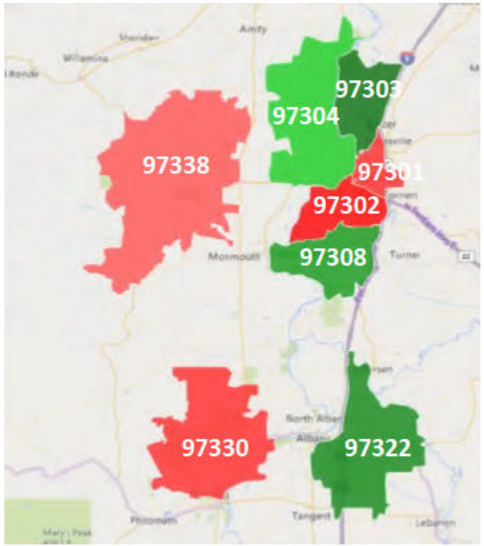
State	County	Overall Satisfaction	Count
Oregon	CLATSOP - OR	844	21
Washington	CLARK - WA	808	106
Oregon	LANE - OR	805	88
Oregon	LINN - OR	780	39
Oregon	LINCOLN - OR	779	13
Oregon	MARION - OR	772	97
Oregon	POLK - OR	769	32
Oregon	MULTNOMAH - OR	765	215
Oregon	CLACKAMAS - OR	765	135
Oregon	WASHINGTON - OR	758	192
Oregon	BENTON - OR	728	20
Oregon	YAMHILL - OR	705	12

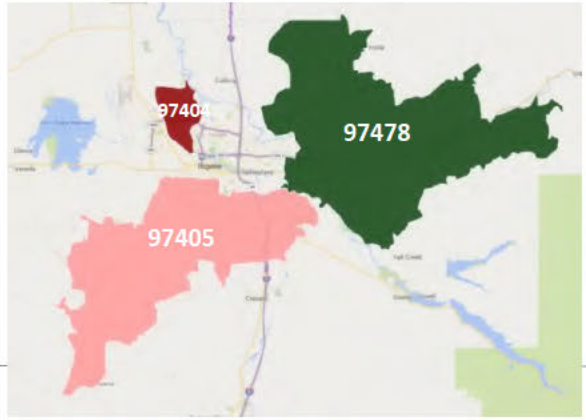
Note: Only showing counties with 10 or more responses.

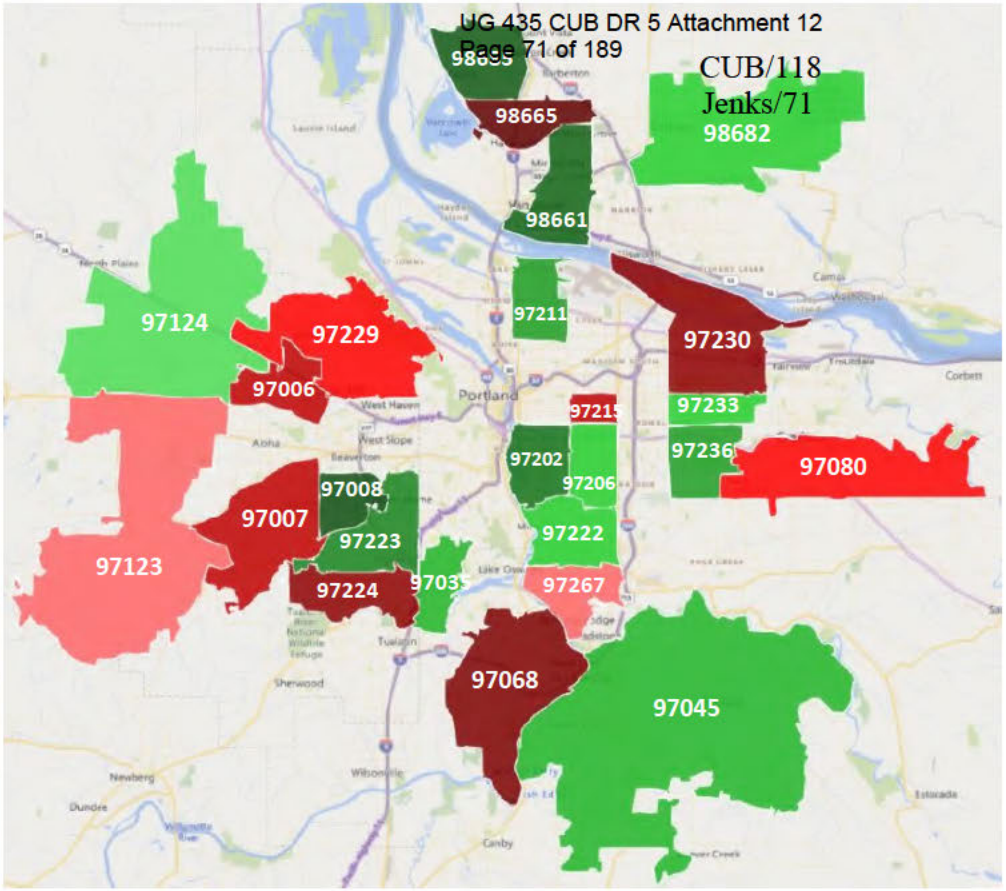


Overall Customer Satisfaction by Zip Code – NW Natural

Note: Only showing zip codes with 10 or more responses.







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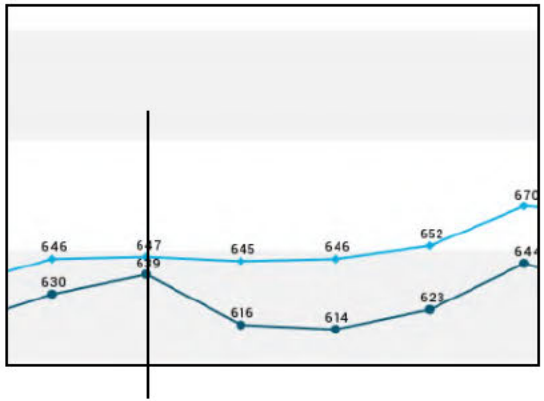
Customer Facing System Changes

Satisfaction Usually Drops During a CIS Migration

One big issue some utilities forget is that they get a decline before the new system is launched because they have had to pull the knowledgeable and more skilled CSRs from the call center. So the drop sometimes happens before the new system is launched.

.

Electric Utility Residential Customer Satisfaction Index – Unnamed Brand

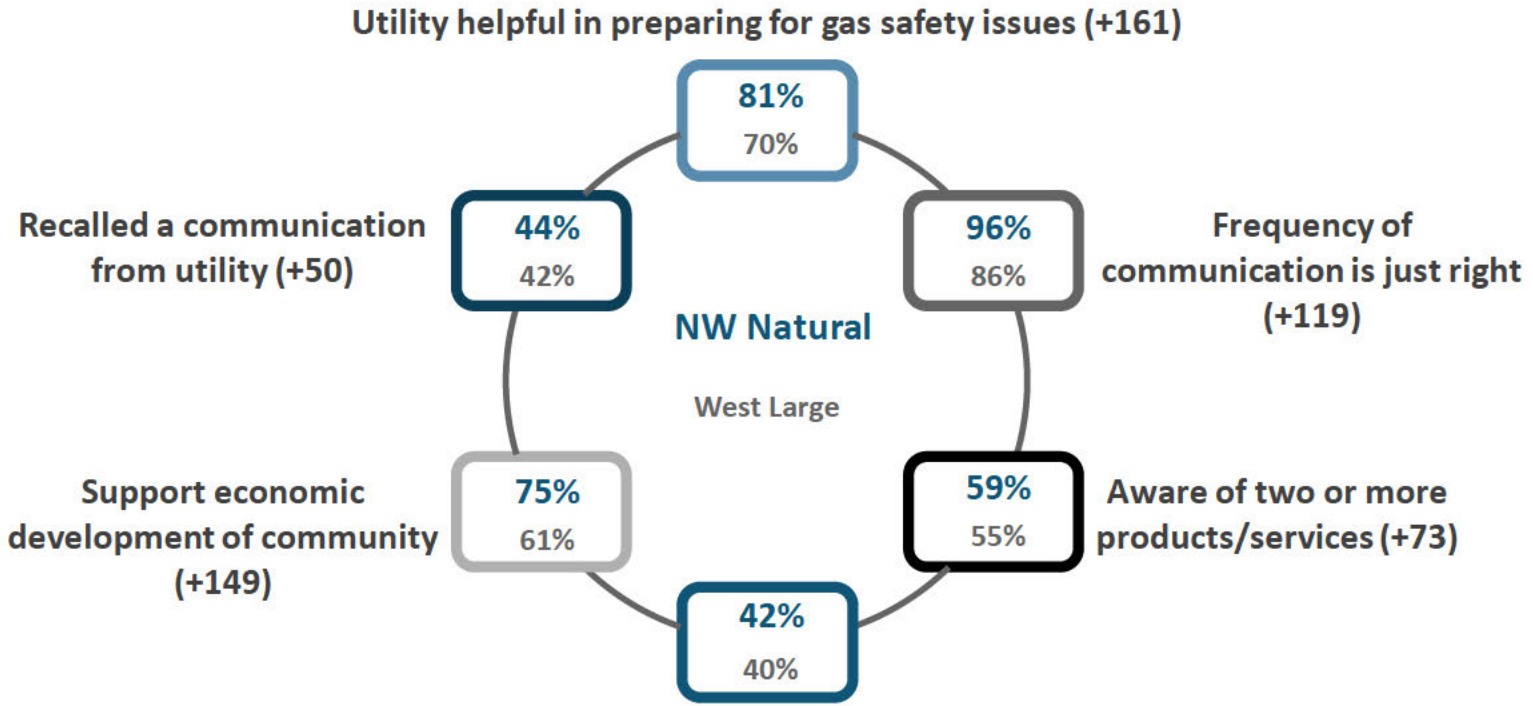


Gas Utility Residential Customer Satisfaction Index – Unnamed Brand

The charts show overall satisfaction by fielding periods for two utilities that underwent recent CIS implementations. The lines point to the approximate go-live date for each utility's CIS – an electric and gas utility (above left) and a gas-only utility (at right).

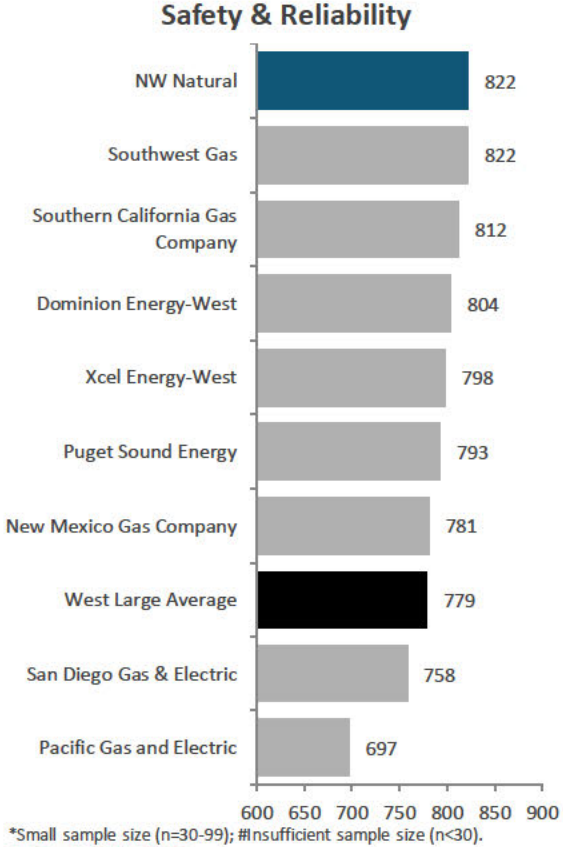
Key Diagnostics

These are the diagnostics that significantly impact overall customer satisfaction



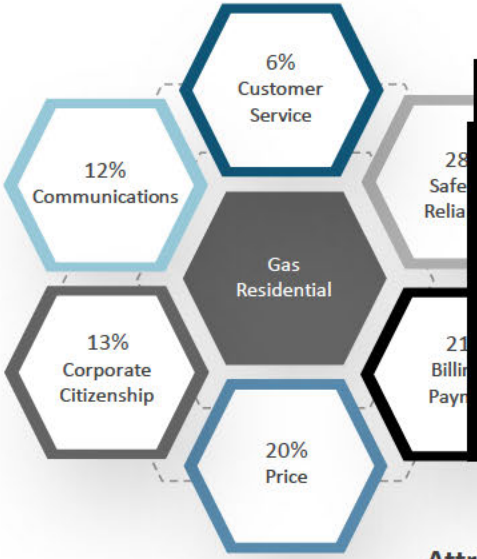
Note: Parentheses show Gap of completing KPI on overall satisfaction index

Safety & Reliability – West Large



*Small sample size (n=30-99); #Insufficient sample size (n<30).

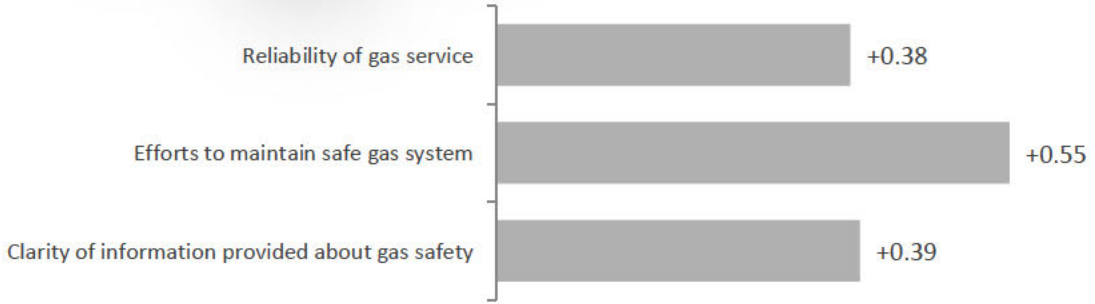
Index Model and Component weighting



[redacted]

Clarity of information provided about gas safety 30%

Attribute Gap to West Large



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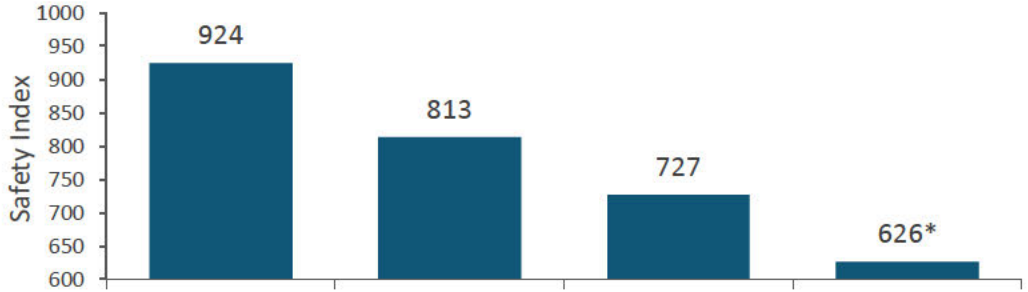
Impact of Safety Preparation

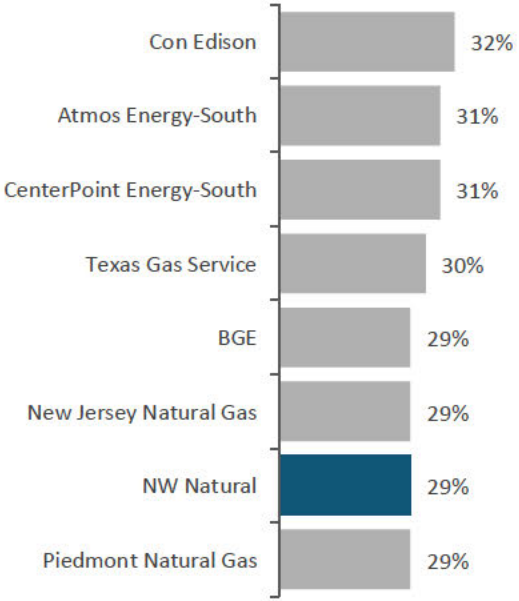
Helpfulness of Utility to Prepare You for a Safety Issue – NW Natural



	29%	52%	14%	6%
Wave 1-2	29%	54%	13%	3%
Wave 3-4	28%	49%	14%	8%

Very Helpful at Preparing You for a Safety Issue

Large



*Small sample size (n=30-99); #Insufficient sample size (n<30).

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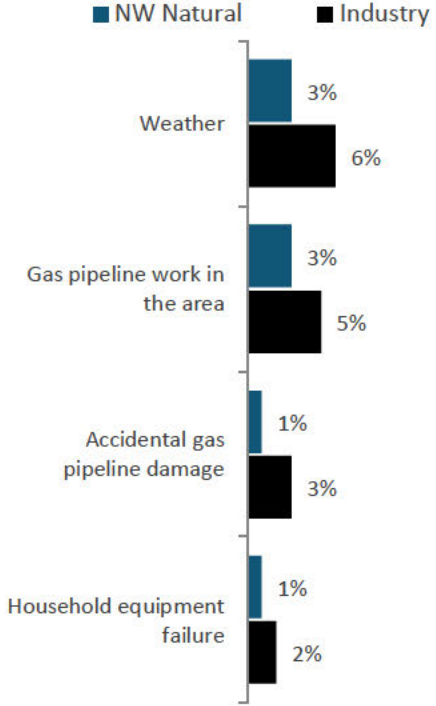
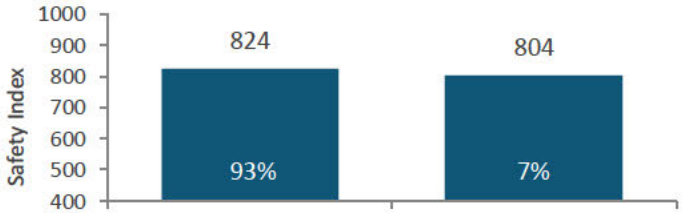
Jenks/76

Gas Interruption Communication

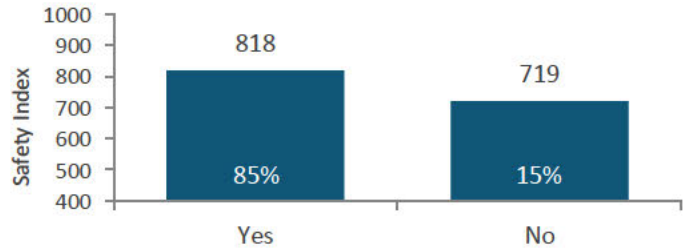
Cause of Interruption



Did not experience any gas service interruptions – NW Natural

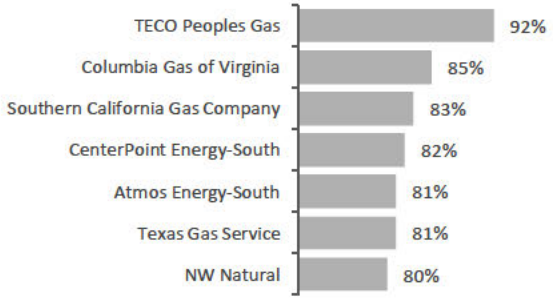


Utility contacted you after gas restored? – NW Natural

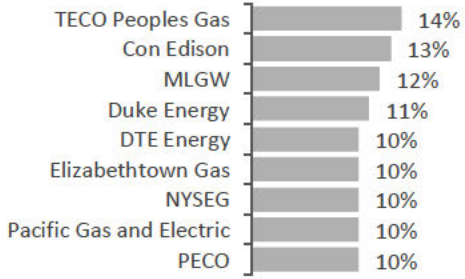


Note: No includes other and don't know.

Top Brands – Contacted after restored



Highest Frequency - Cause of Interruption Weather



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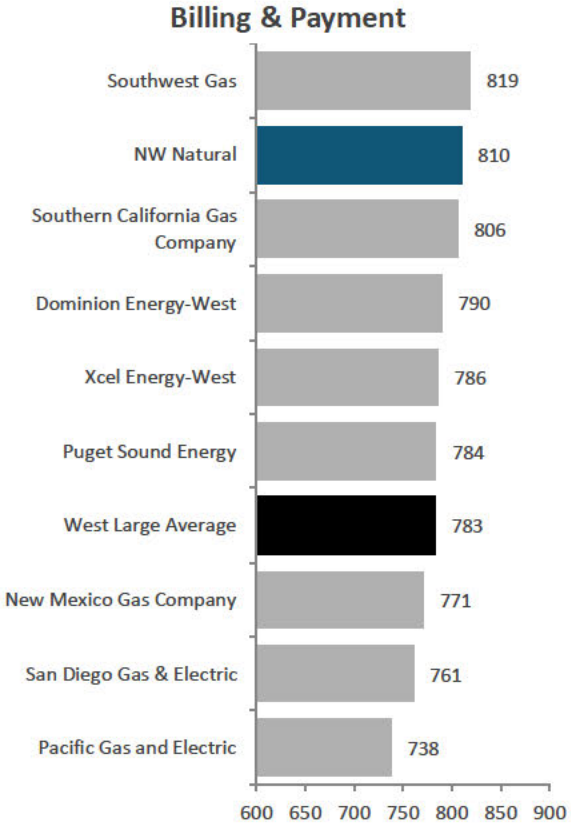
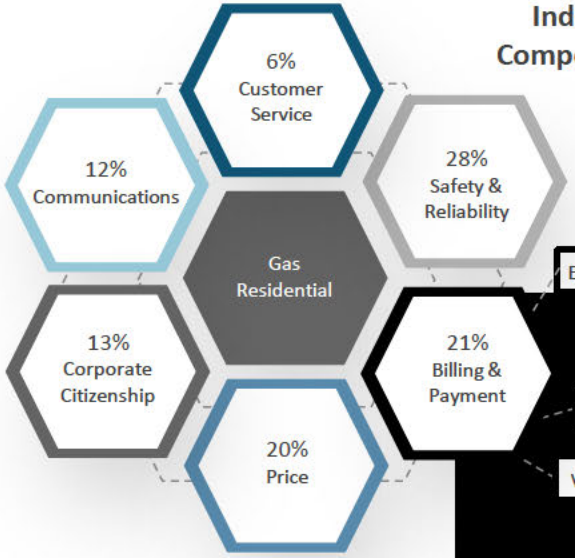
Jenks/77

Billing & Payment – West Large



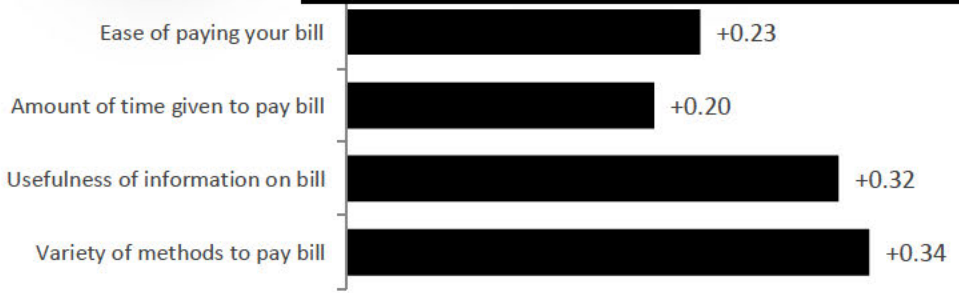
Index Model and Component weighting



Ease of paying your bill 30%

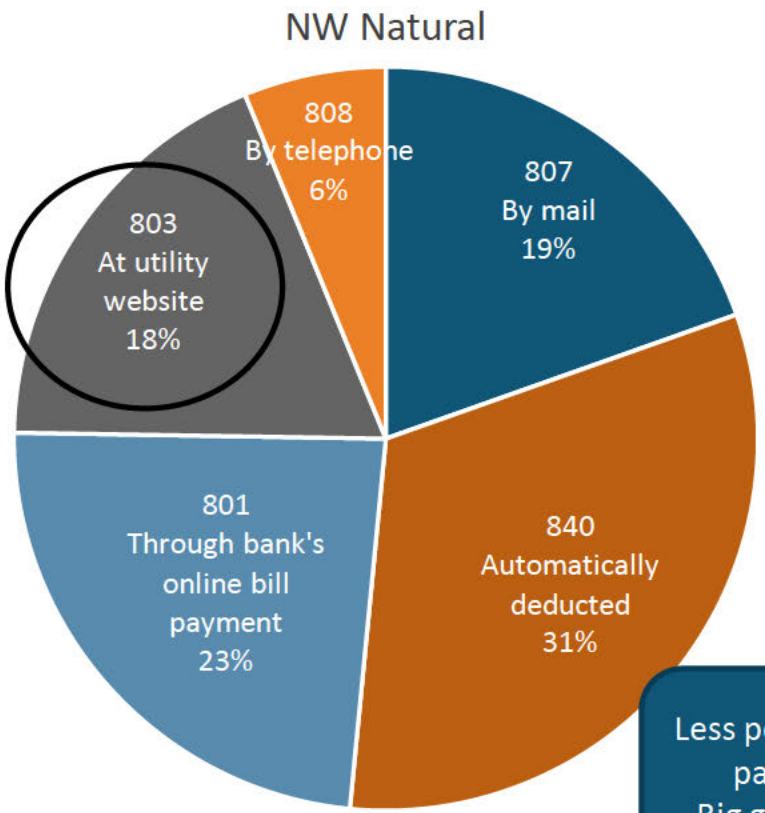
Usefulness of information on bill 23%

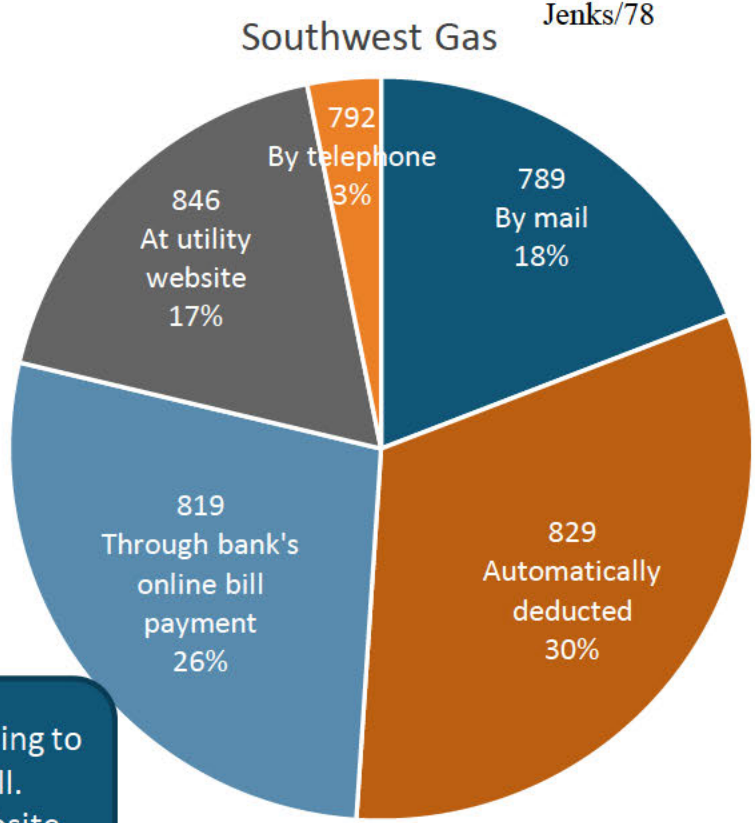
Variety of methods to pay bill 22%



CUB/118
Jenks/78

Satisfaction on How Bill was Paid





Less people calling to pay their bill.
Big gap in website payment satisfaction

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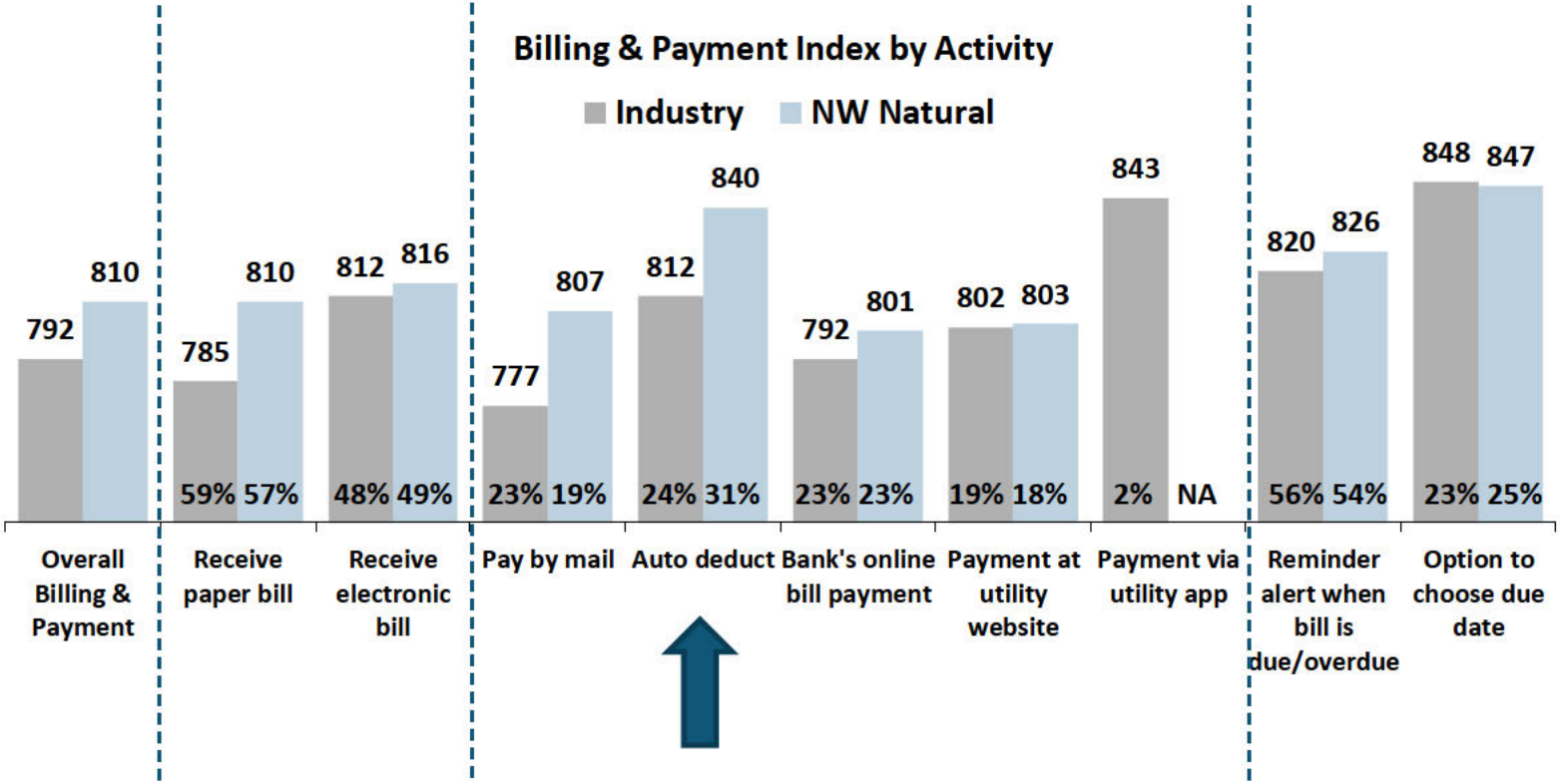
Jenks/79

Account features and payment options can add value to increase satisfaction



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Jenks/80

Customer Comments

What Can Be Improved with Billing & Payment?

Asked of everyone who provides a rating of 1 – 7 on Overall Billing & Payment Satisfaction

29%

Responded to this verbatim question

"Let me put it on a credit card with no fee so I could earn rewards."

"Bill for actual use not the average home size. There are 2 people in the house and they charge for a family of 5."

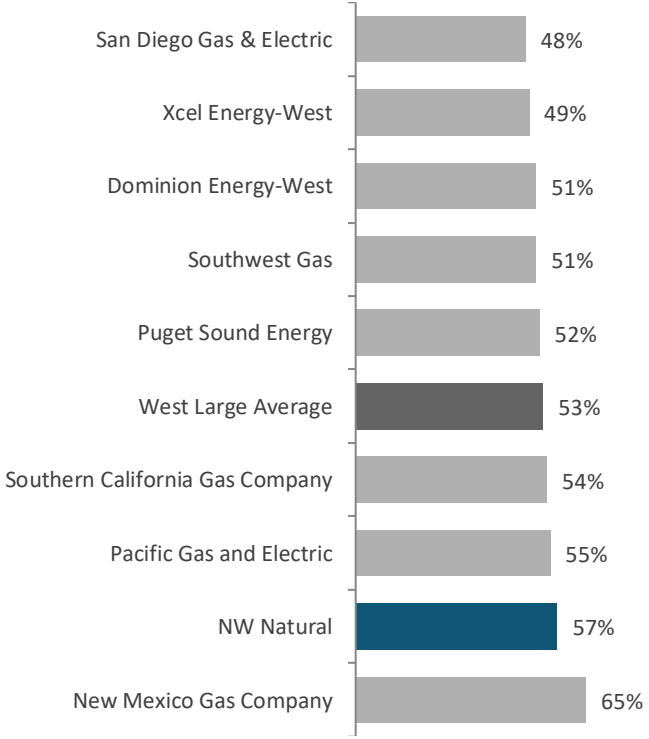
"Offer a peak time rebate program like Portland General Electric offers for it's electric customers."

"Better usage by daily reads."

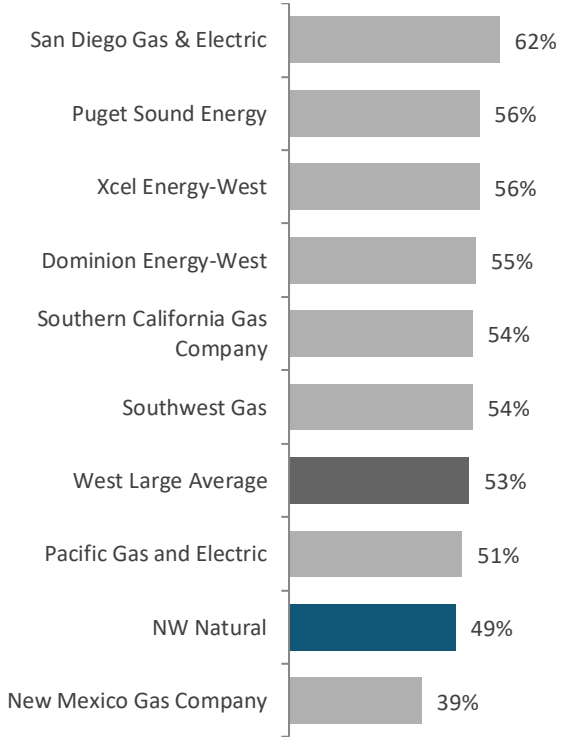
"More places I can pay for my bill in person and get a receipt."

Type of Monthly Bill Statement

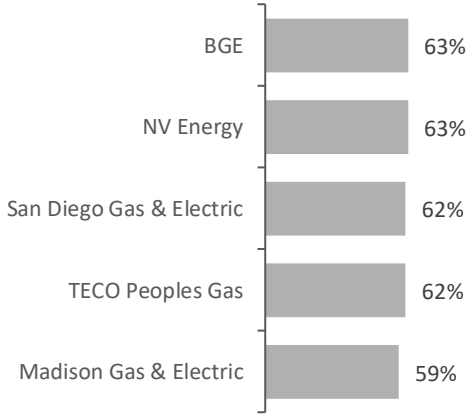
Traditional Paper – West Large



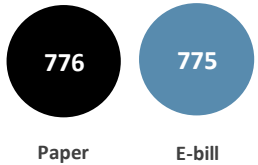
E-bill – West Large



Top Brands - Receive E-bill



Bill Statement Overall Satisfaction – NW Natural



*Small sample size (n=30-99); #Insufficient sample size (n<30).

Usefulness of Information on Bill – Best Practices

Consumers provides details for all bill-related aspects

Highest: Usefulness of Information on Bill

- TECO Peoples Gas – 8.22
- Consumers Energy – 8.07
- Columbia Gas of Virginia – 8.05

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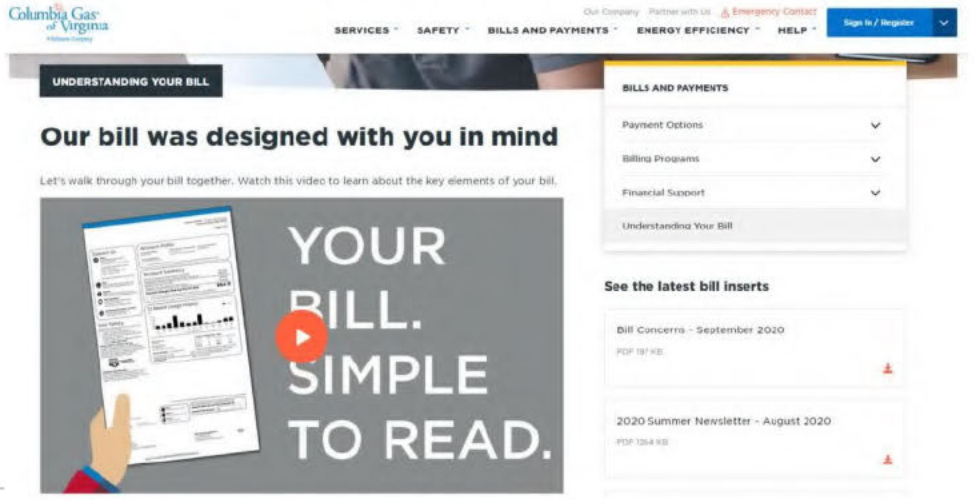
Jenks/82

Columbia Gas offers a video explanation and includes bill inserts online



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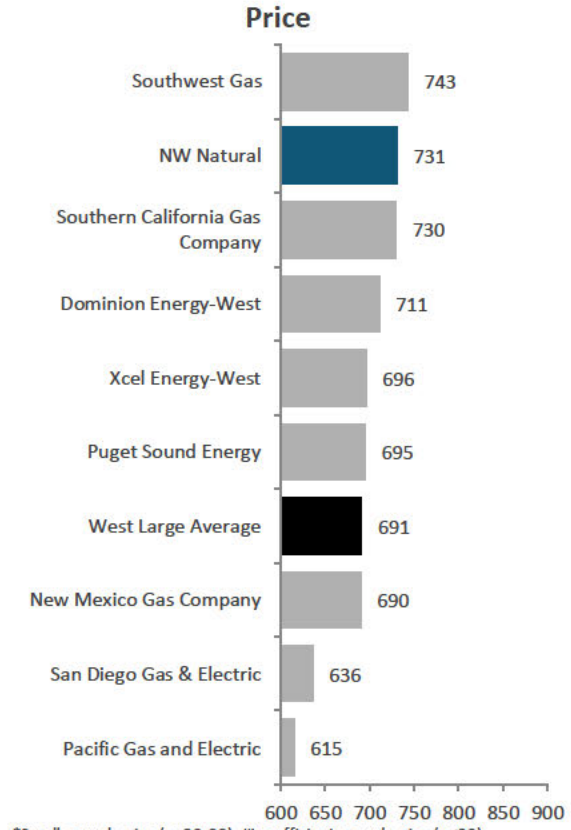
Index Model and Component Weighting
CUB/118
Jenks/83

Price – West Large



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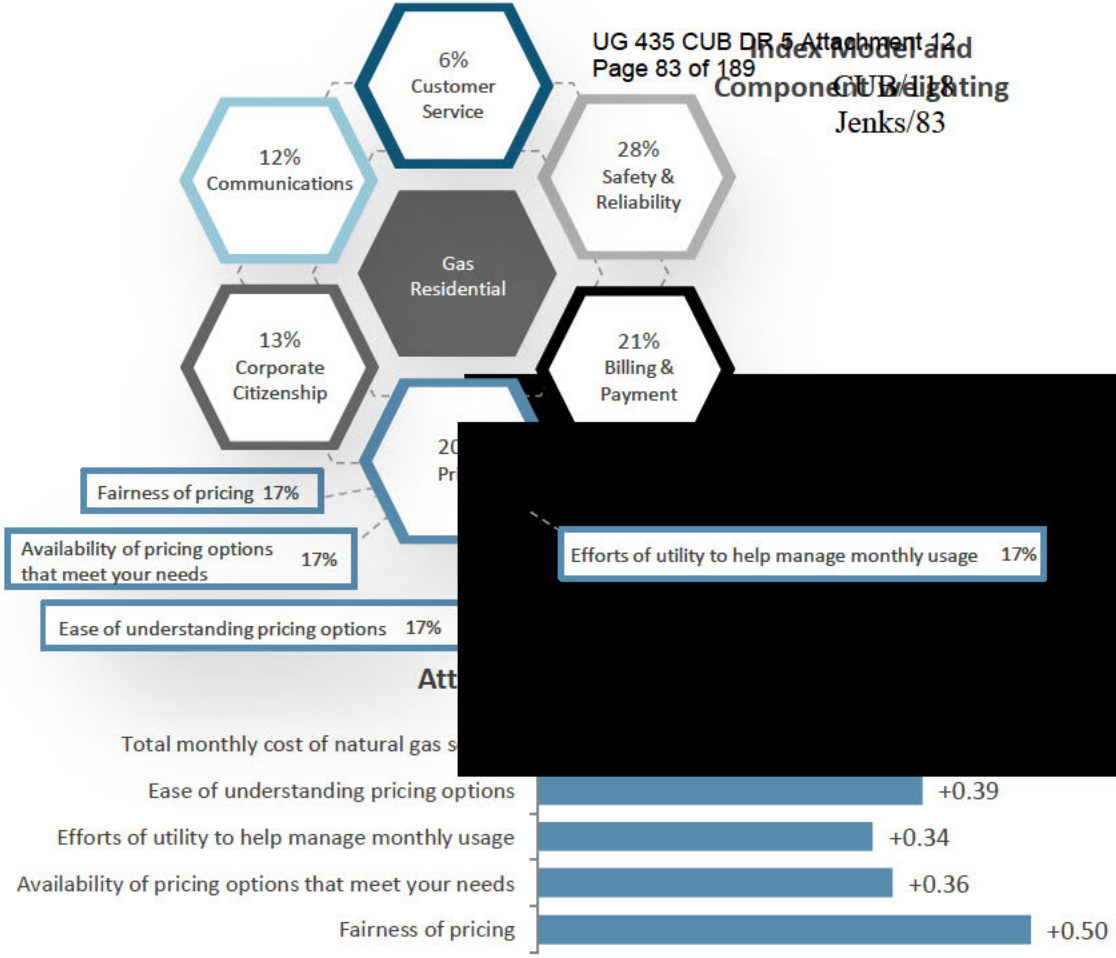

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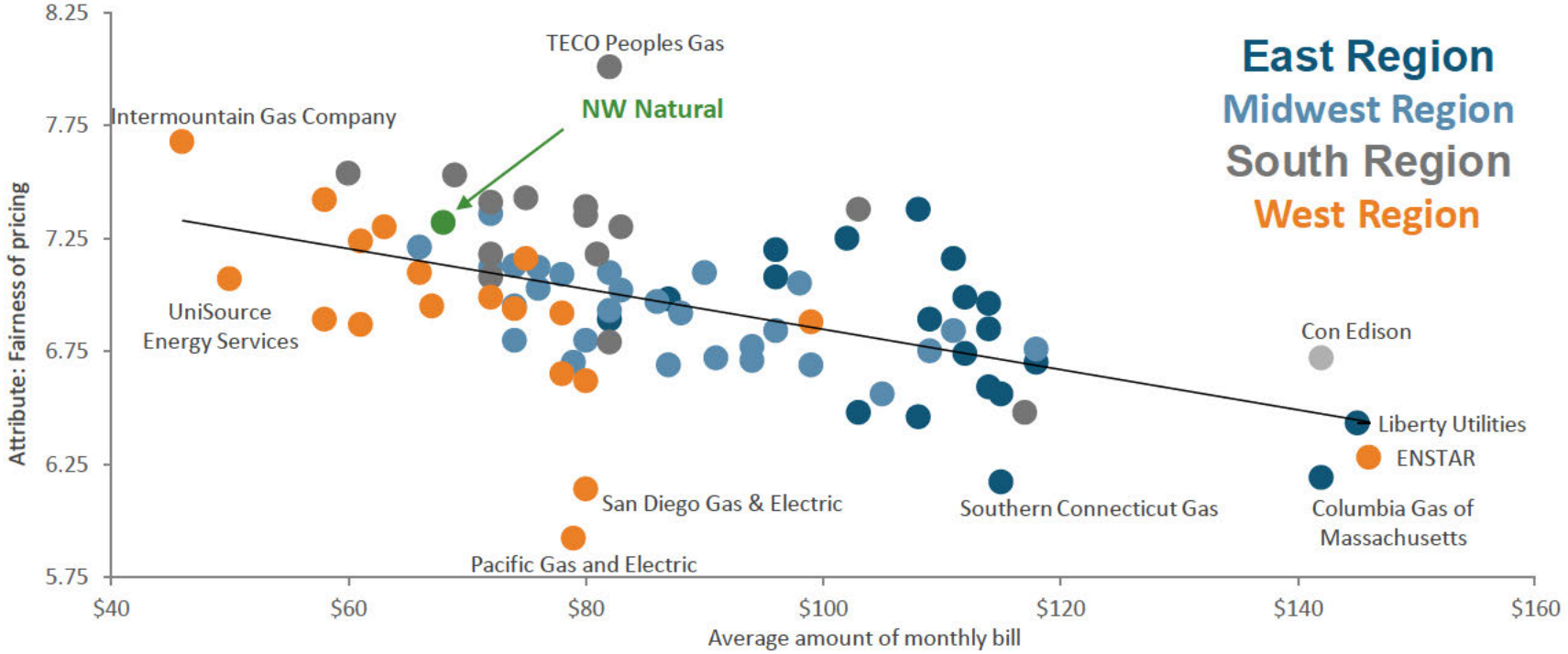
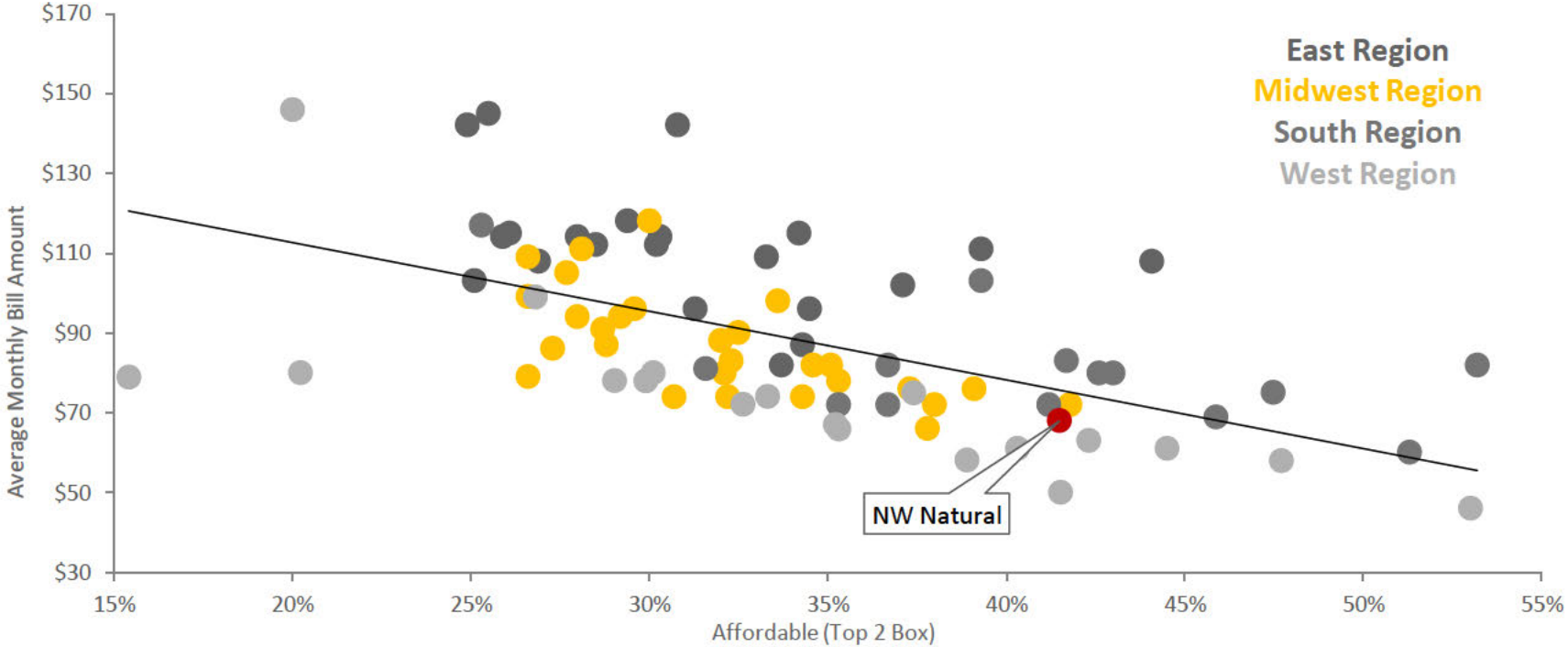
Jenks/84



Impact of Price on Satisfaction

Price satisfaction has two main parts: The perceived affordability a customer has for the cost of their service and the actual price paid on a monthly basis



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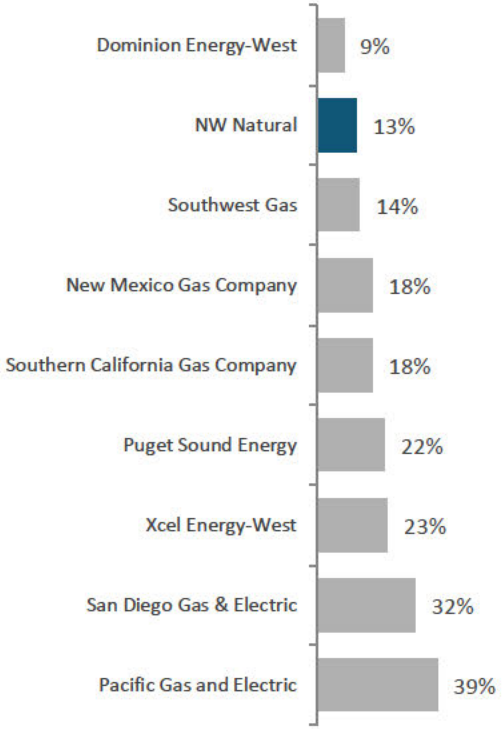
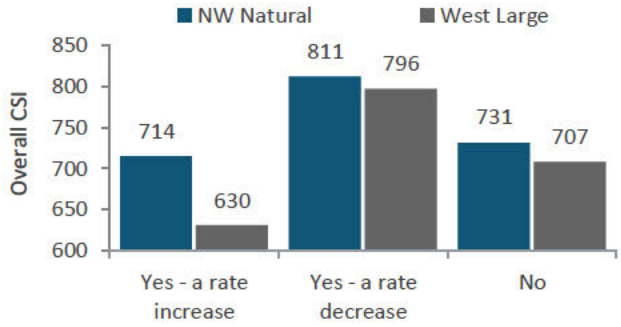
Overall CSI by Heard about Rate Changes

% Heard About a Rate Increase – West Large



Price Index by Price Change

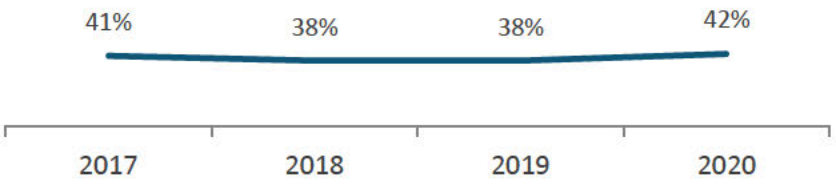


% Heard about a Rate Increase – NW Natural

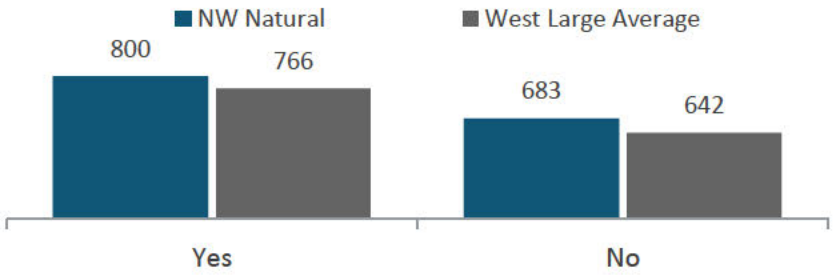
*Small sample size (n=30-99); #Insufficient sample size (n<30).

Conservation Awareness Impacts Many of the Factors and Attributes Driving Overall Satisfaction

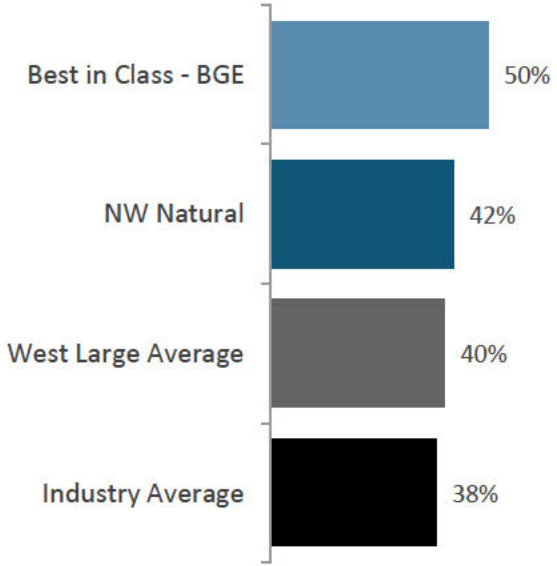
Familiarity with Conservation Programs – NW Natural



Impact of Conservation Awareness on Price Satisfaction



Familiarity with Conservation Programs



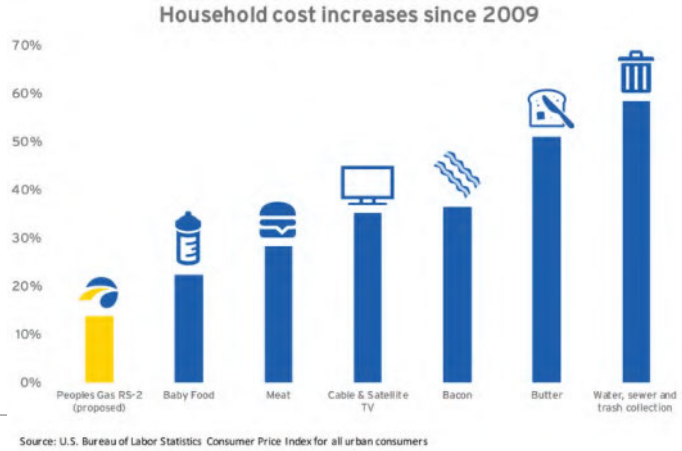
*Small sample size (n=30-99); #Insufficient sample size (n<30).

Clear Path to Rate Information

TECO Peoples Gas has a great dropdown box for Residential customers

Rates information is easy to find

TECO PEOPLES GAS
AN EMERA COMPANY



Source: U.S. Bureau of Labor Statistics Consumer Price Index for all urban consumers

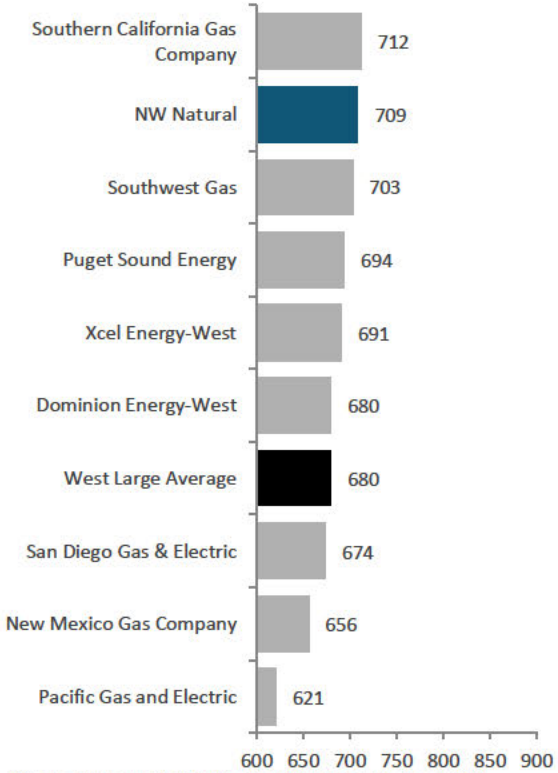
While they are entering their first rate case in 12 years, they still have a playful way of showing the value of their service

J.D. POWER

2020 Gas Utility Residential Satisfaction Study

Communications – West Large

Communications



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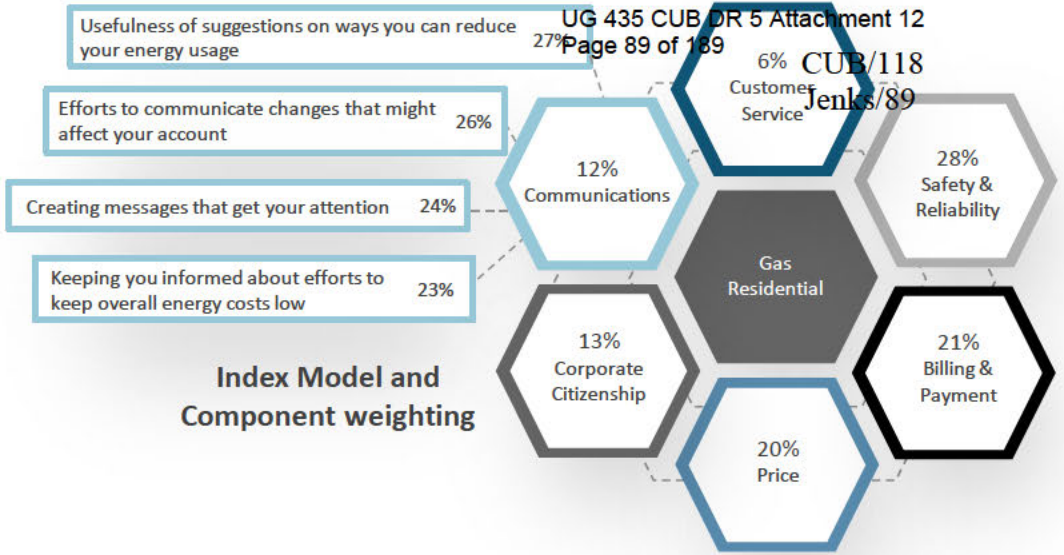
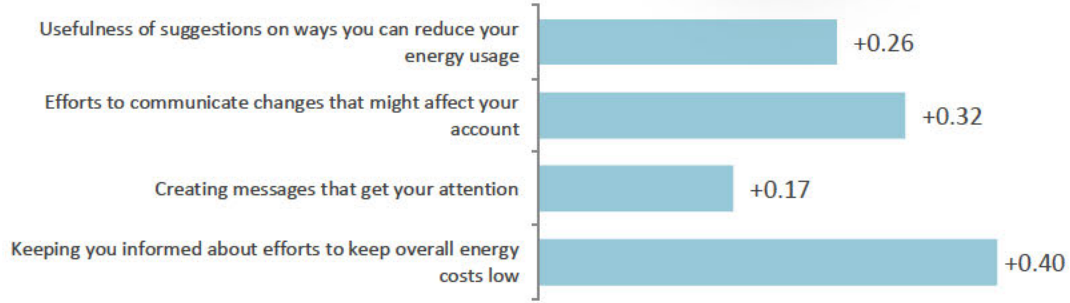


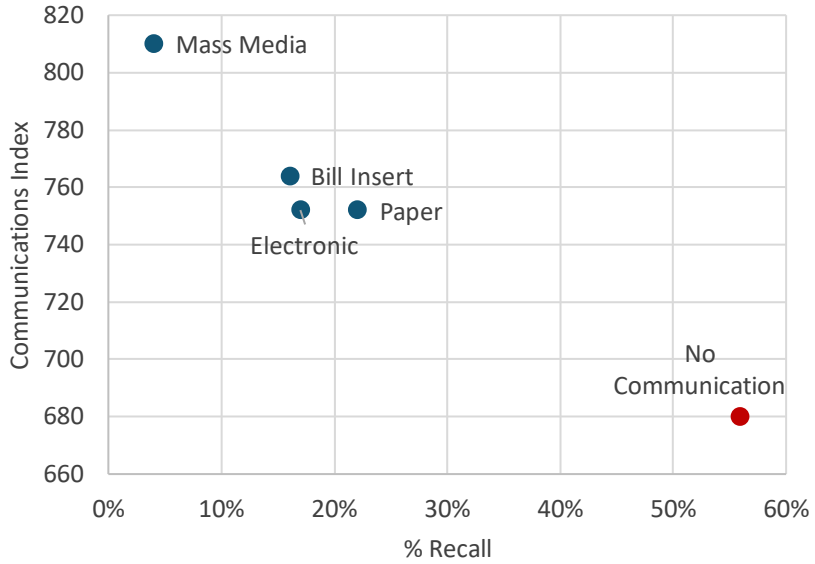
Index Model and Component weighting

Attribute Gap to West Large

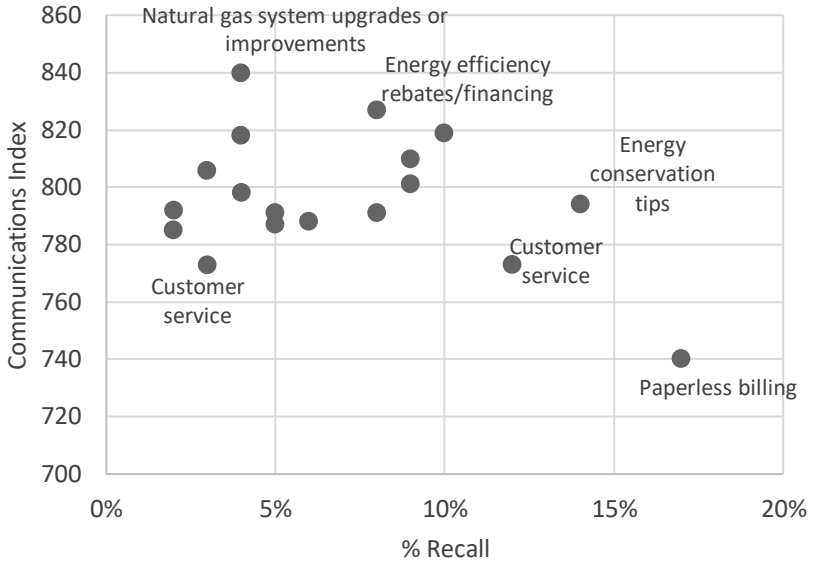


Communication Recall from Utility – NW Natural

Where Communication was Recalled



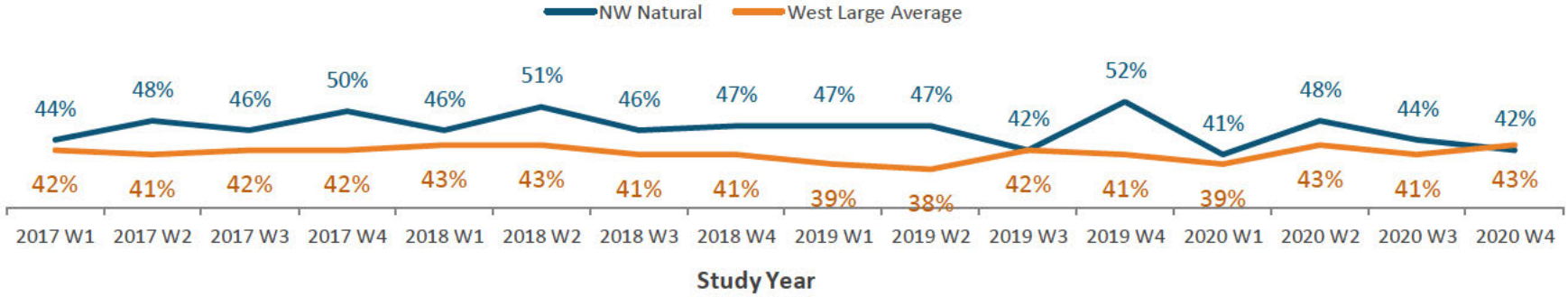
Topic of Communication



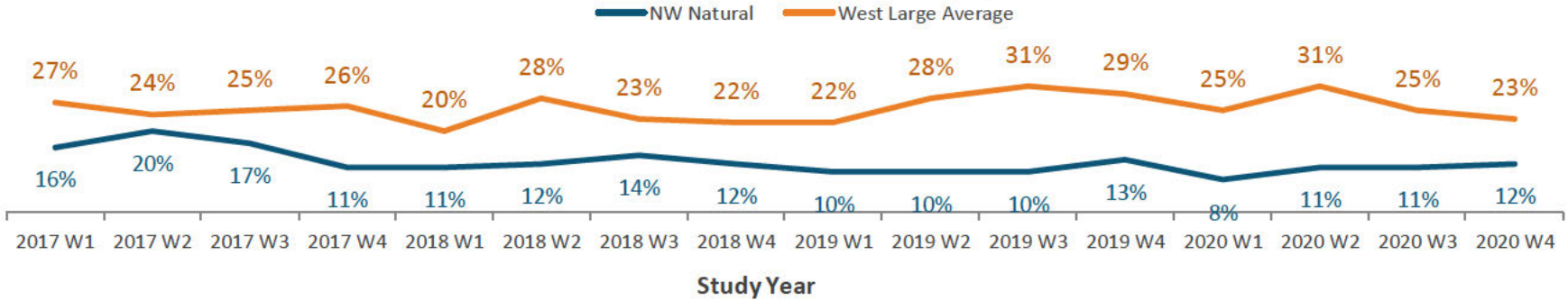
Mass Media = Newspaper/magazine, television, radio, billboard
Paper = Brochure, bill newsletter, direct mail, statement message
Electronic = Utility website, email, utility blog, utility social media site , text message
No Communication = No and Don't know

Communications and Media Recall

Recall Utility Communication (% yes)

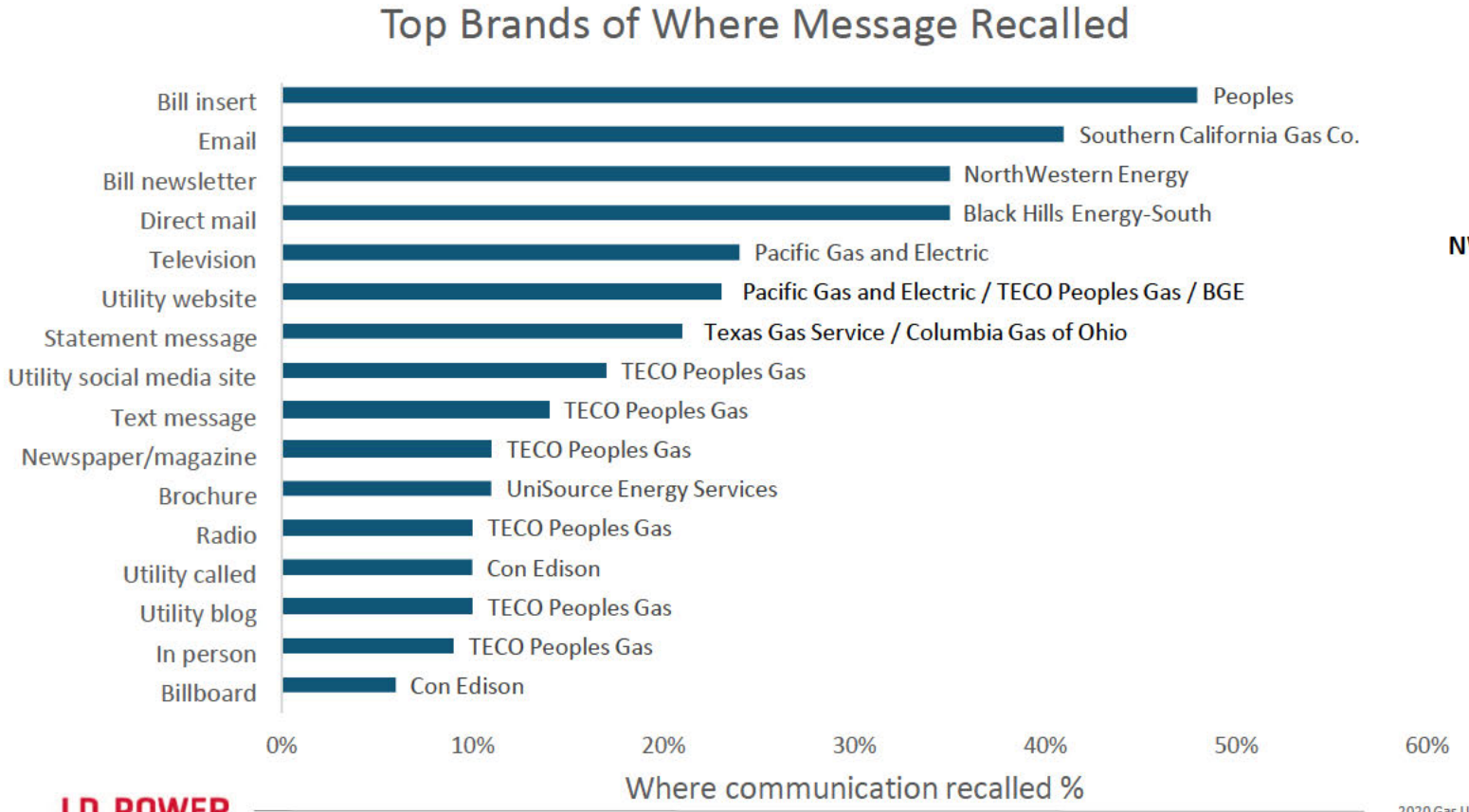


Recall Media Communication (% yes)

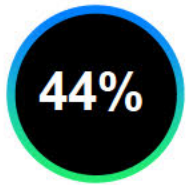


*Small sample size (n=30-99); #Insufficient sample size (n<30).

Variety of Communication Formats is Important



NWN Communication % Recalled



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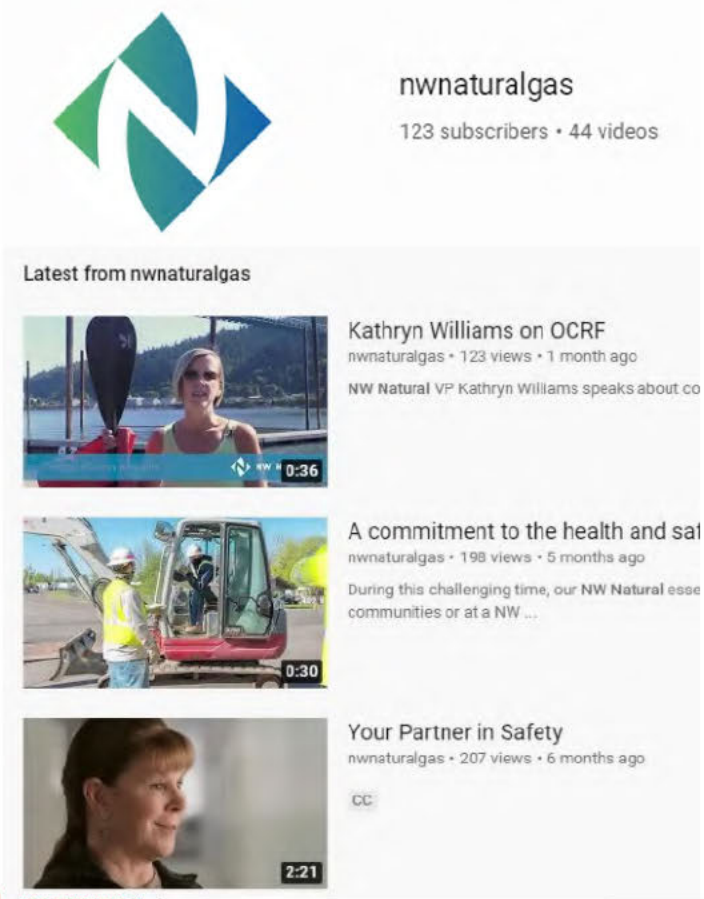
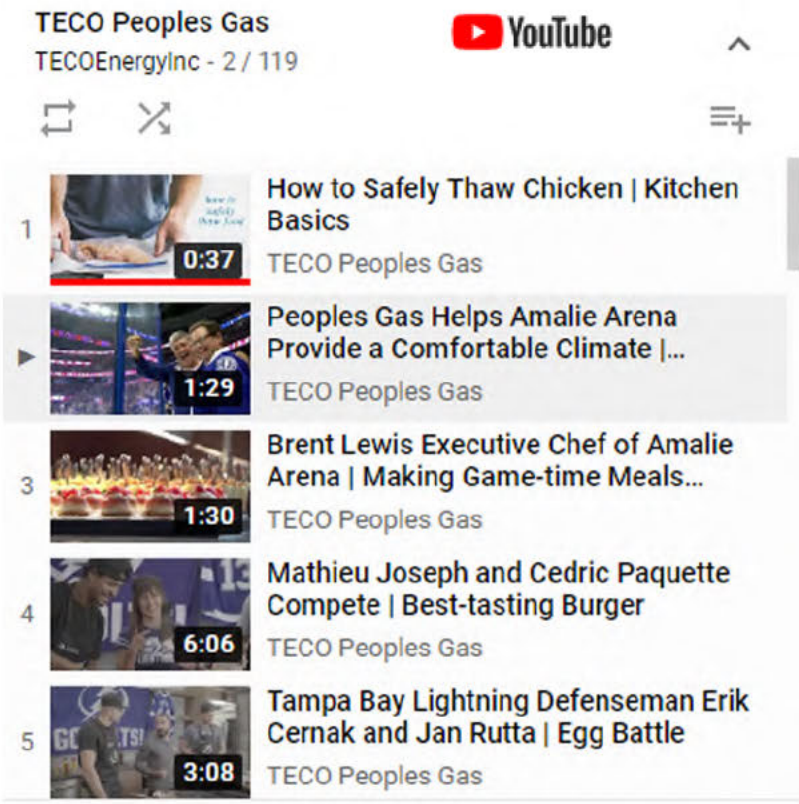
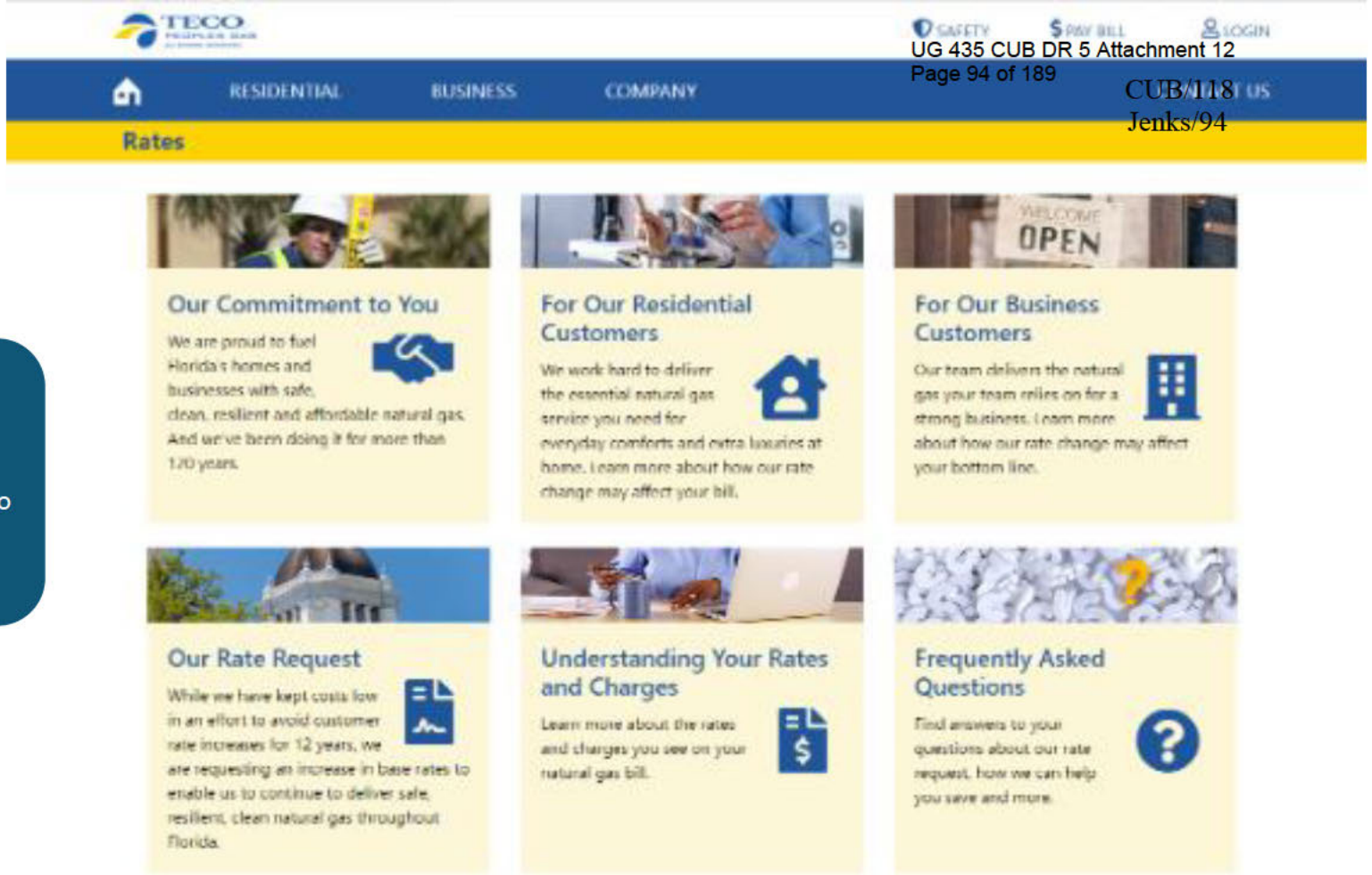
2020 Gas Utility Residential Satisfaction Study

YouTube Channel





TECO Peoples Gas does well to communicate how to keep costs low



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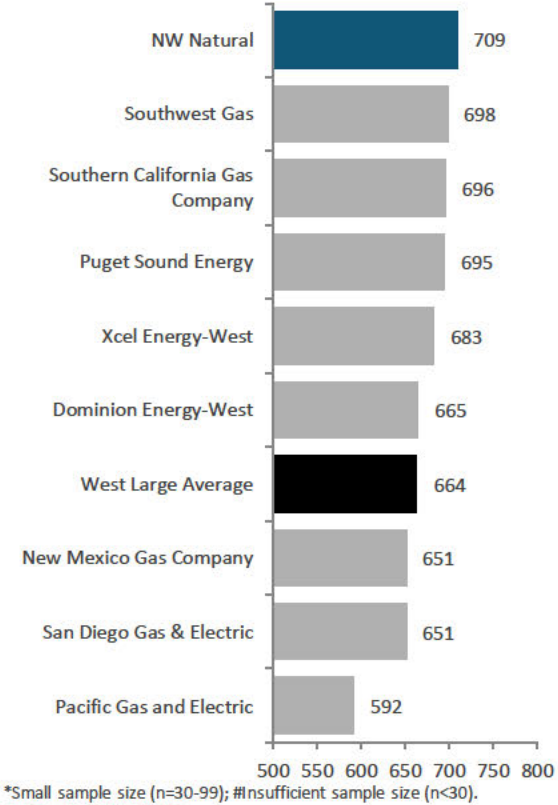
Jenks/95

Corporate Citizenship – West Large

Corporate Citizenship



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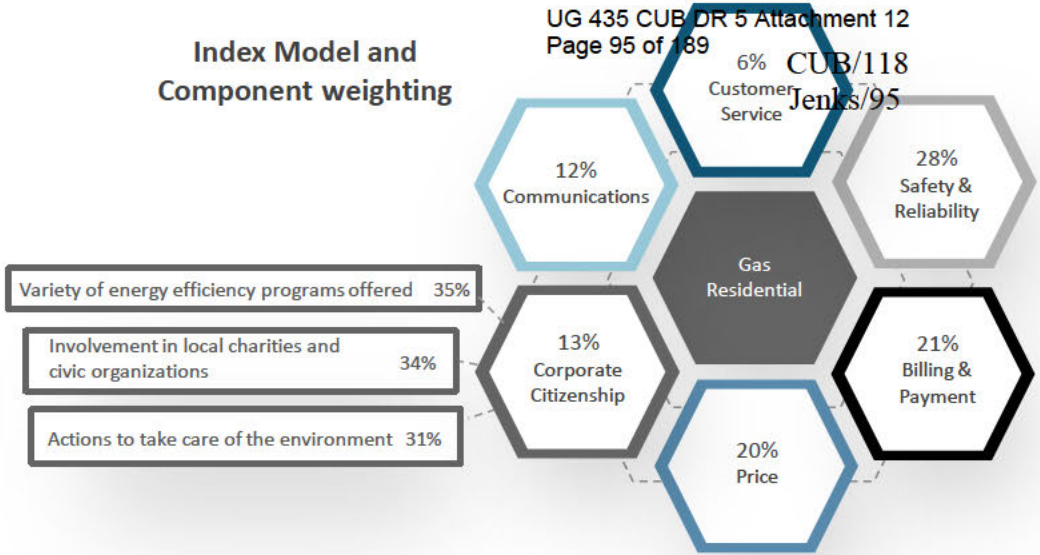
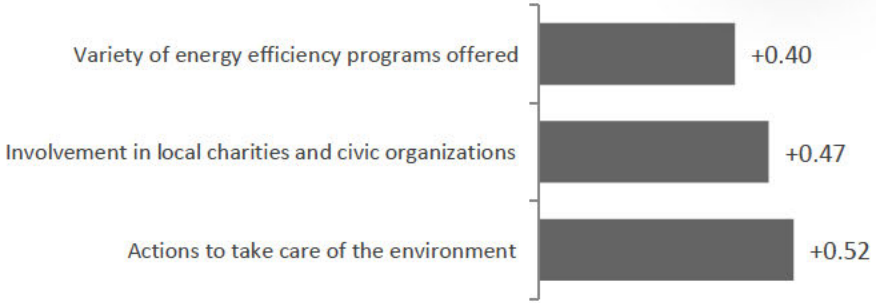
Index Model and Component weighting



Attribute Gap to West Large



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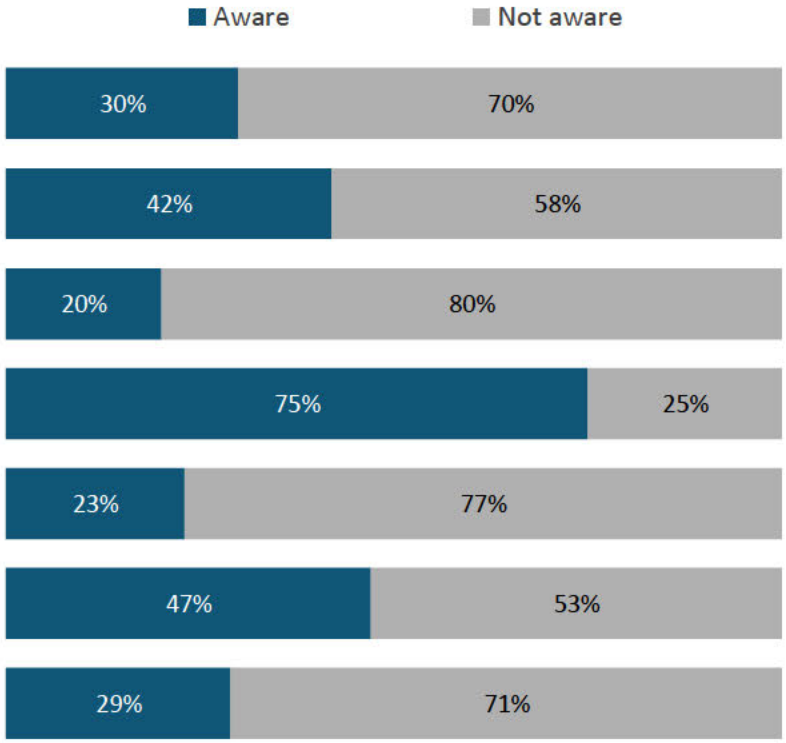
Jenks/96

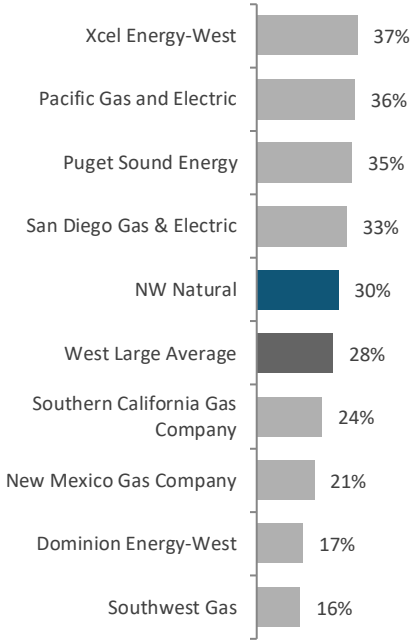
Corporate Citizenship Awareness – NW Natural

	OSAT Impact	Awareness Gap from 2019	Gap to WL
Improve impact on environment	+135	+3%	+2%
Energy efficiency or conservation programs	+131	+4%	+2%
Donations or sponsorships	+143	+0%	+6%
Supports economic development	+144	+0%	+14%
Observed utility volunteers	+116	+1%	+8%
Assistance programs	+89	-6%	+14%
Protect and restore wildlife	+162	+5%	+12%



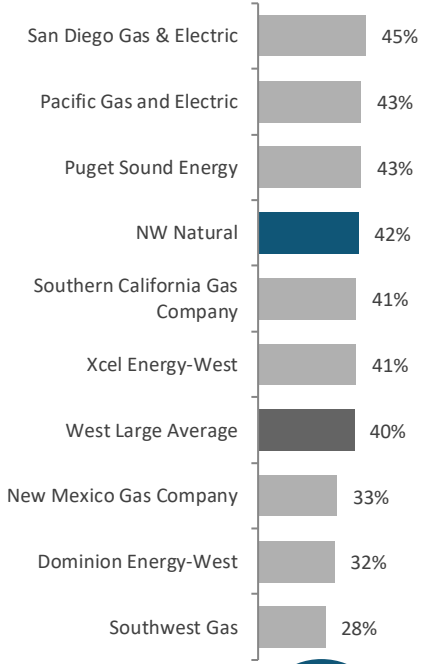
Corporate Citizenship Performance – West Large

Improve impact on environment



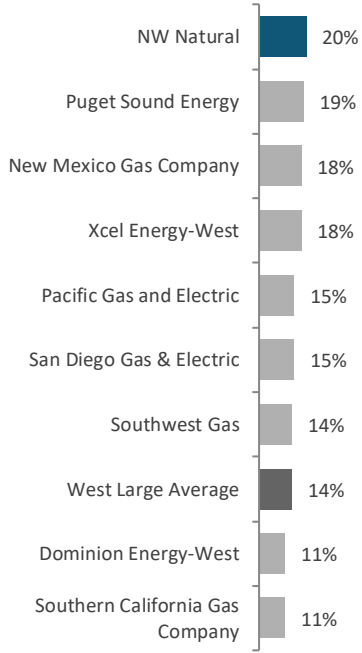
Industry 24%

Energy efficiency or conservation programs



Industry 38%

Donations / sponsorships

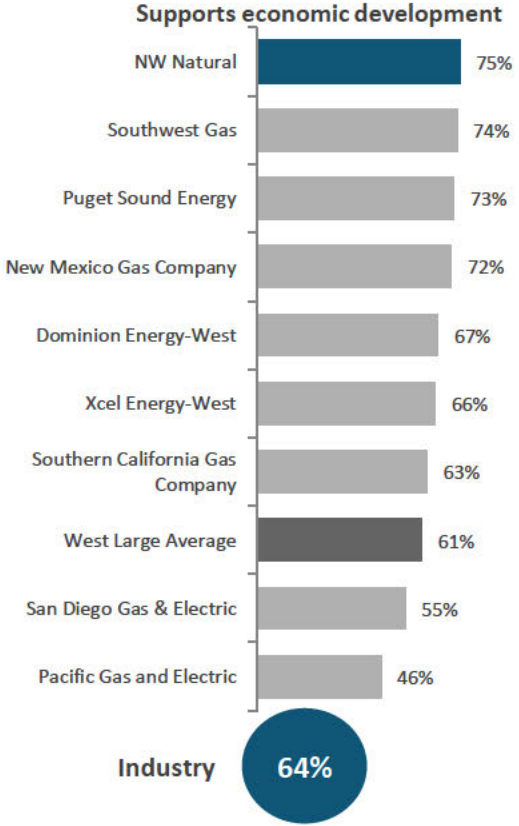


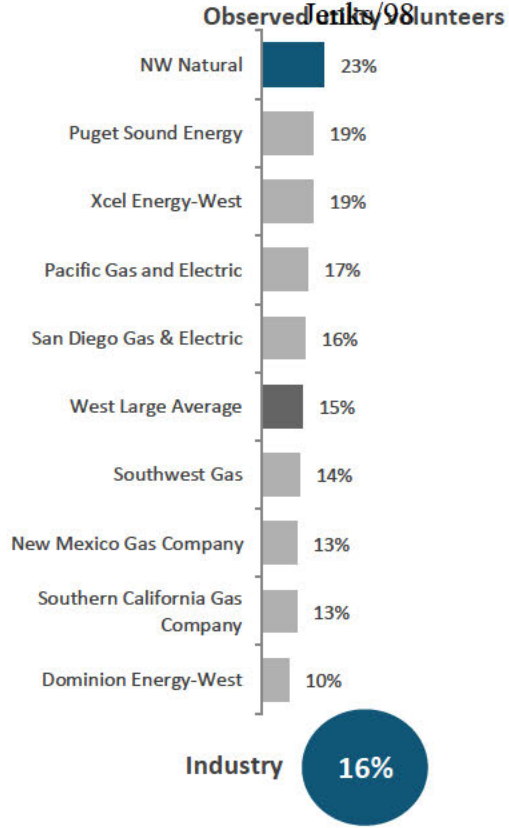
Industry 16%

*Small sample size (n=30-99).

CUB/118
Jenks/98

Corporate Citizenship Performance Continued – West Large





*Small sample size (n=30-99).

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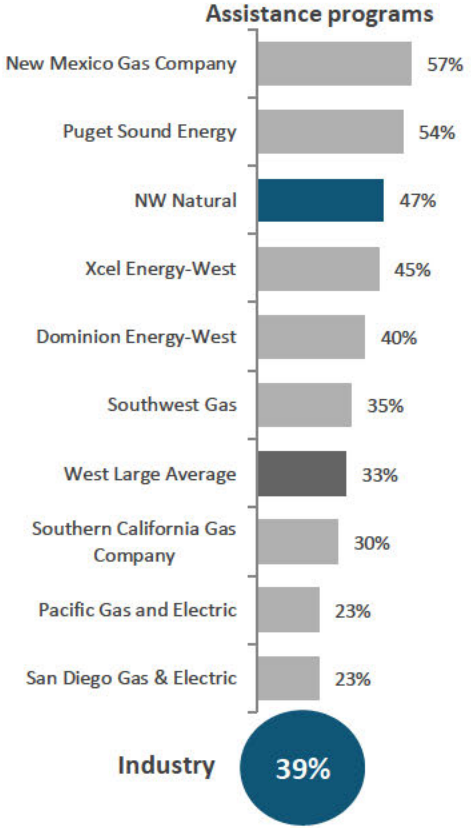
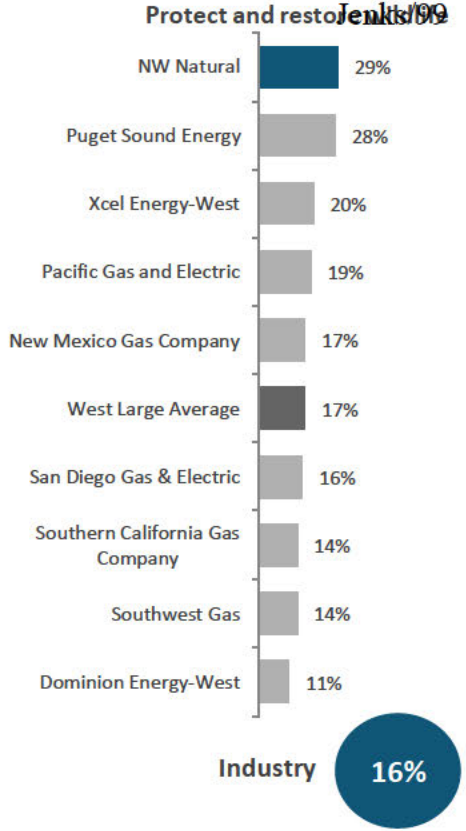
Jenks/99

Corporate Citizenship Performance Continued – West Large





*Small sample size (n=30-99).

Customer Comments

Asked of everyone who provides a rating of 1 – 7 on Overall Corporate Citizenship Satisfaction

53%

Responded to this verbatim question

What Can Be Improved with Corporate Citizenship?

"Be more vocal about what you are doing so that everyone in the community is aware and we can talk about it."

"More communication and options for energy saving plans and incentives."

"Show that they are competitive (environmentally) with other options that provide heating sources in are region."

"They need to contribute more to improving the environment."

"Maybe a newsletter with monthly bill."

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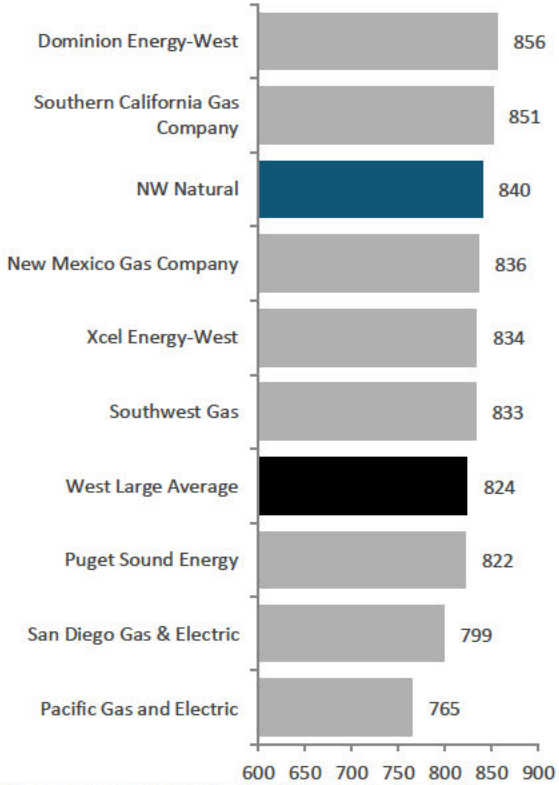
Jenks/101

6% Customer Service

Customer Service – West Large

Customer Service



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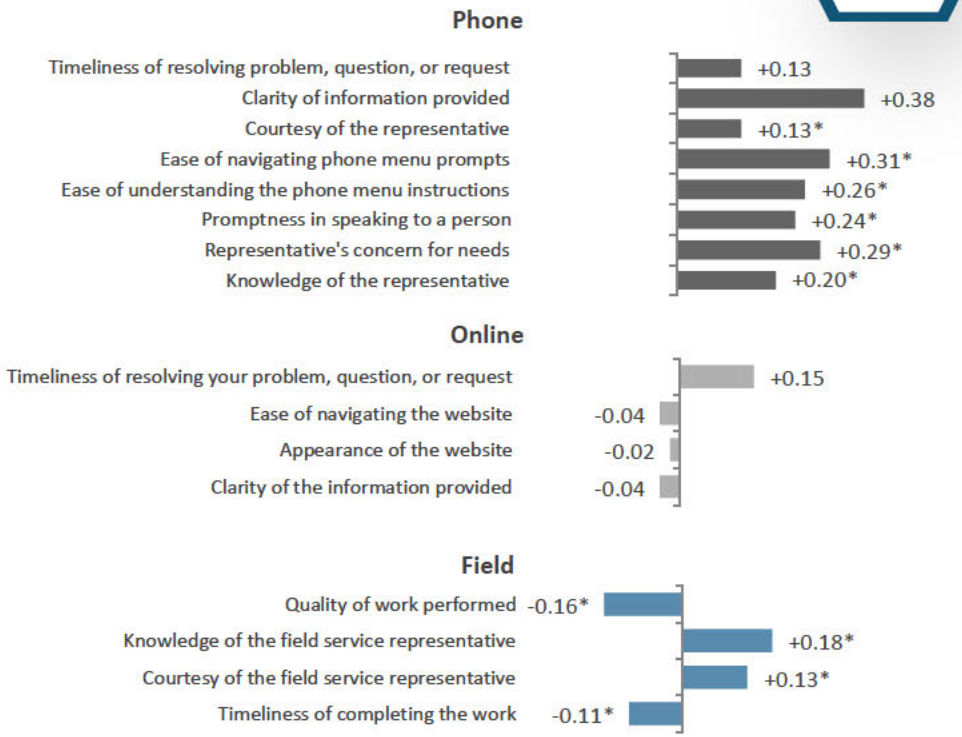
Attribute Gap to West Large

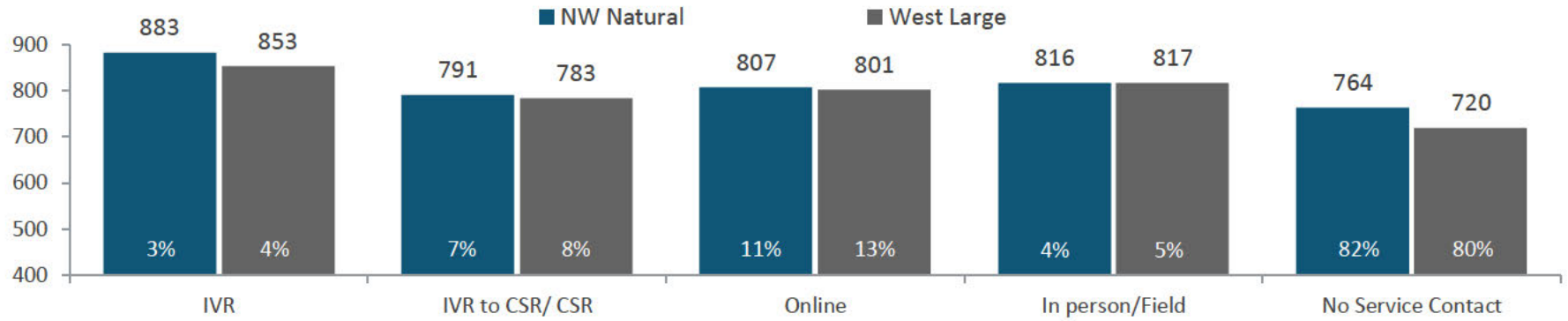


Customer Service Channels – National Rankings and Quartiles

NW Natural

Customer Service Channel	National Rank (out of 83 Brands)	Quartile
Phone	20	1
Online	45	3
Field	43	3

Overall CSI by Service Experience



Note: The sum of percentages may not equal to 100%, respondents may have had an online, phone, and In person experience.
Based out of the whole population.

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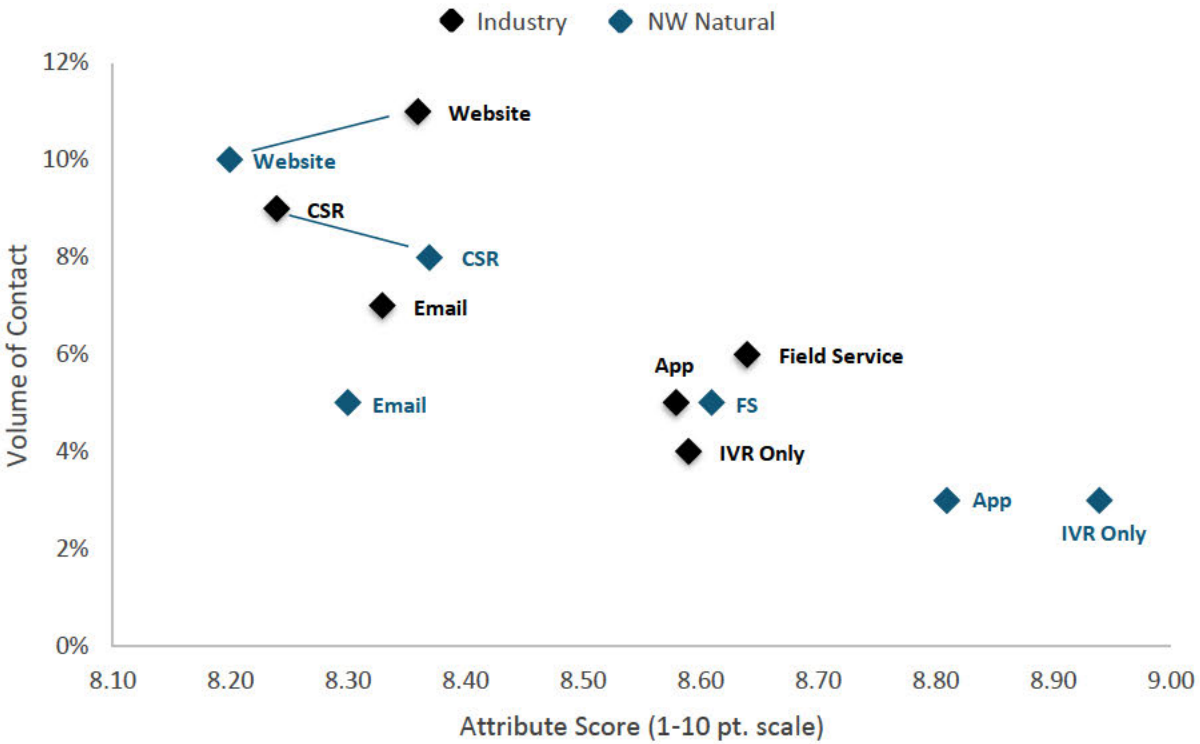
Jenks/103

Satisfaction with Customer Service Channels

Customer Service Channel Satisfaction – Industry



Customer Service Channel Summary

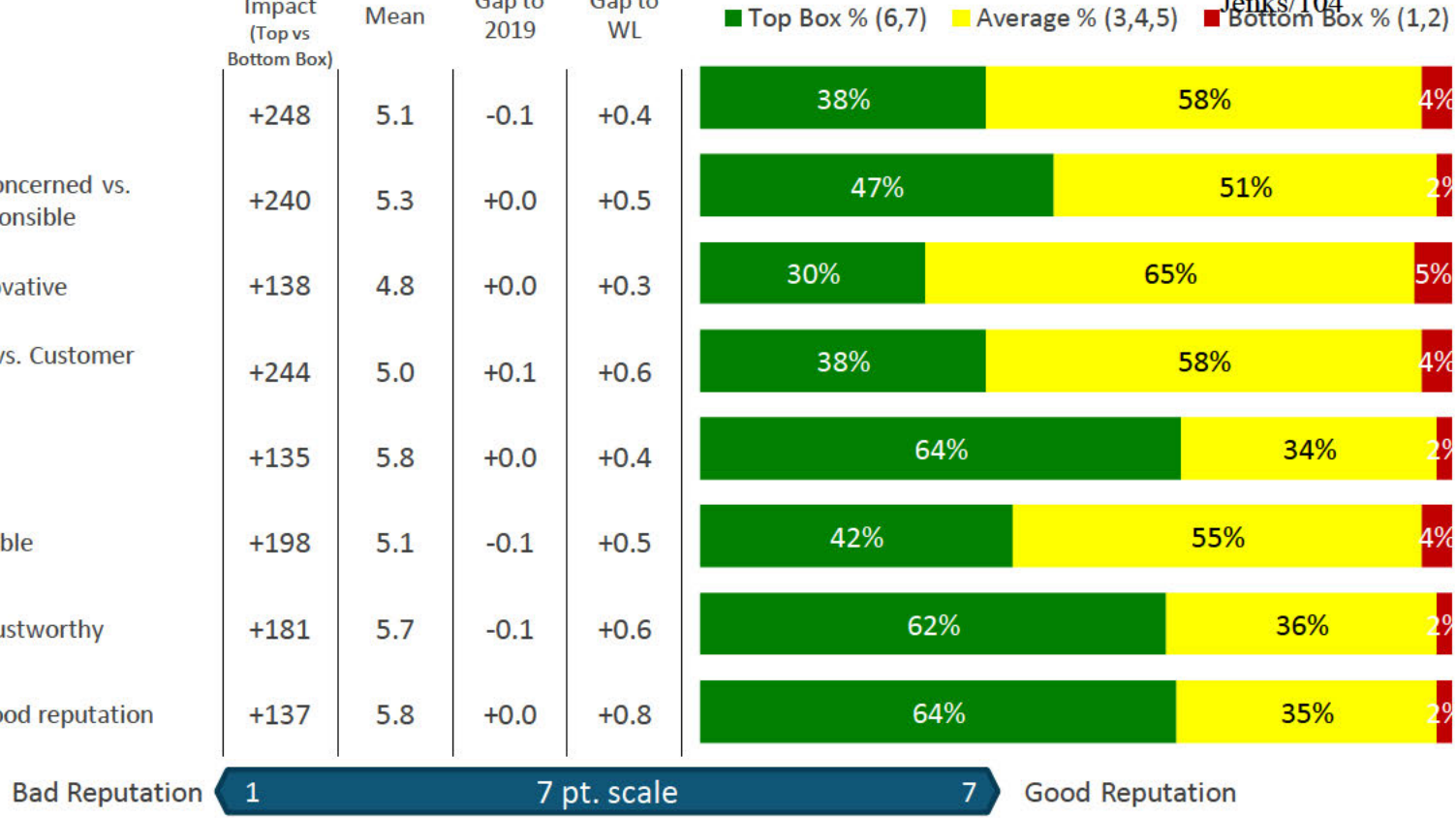
- NW Natural -

Channel	% Contacted	Industry Rank (of 83)
App	3%	15
CSR	8%	38
Email	5%	40
Field Service	5%	41
IVR Only	3%	20
Website	10%	57

CUB/118
Jenks/104

Brand Image Analysis

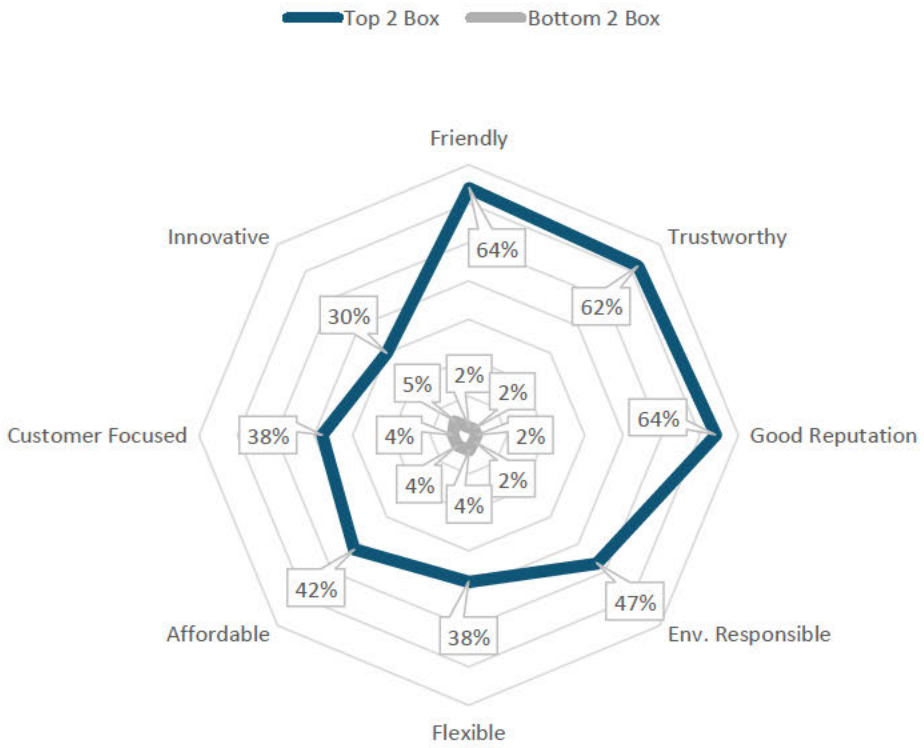
	OSAT Impact (Top vs Bottom Box)	Mean	Gap to 2019	Gap to WL
Rigid vs. Flexible	+248	5.1	-0.1	+0.4
Environmentally unconcerned vs. Environmentally responsible	+240	5.3	+0.0	+0.5
Conventional vs. Innovative	+138	4.8	+0.0	+0.3
Bottom line focused vs. Customer focused	+244	5.0	+0.1	+0.6
Rude vs. Friendly	+135	5.8	+0.0	+0.4
Expensive vs. Affordable	+198	5.1	-0.1	+0.5
Untrustworthy vs. Trustworthy	+181	5.7	-0.1	+0.6
Bad reputation vs. Good reputation	+137	5.8	+0.0	+0.8



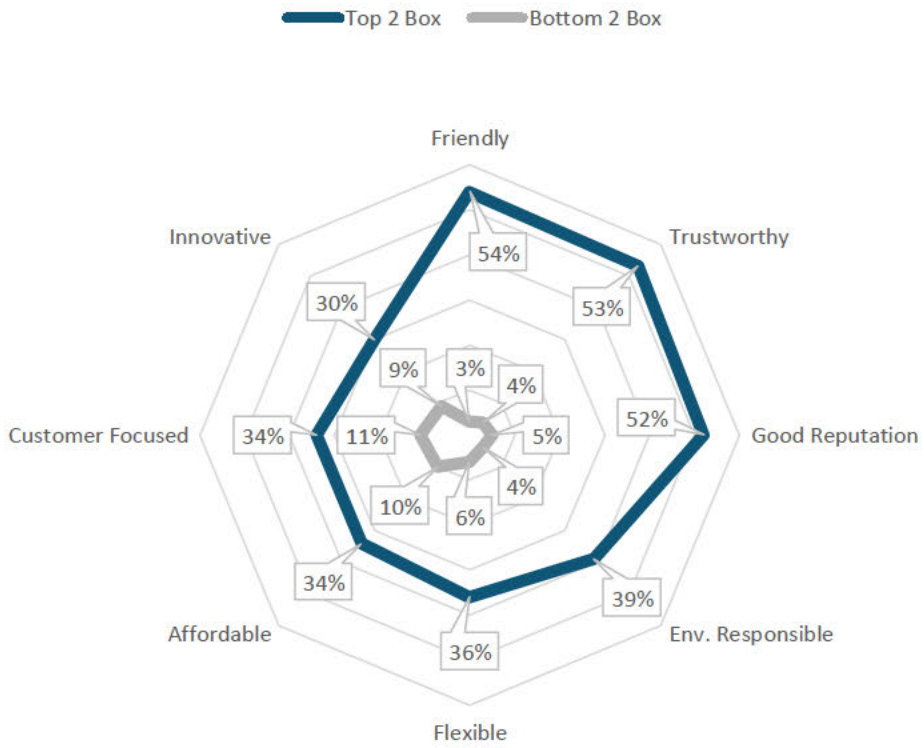
CUB/118
Jenks/105

Utility Image

Brand Image – NW Natural



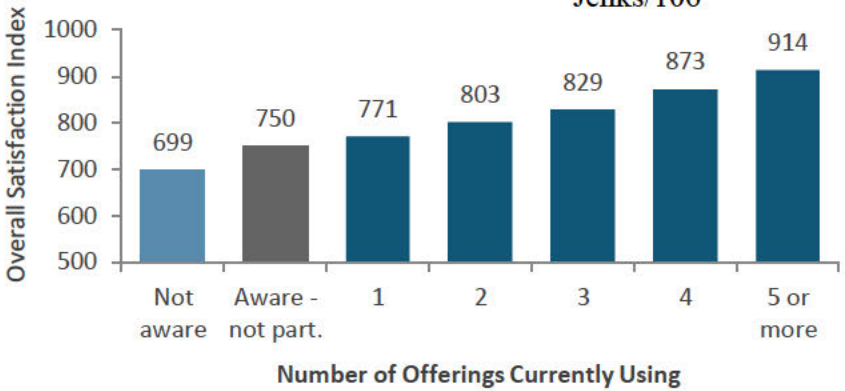
Brand Image - Industry



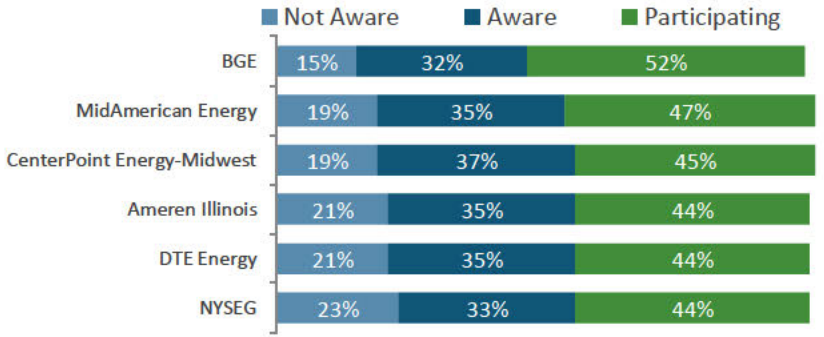
Impact of Products & Services

NW Natural	Not Aware	Aware – Not Participating	Participating
Average bill amount ($)	$69	$64	$72
Online account	49%	64%	70%
Effort to help you manage monthly usage	6.56	7.25	7.68
Price Index	679	741	768
Conservation awareness	23%	44%	56%

Impact on Overall Satisfaction – Industry



Top Participating Brands Products & Services



*Small sample size (n=30-99); #Insufficient sample size (n<30).

J.D. POWER

Thank You!

J.D. POWER

2021 Gas Utility Residential Customer Satisfaction Study

NW Natural

Mark Spalinger
Director, Utilities Intelligence
January 2022

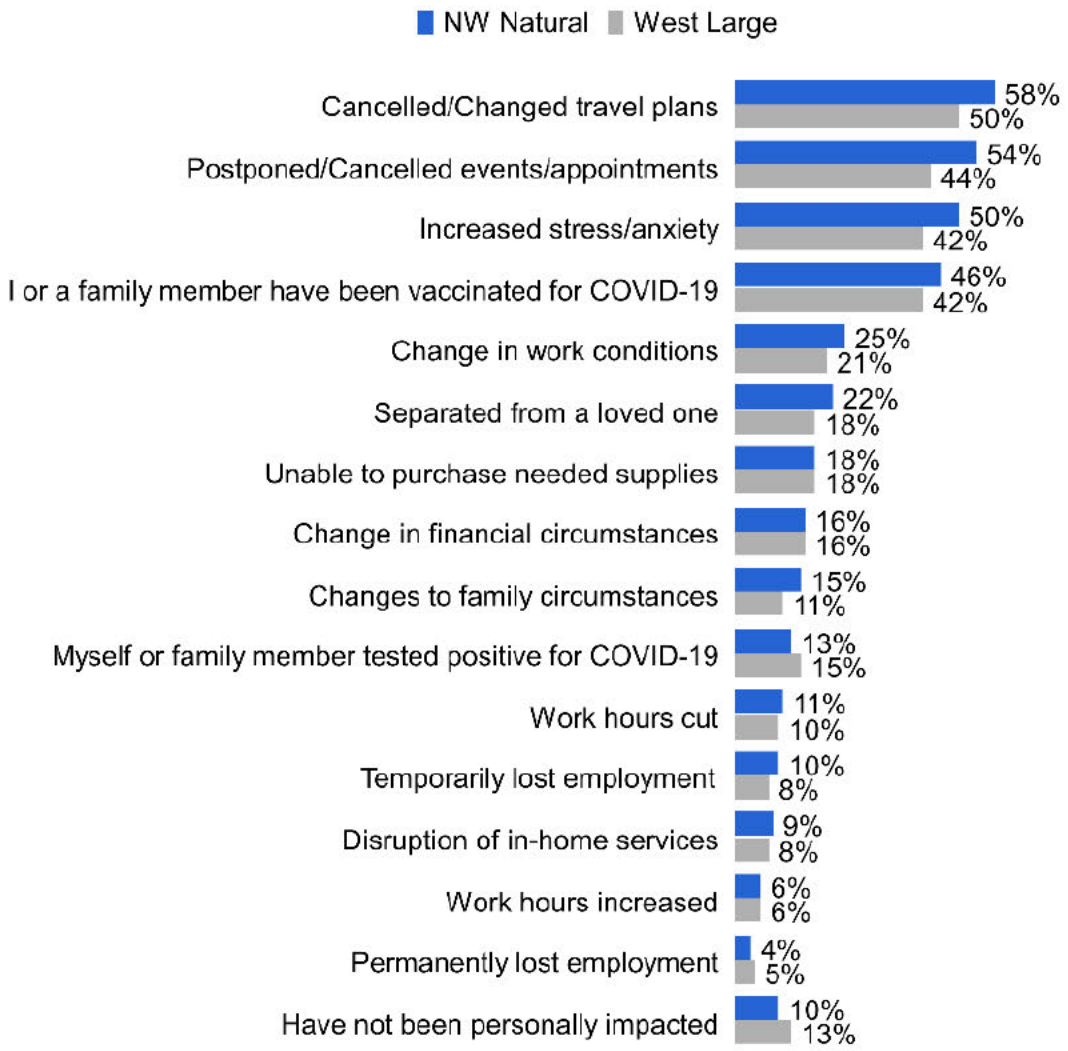
"There is no power for change greater than a community discovering what it cares about"

MARGARET J. WHEATLEY
American Author

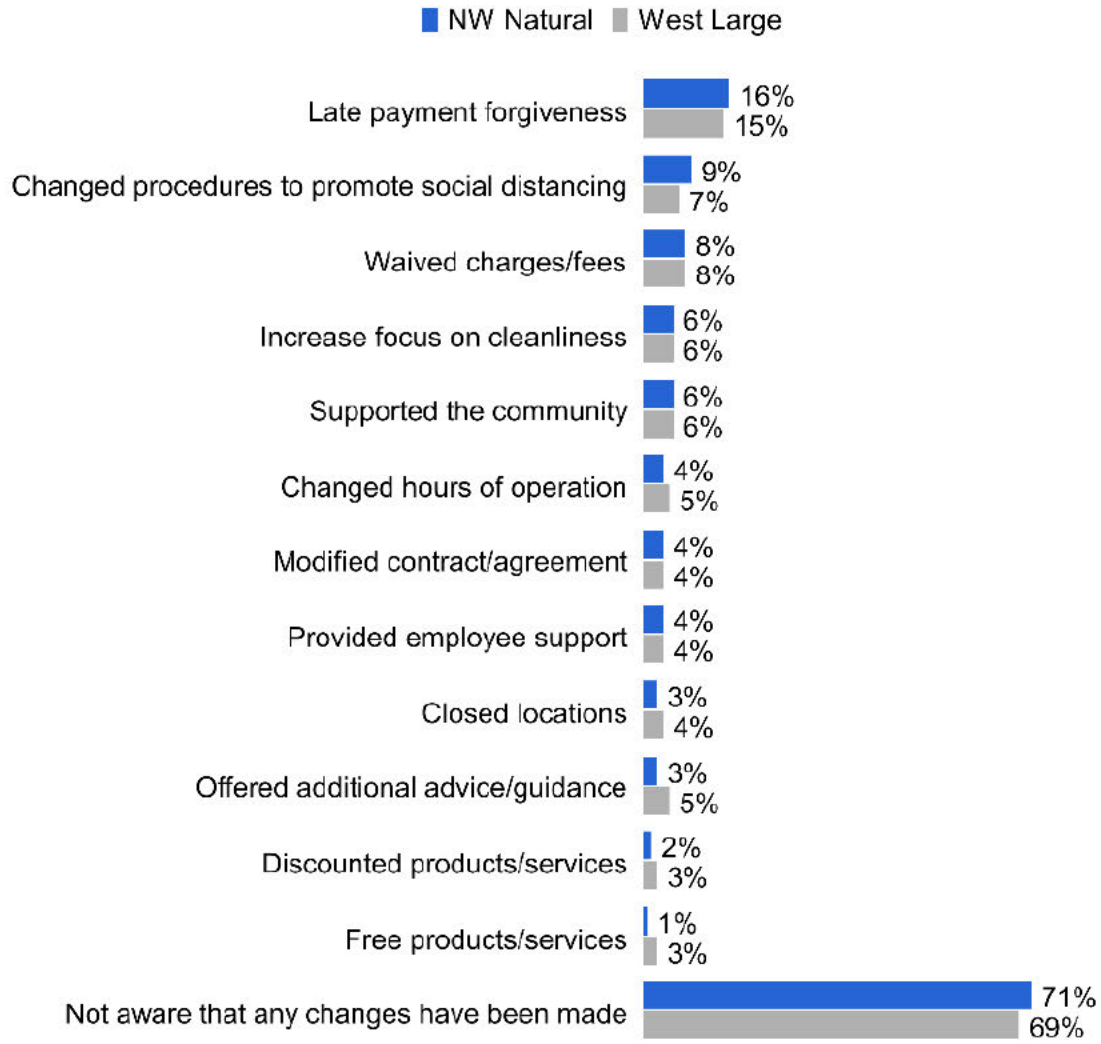
COVID-19 Summary

CUB/118
Jenks/110

How Personally Impacted by the COVID-19 Outbreak



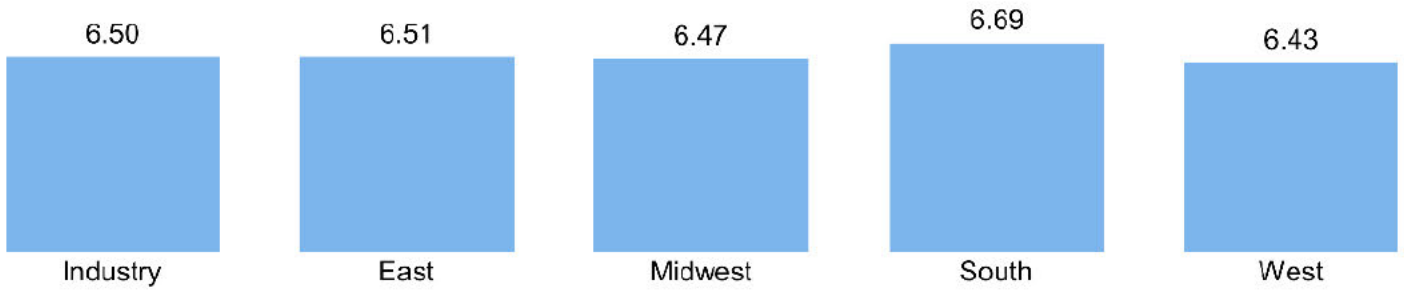
What has Utility done in response to the COVID-19 Outbreak



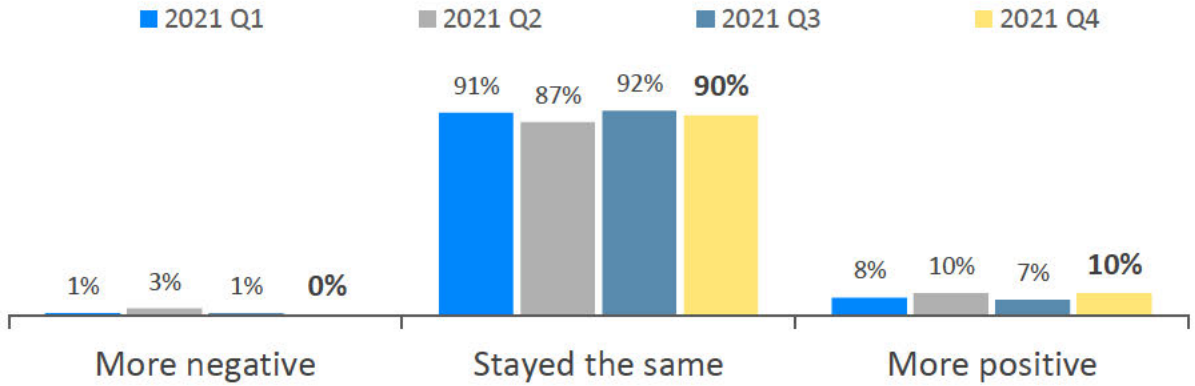
J.D. POWER

COVID-19 Summary

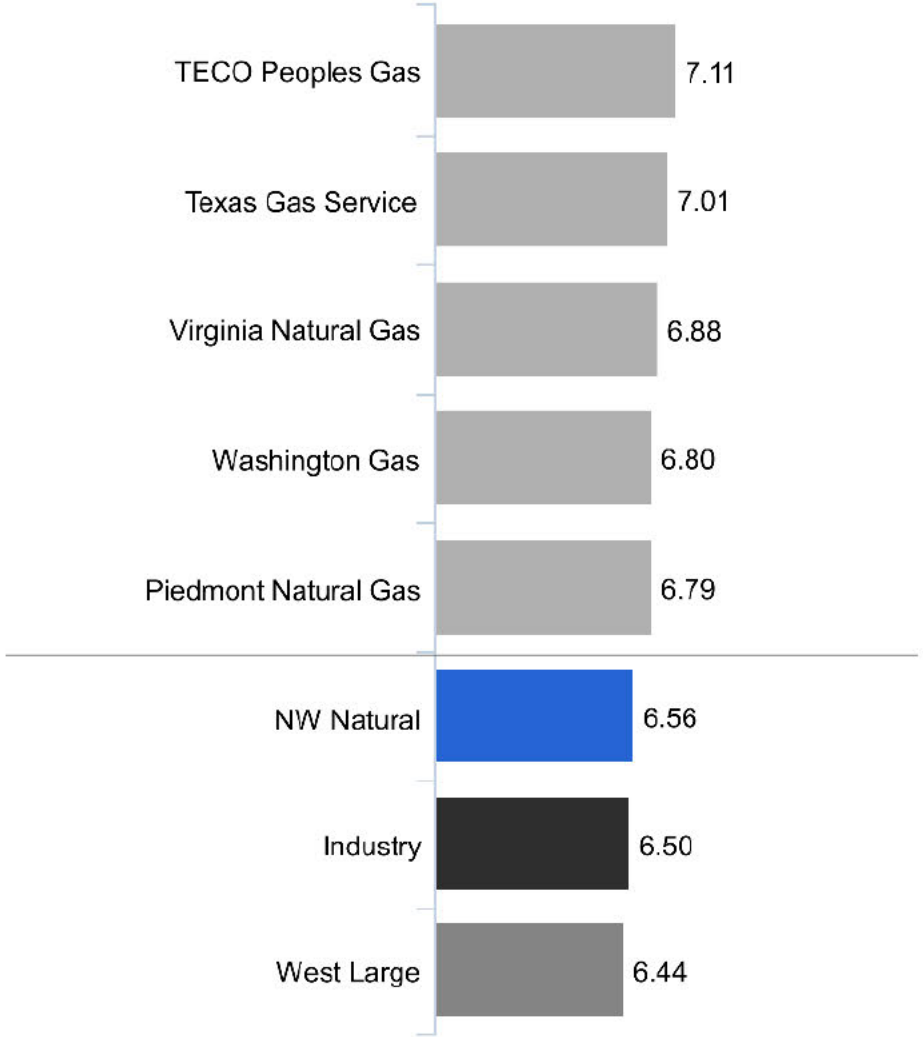
Rating: Utility Response to COVID-19 by Region



How has the response from your utility to the COVID-19 outbreak changed your impression?

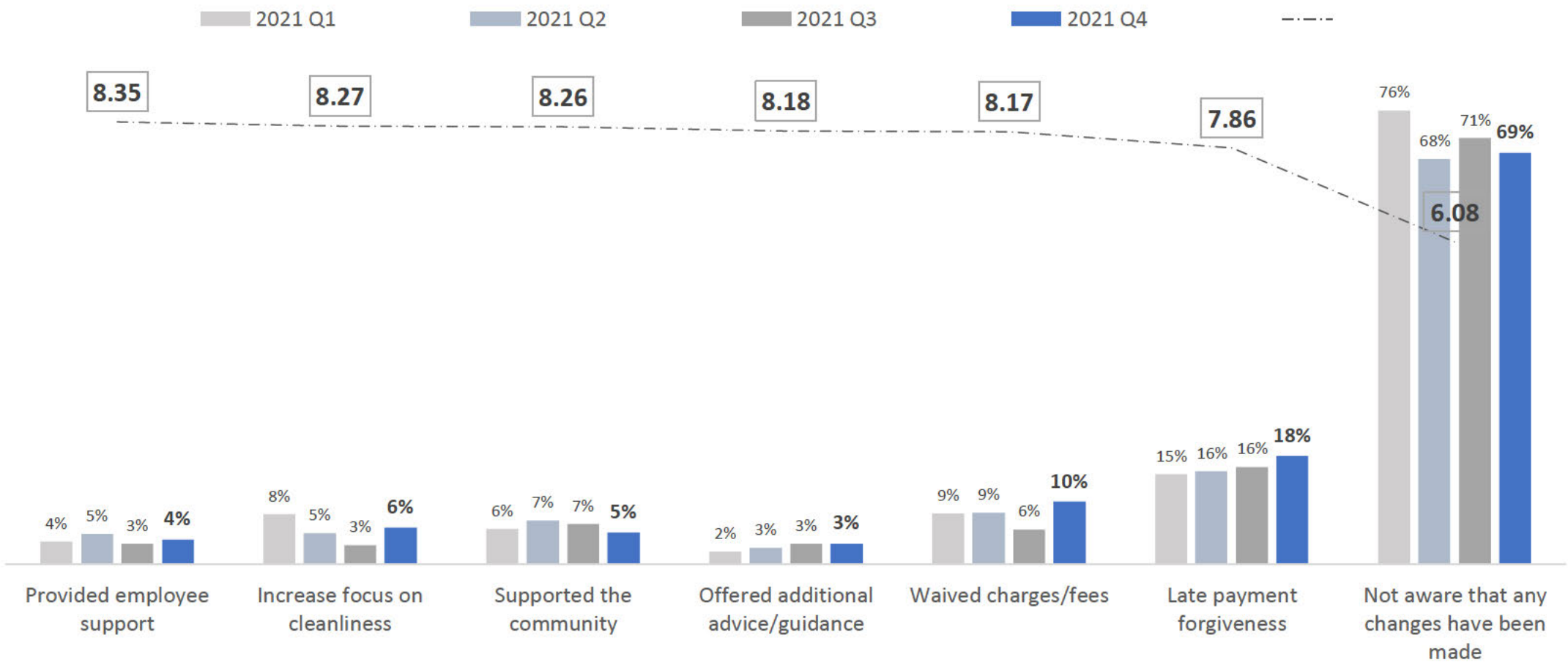


Top Brand Rating: Utility Response to COVID-19



Covid-19 Utility Response – NW Natural

CUB/118
Jenks/112



2021 Gas Utility Residential Study Overview

CUB/118
Jenks/113

58,000+
TOTAL RESPONSES NATIONALLY

20TH
YEAR OF THE STUDY

85 BRANDS
WITH 125,000+ RESIDENTIAL CUSTOMERS

KEY INDEX FACTORS

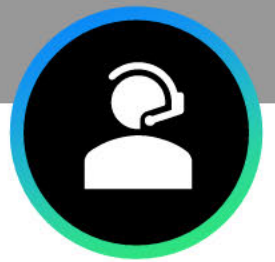
SAFETY & RELIABILITY
29%

BILLING & PAYMENT
21%

PRICE
21%

CORPORATE CITIZENSHIP
13%

COMMUNICATIONS
10%



CUSTOMER CARE
7%

Award Segments:

- East Large
- East Midsize
- Midwest Large
- Midwest Midsize
- South Large
- South Midsize
- West Large
- West Midsize

Size Segment Split:

- Large (400k+ customers)
- Midsize (<400k customers)

WHEN INTERACTION IS PRESENT
20%

Key Takeaways – NW Natural

NW Natural continues to be Helpful at preparing for safety issues

Helping customers prepare for safety issues drives higher satisfaction and is a strength. NW Natural is top 10 in the nation for Awareness of utility efforts to increase general safety of the gas system.

Communication recall for residential customers is declining

Communicating through a variety of channels and Creating messages that get attention are key to maximize communications satisfaction.

Customer Awareness of Citizenship efforts remains high

Continuing to keep customers aware of citizenship efforts will drive higher satisfaction. Let customers know of system improvements, energy efficiency programs offered, and what you are doing to take care of the environment.

Helping customers to manage monthly usage

Helping customers manage monthly usage has a large impact on Price satisfaction. One area of opportunity for NW Natural is Helping customers lower their monthly bill which has a significant impact on overall satisfaction as well as price satisfaction.

Customer Comments

Earn satisfaction asked of everyone who provides a rating of 8 - 10 on Overall Satisfaction

Need to improve asked of everyone who provides a rating of 1 - 7 on Overall Satisfaction

What does NW Natural do well to earn your satisfaction?

"Works with me on making my payments with no late fees"

"Reliability as well as good communication"

"Listens to customers, uses computer automation appropriately, very helpful and flexible payment options."

"They treat me like family and want to make sure I'm happy"

"Send out info every month on various topics concerning natural gas. No problems so far...40 years!!"

What does NW Natural need to improve to earn your satisfaction?

"Communication to residents when work is to take place on your street."

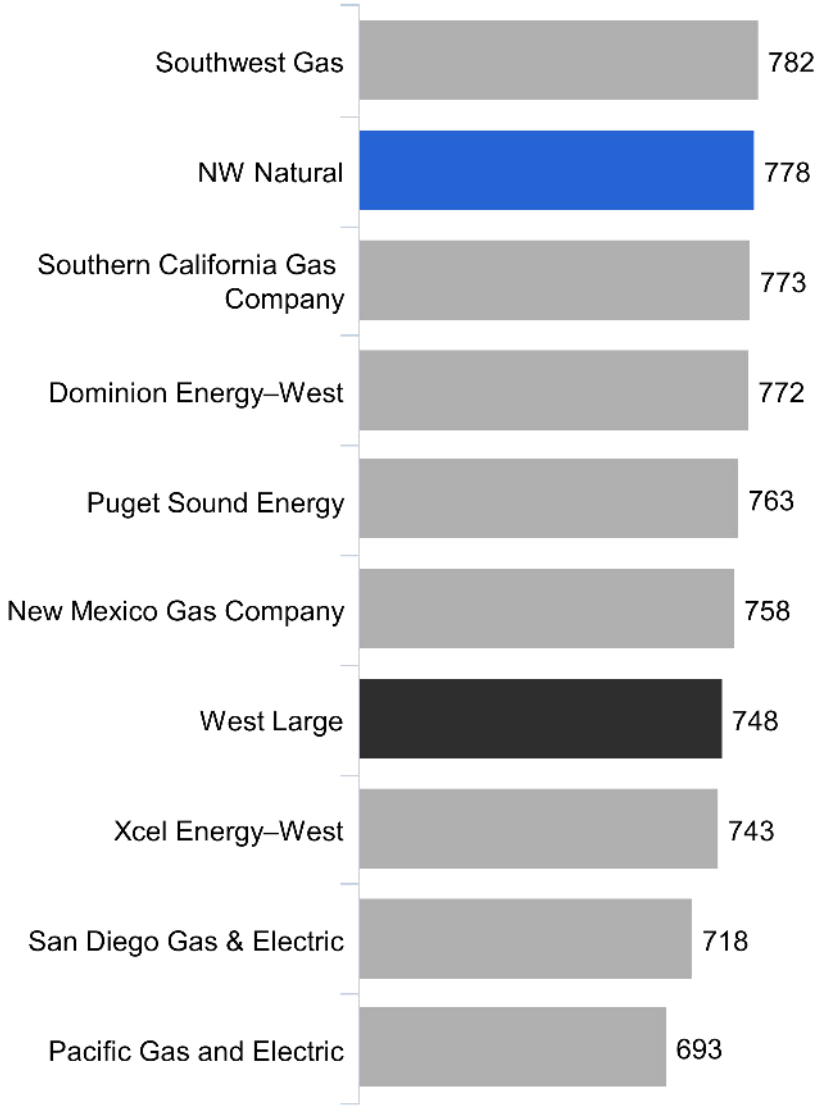
"Education for emergency situations"

"More communication on environmentally friendly alternatives and gas saving tips."

"A little more communication"

"With online payments, there is less chance to see literature on safety and emergency procedures. Need to have a way to have customers see this as reminders"

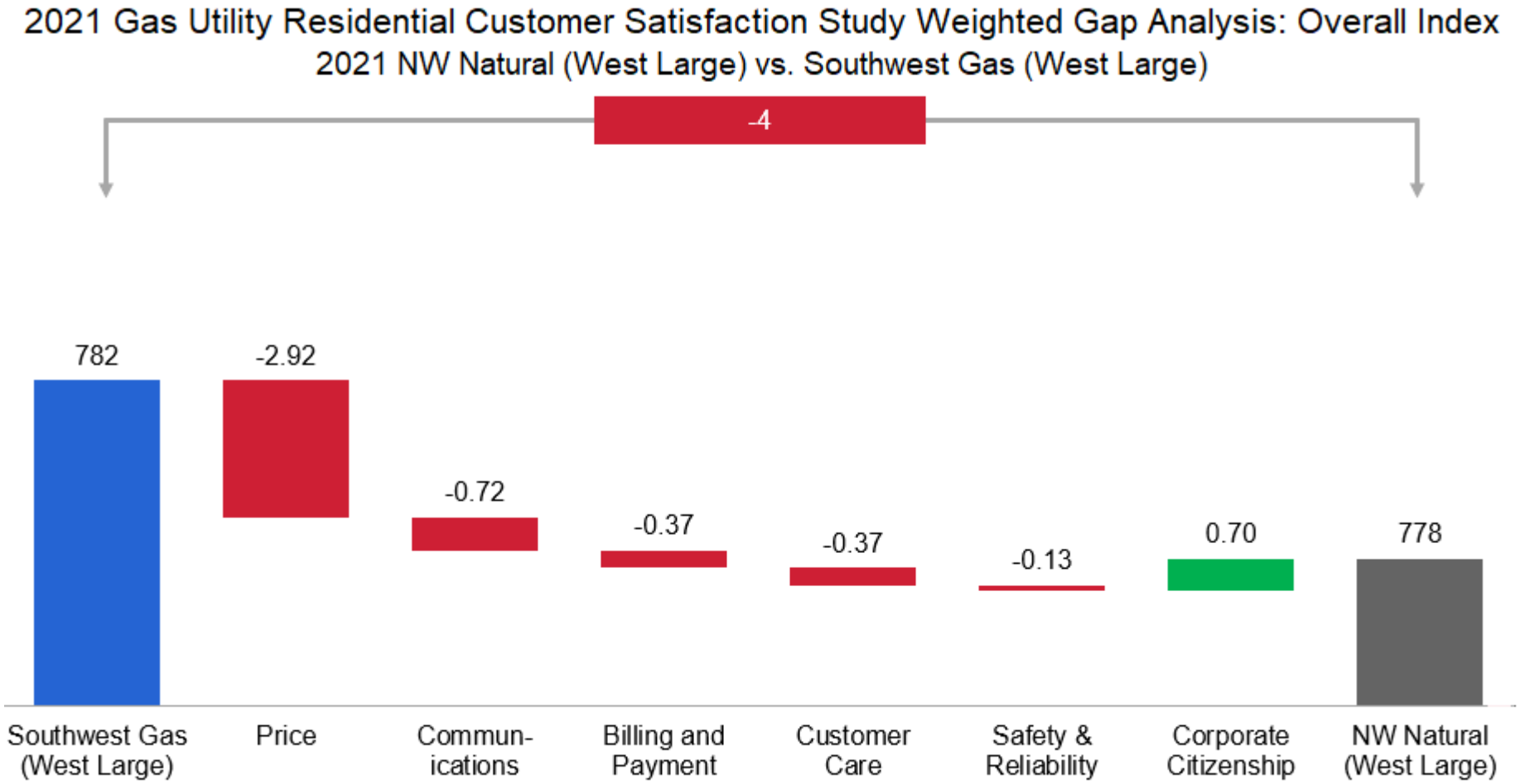
NW Natural Overall Satisfaction Ranking



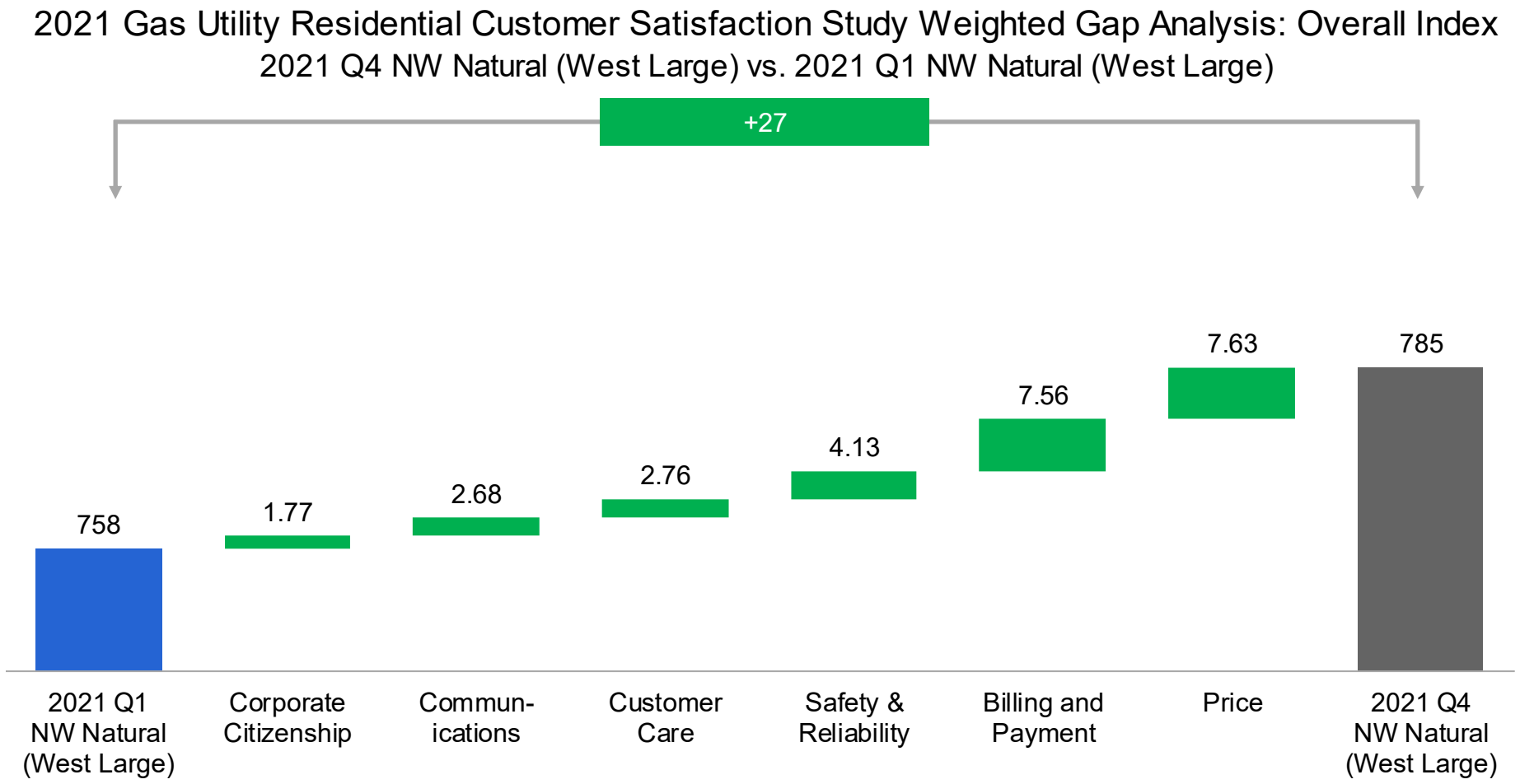
	2020 Rank	2021 Rank
Southwest Gas	1 of 9	1 of 9
NW Natural	2 of 9	2 of 9
Southern California Gas Company	3 of 9	3 of 9
Dominion Energy–West	4 of 9	4 of 9
Puget Sound Energy	5 of 9	5 of 9
New Mexico Gas Company	7 of 9	6 of 9
West Large	-	-
Xcel Energy–West	5 of 9	7 of 9
San Diego Gas & Electric	8 of 9	8 of 9
Pacific Gas and Electric	9 of 9	9 of 9

Weighted Gap vs. Southwest Gas

CUB/118
Jenks/117



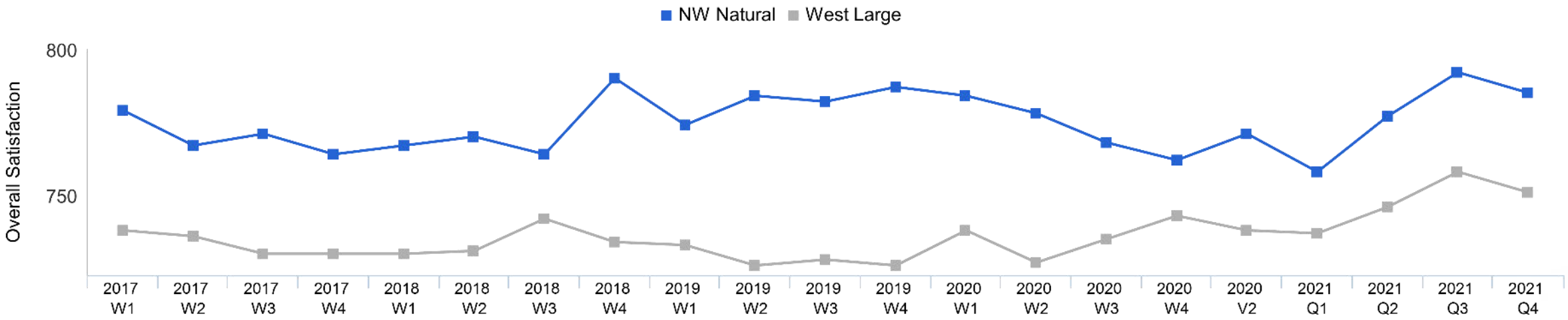
Weighted Gap vs. 2021 Q1



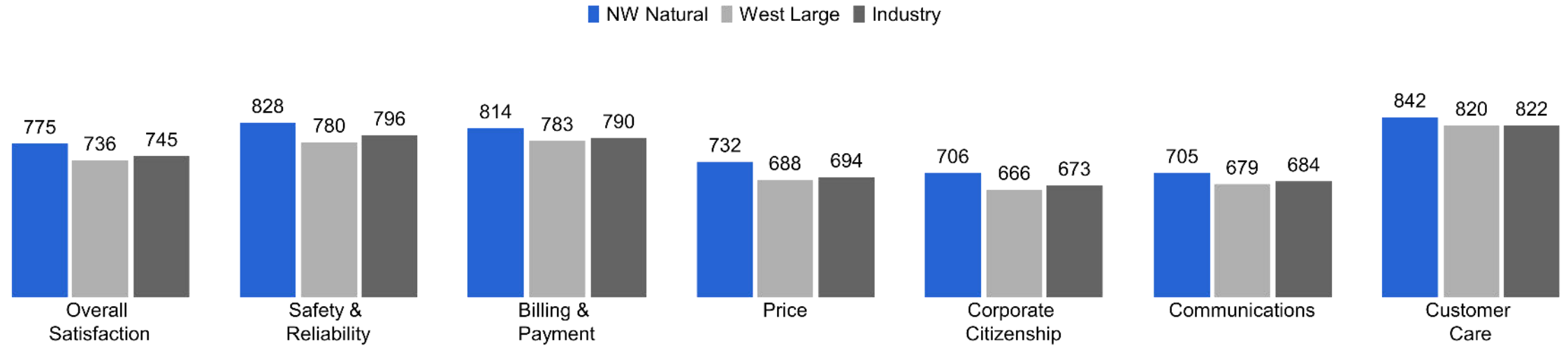
Index and Factor Trend

CUB/118
Jenks/119

Overall Satisfaction Trend



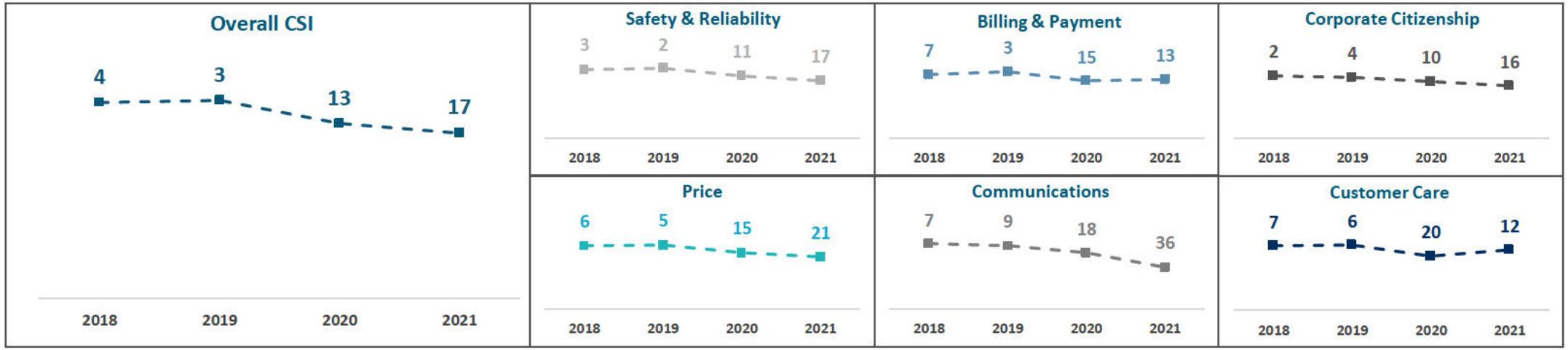
NW Natural Factor Performance



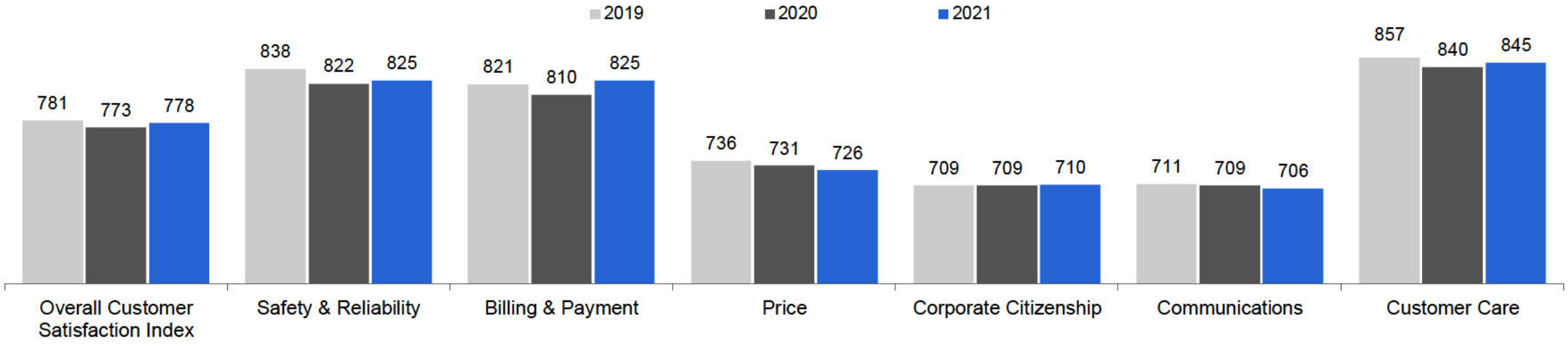
Ranking Compared to Industry

CUB/118
Jenks/120

NW Natural Historical Factor Ranks



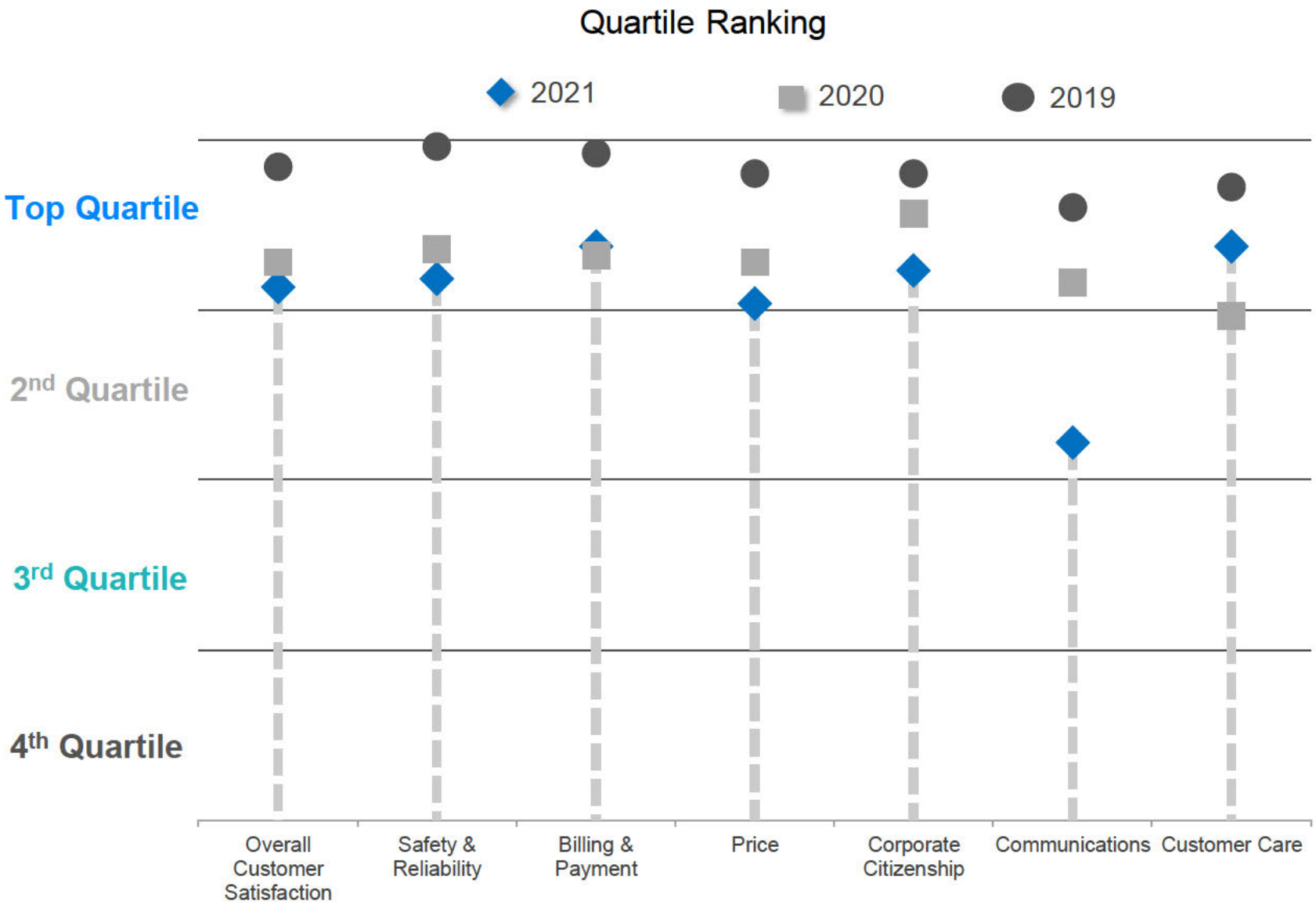
NW Natural Historical Factor Trend



Note: The Industry consists of 84 brands for 2018, 2019, and 2021.2020 has 83 brands in the Industry

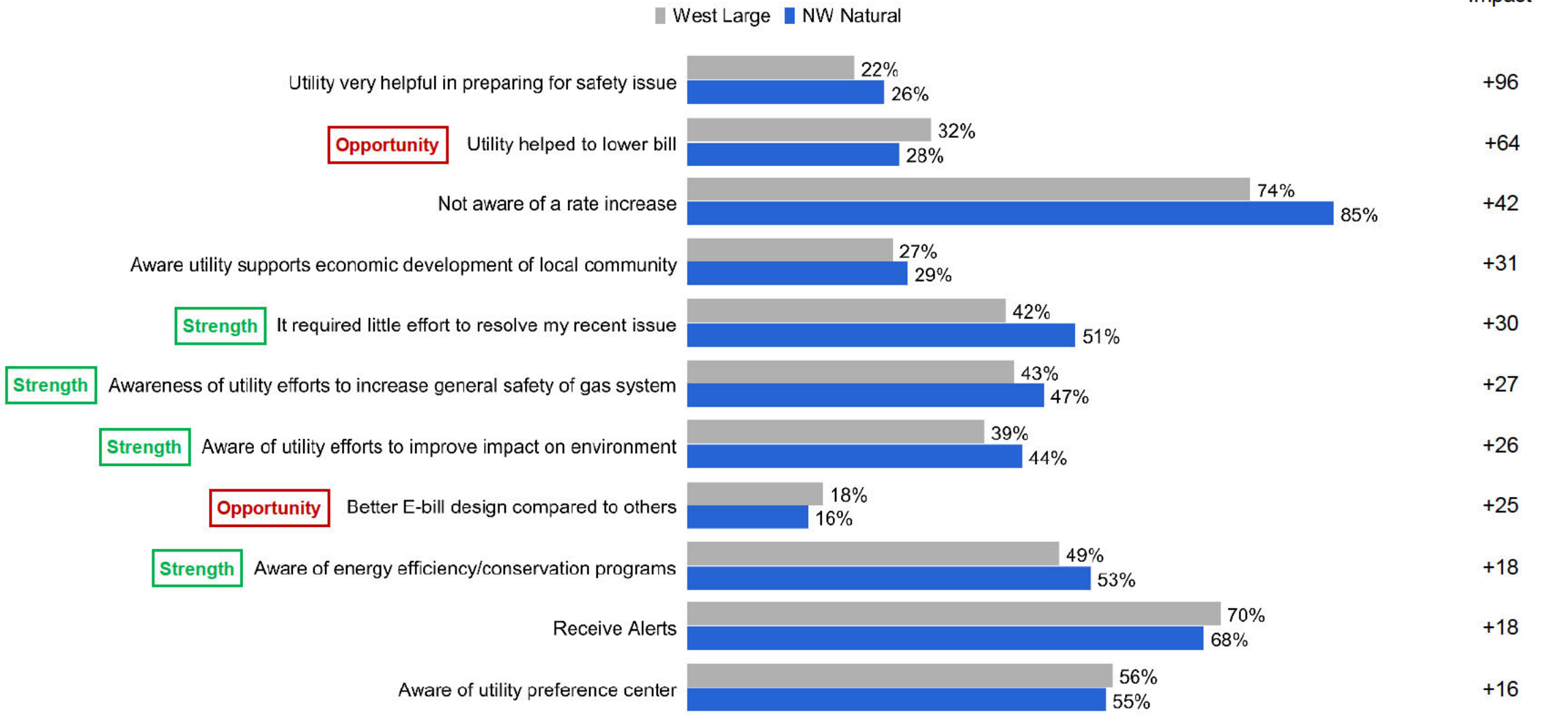
CUB/118
Jenks/121

Quartile Comparison to Industry



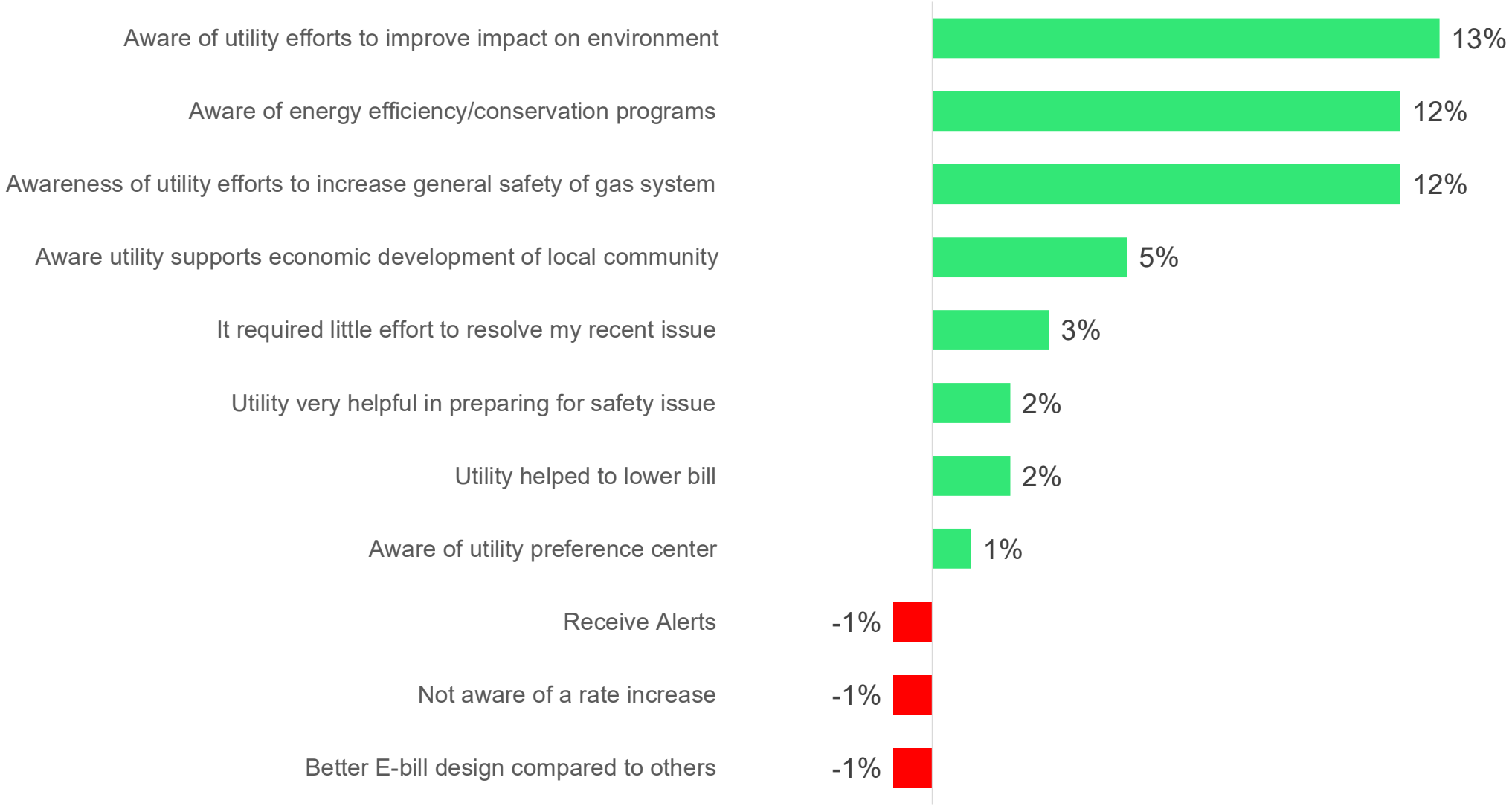
Key Performance Indicators

CUB/118
Jenks/122



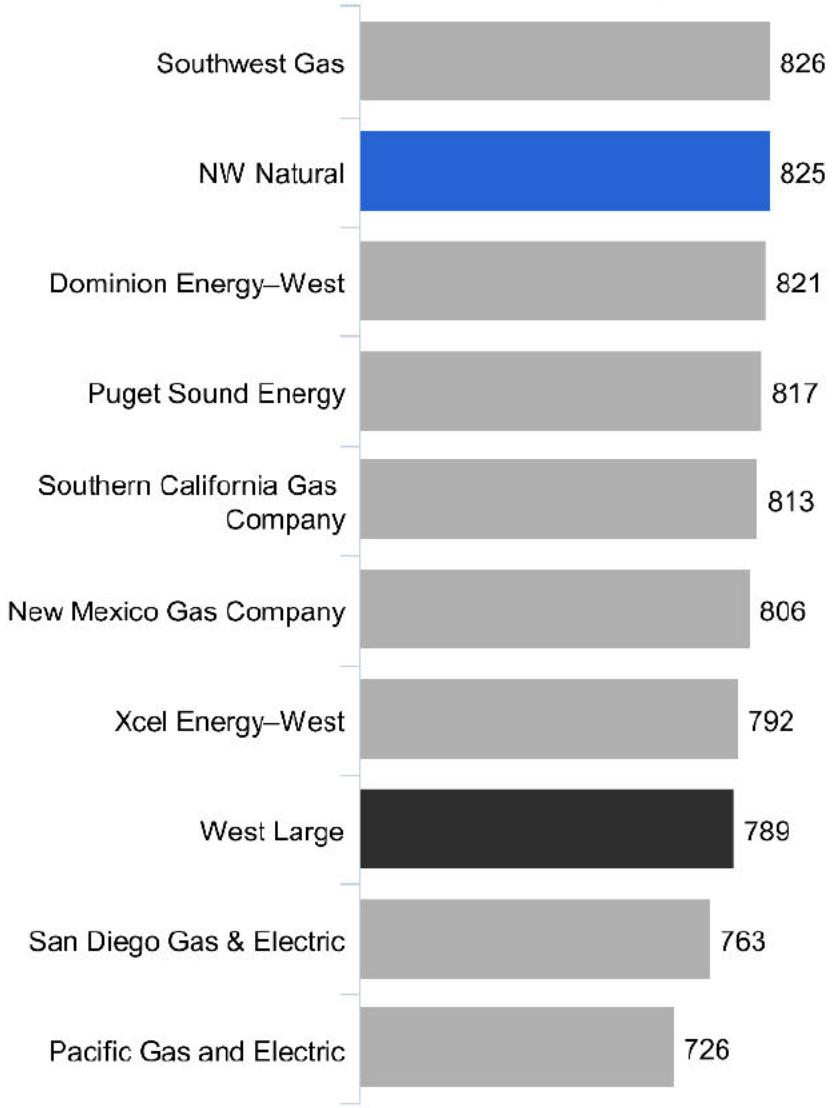
NW Natural Gaps to Southwest Gas KPI's

CUB/118
Jenks/123

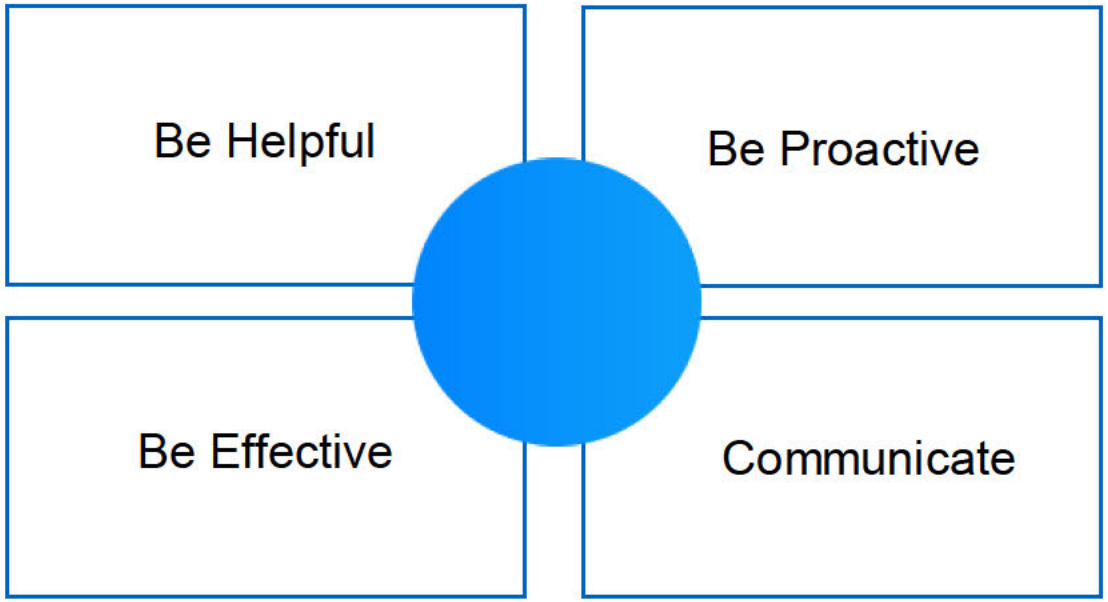


Safety & Reliability - West Large

Safety & Reliability



Best Practices



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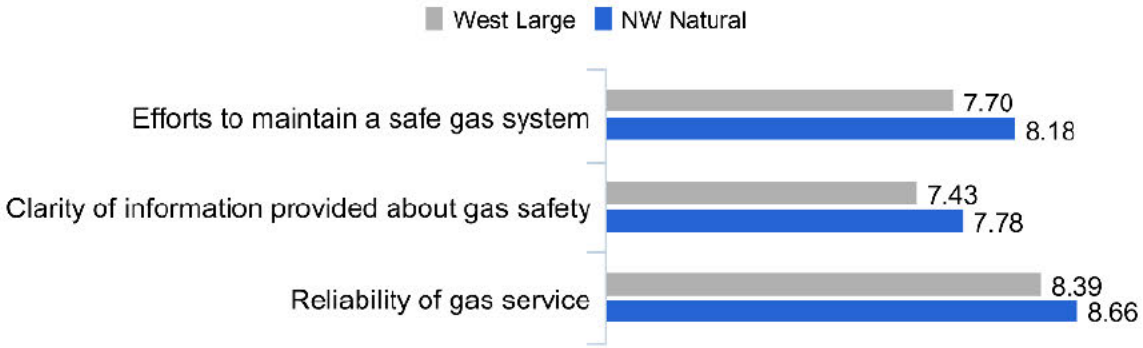
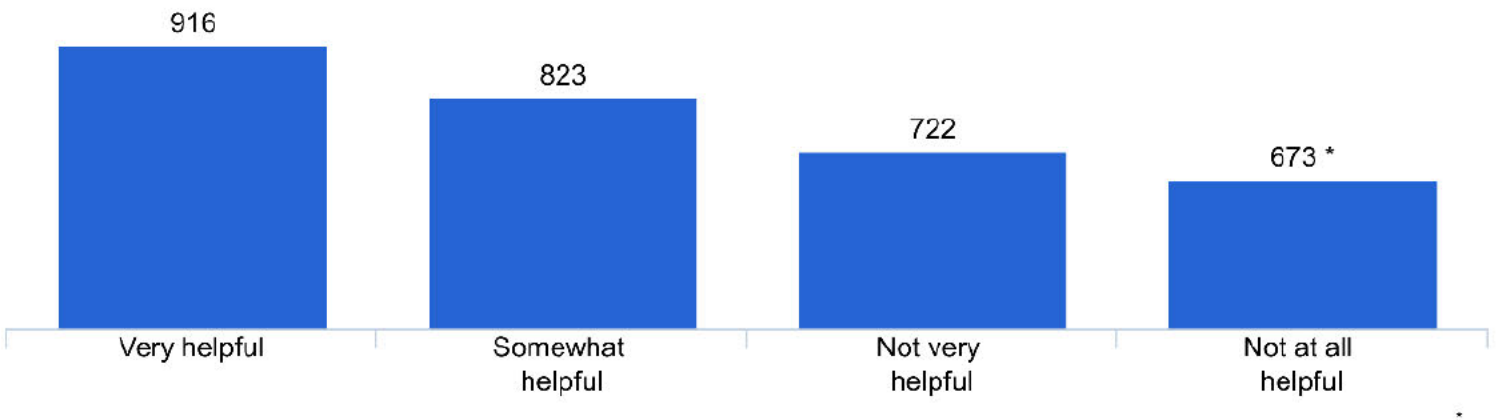


Impact of Safety Preparation - NW Natural

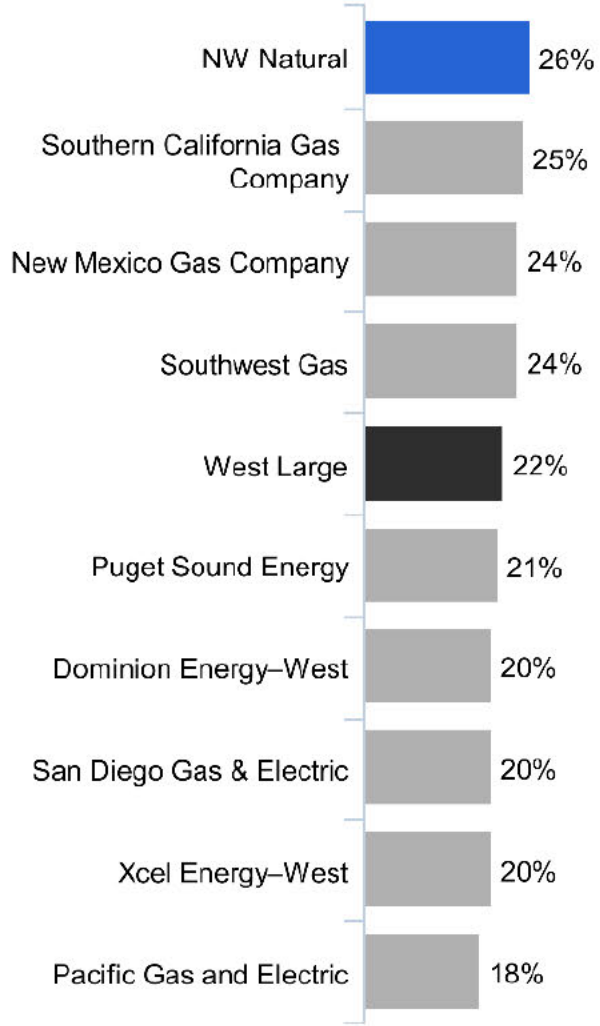
CUB/118
Jenks/125

	Helpful	Not Helpful
Frequency		
Safety & Reliability Index		
RATING: Efforts to maintain a safe gas system	8.47	6.89
Had safety inspection done		7%

Helpfulness of Utility to Prepare You for a Safety Issue by Safety & Reliability Index



Very Helpful at Preparing You for a Safety Issue

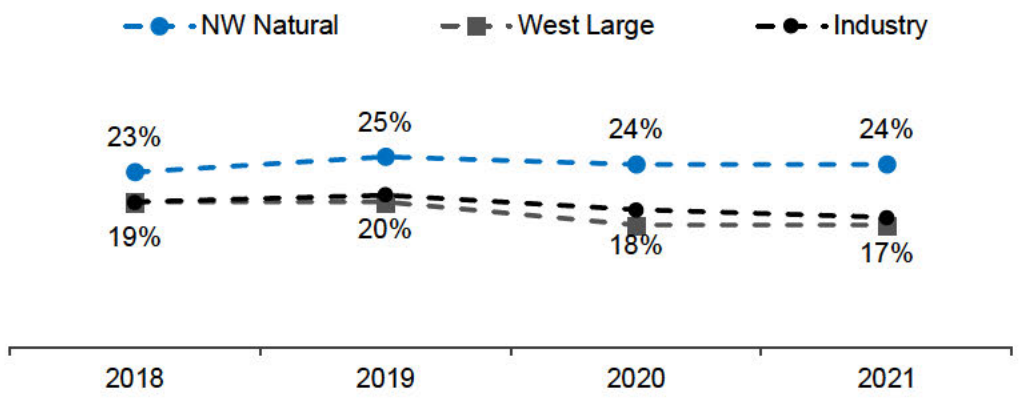


*Small sample size (n=30-99); insufficient data (n<30) not shown

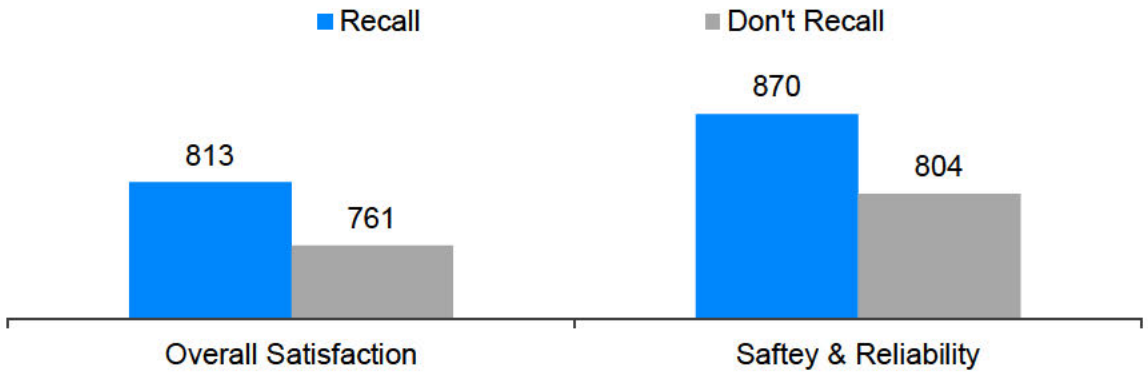
Safety Communications Recall from Utility

CUB/118
Jenks/126

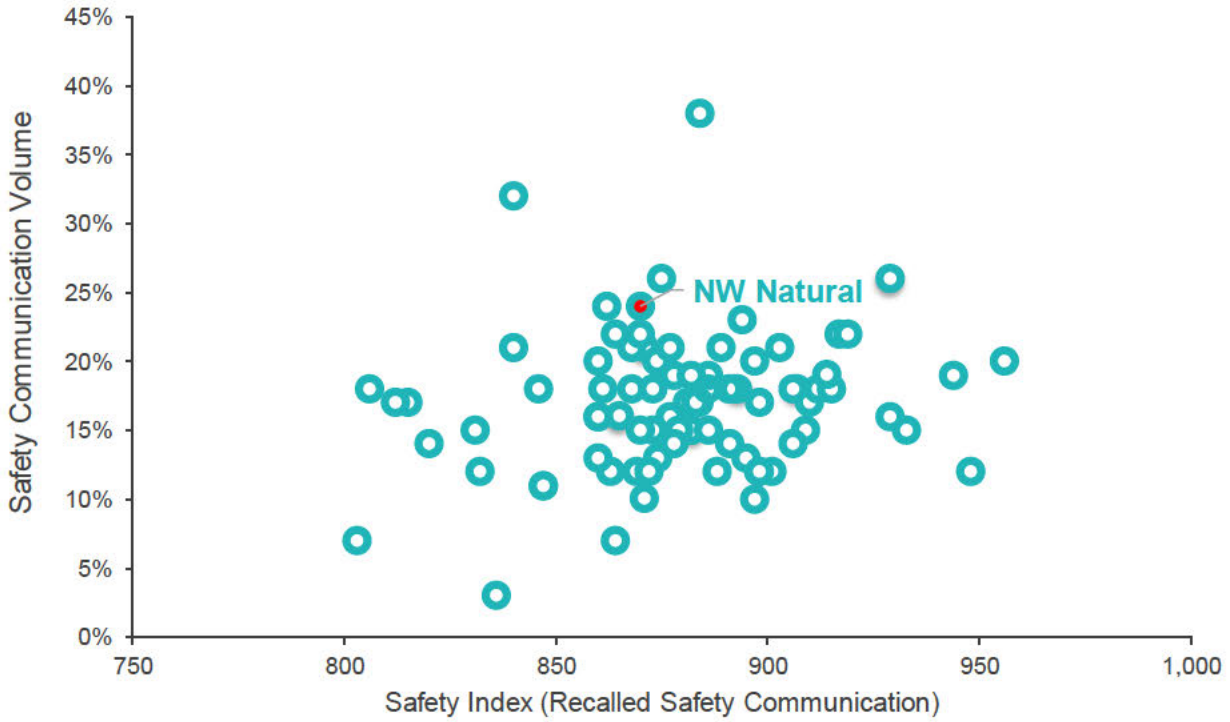
Recall Utility Communication – Consumer Safety Around Natural Gas



Utility Safety Communication Recall on Satisfaction – NW Natural



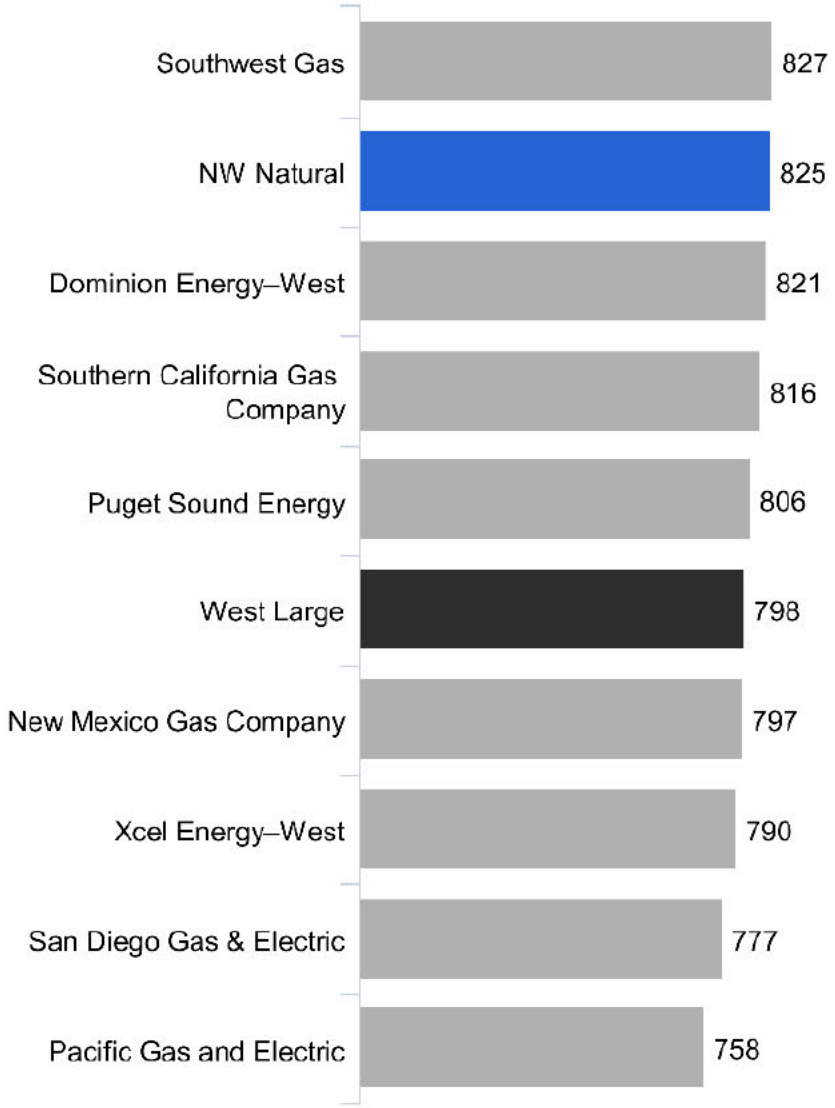
Safety Communication Volume by Satisfaction



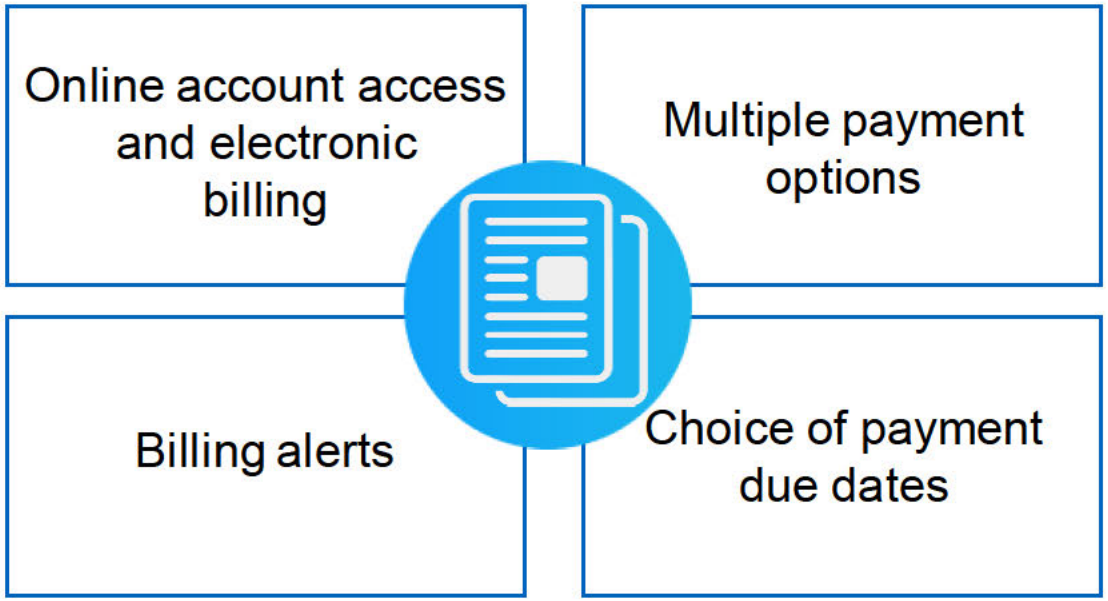
Billing & Payment - West Large

CUB/118
Jenks/127

Billing & Payment



Best Practices



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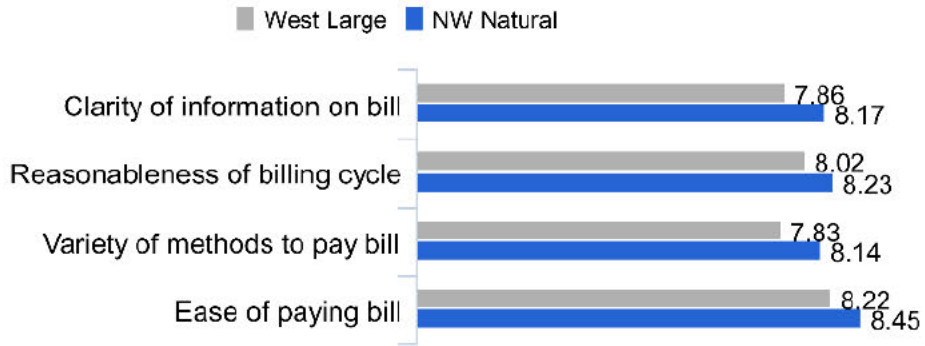
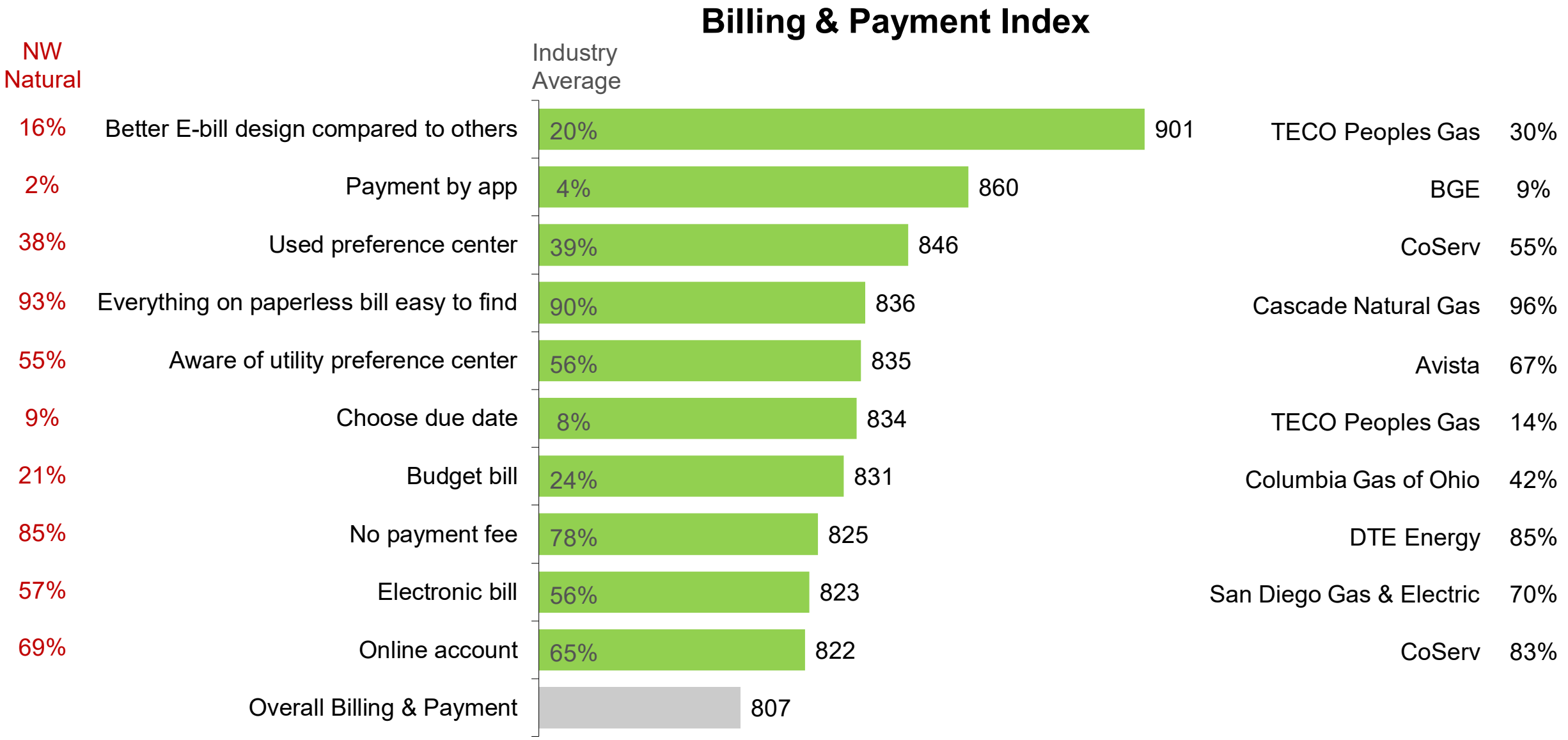


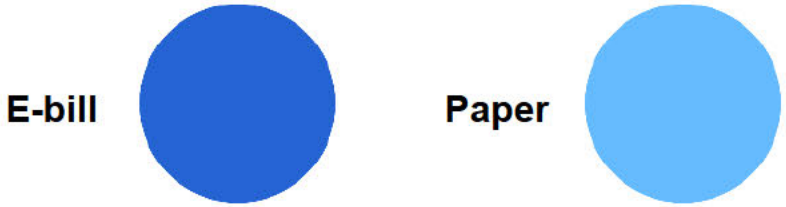
Value Added Billing and Payment Features Increase Satisfaction

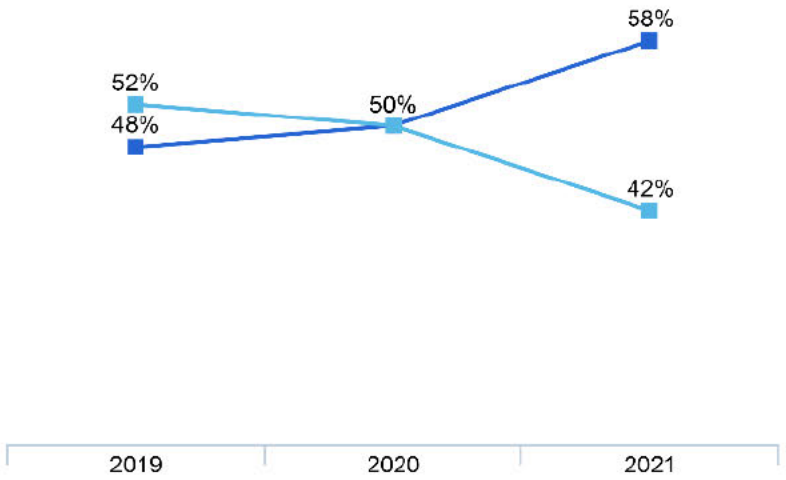
CUB/118
Jenks/128



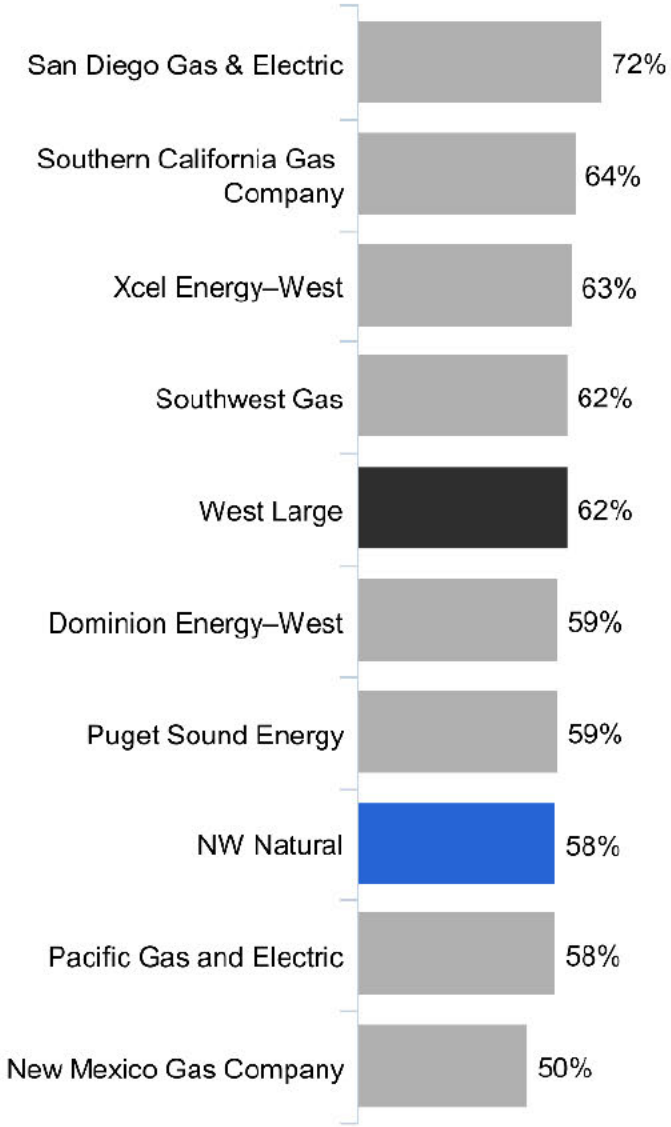
Electronic Bill Receipt

Billing & Payment Satisfaction by Type of Bill Statement - NW Natural





West Large E-bill Incidence

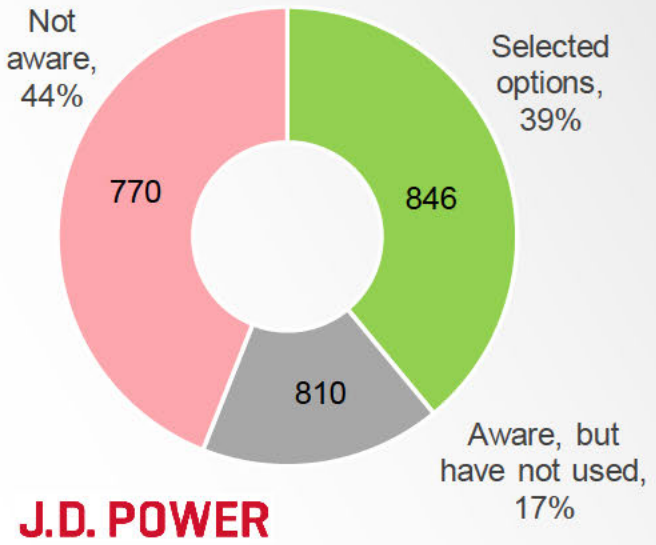


Preference centers improve billing & payment satisfaction

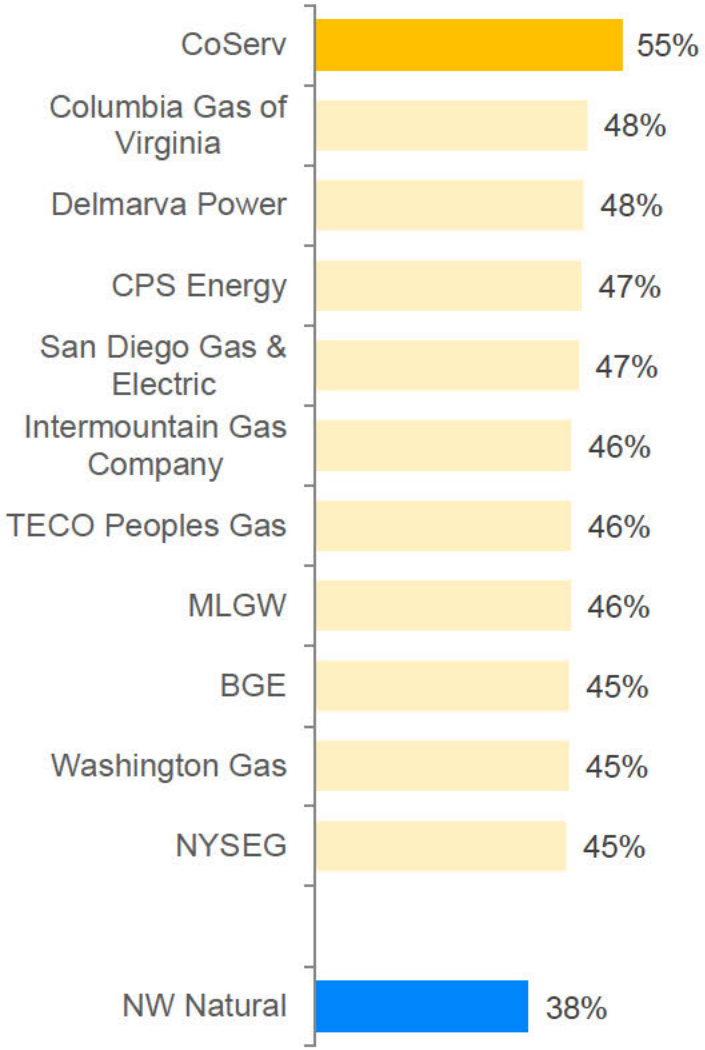
On average, 56% of customers know their gas utility has a preference center and 39% have used it.

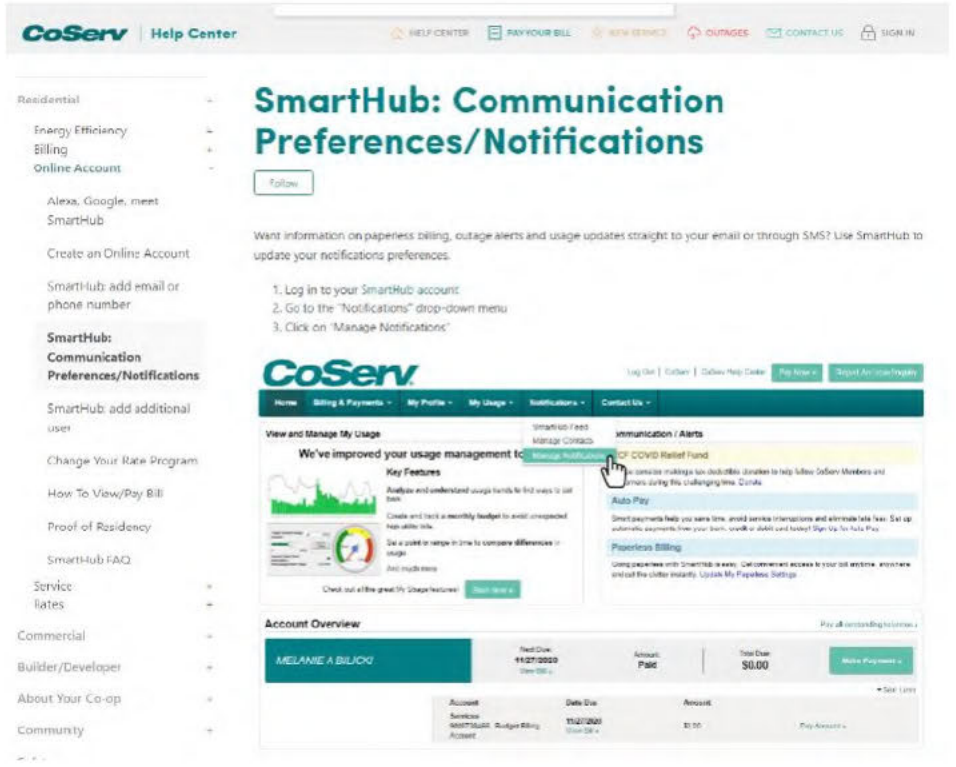
Awareness increases billing & payment satisfaction from 770 to 810. And on average, if customers also use the preference center, then satisfaction improves to 846.

Satisfaction and percentage of customers aware of and using preference center



Preference center usage - Top Brands





https://support.coserv.com/hc/en-us/articles/360007942453-SmartHub-Communication-Preferences-Notifications

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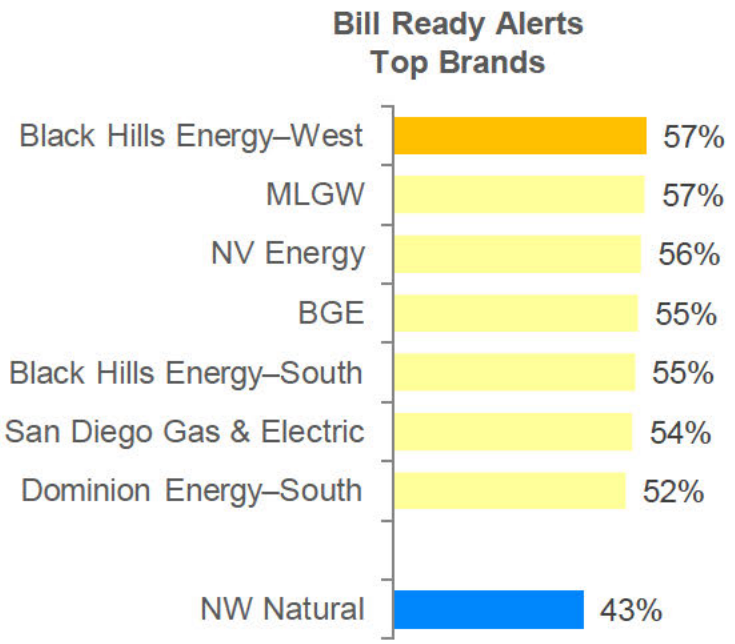
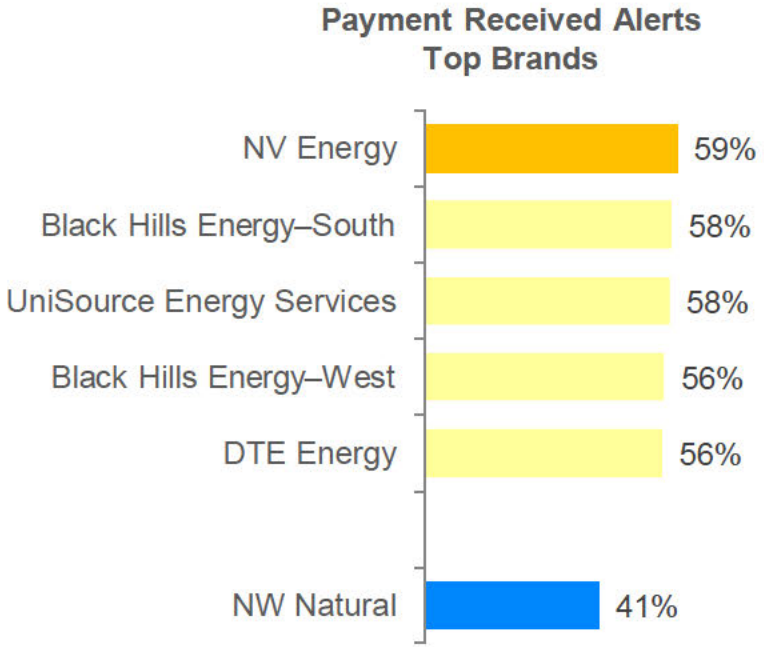
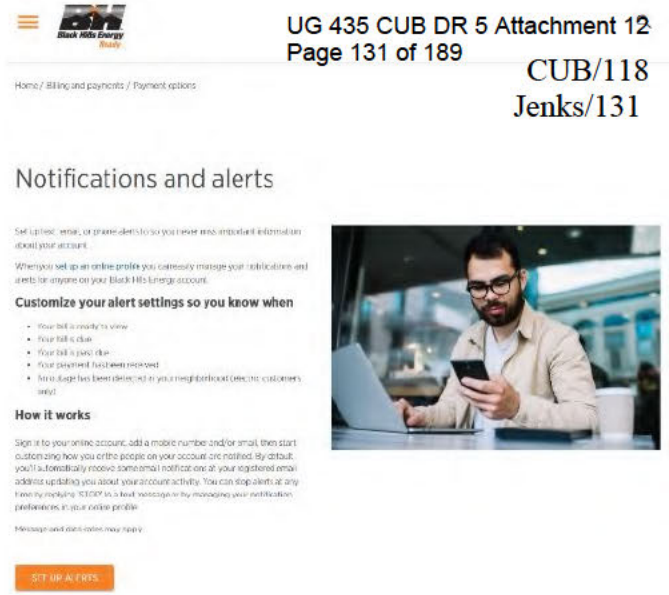
Billing Alerts

Billing alerts increase satisfaction with customers. A simple alert letting a customer know that the bill is ready increases satisfaction to 829; and an alert to confirm the payment was received increases satisfaction to 836.

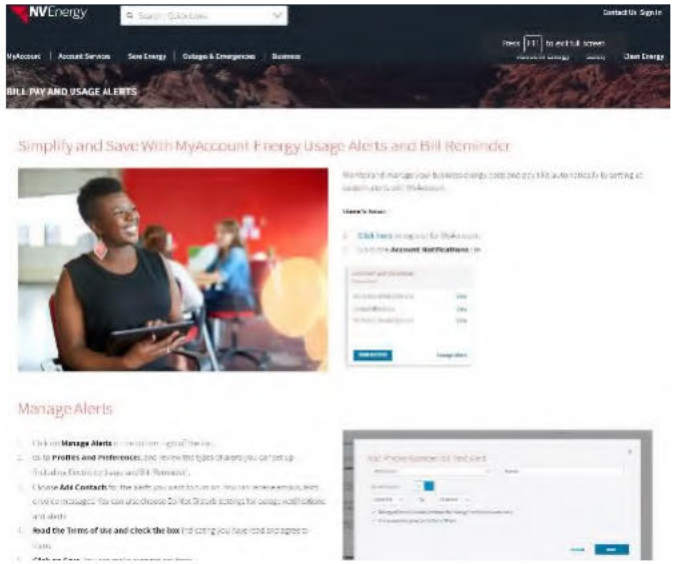
Black Hills has the most customers reporting they received an alert stating the bill is ready; NV Energy has the most customers reporting they received a payment confirmation alert.





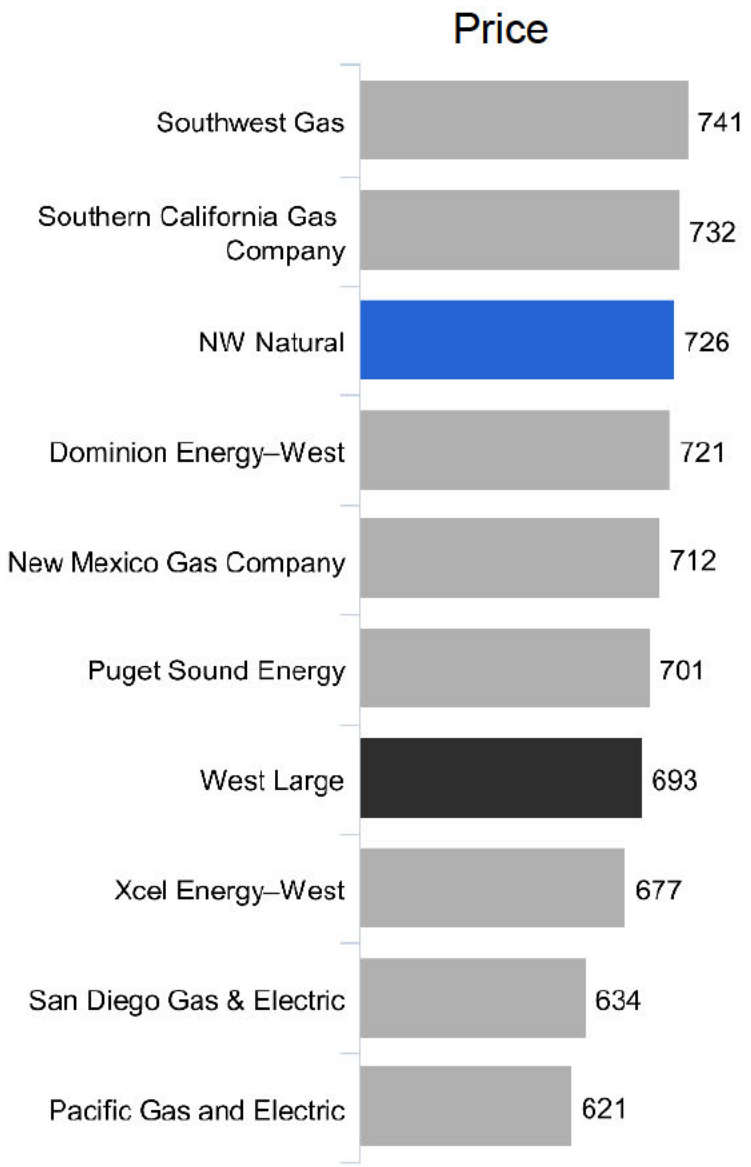


www.blackhillsenergy.com/billing-and-payments/payment-options/notifications-and-alerts



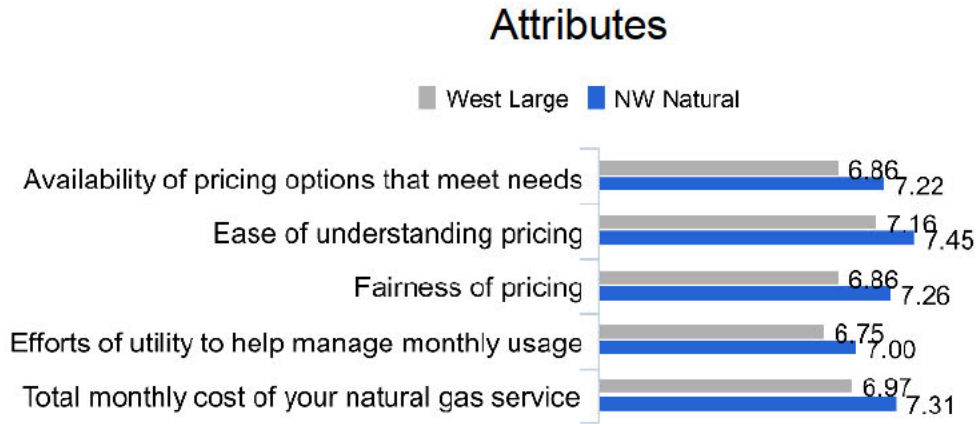
www.nvenergy.com/save-with-powershift/business-energy-services/small-business-customers/bill-pay-and-usage-alerts

Price - West Large



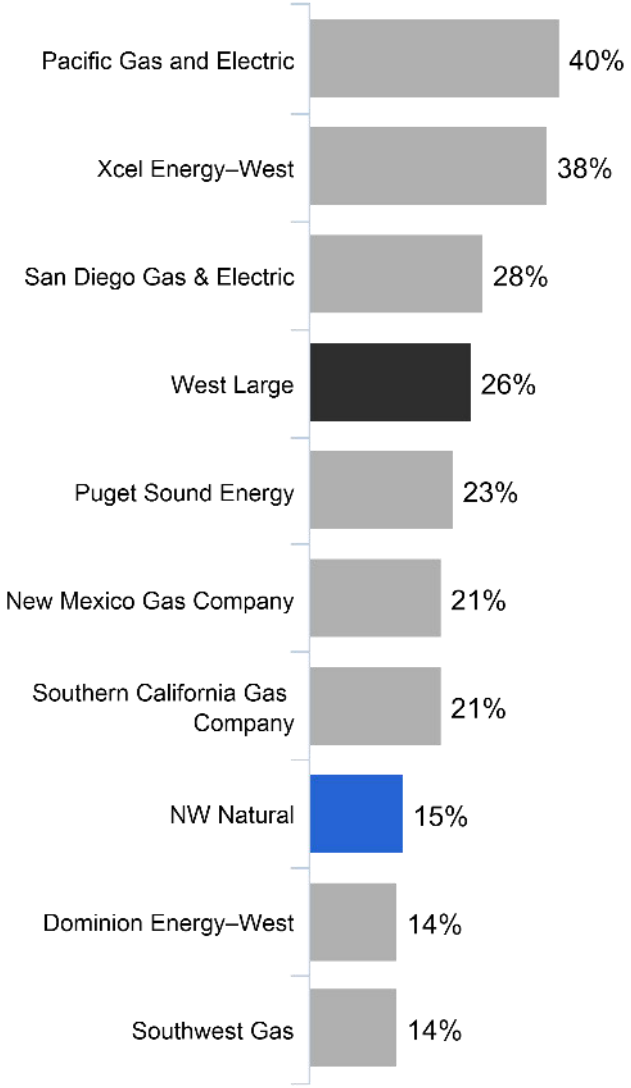
Best Practices

- Efforts to help manage monthly usage
- Aware and participation in pricing options
- Clarity of pricing information
- Help ensure financial assistance is reaching the targe audience

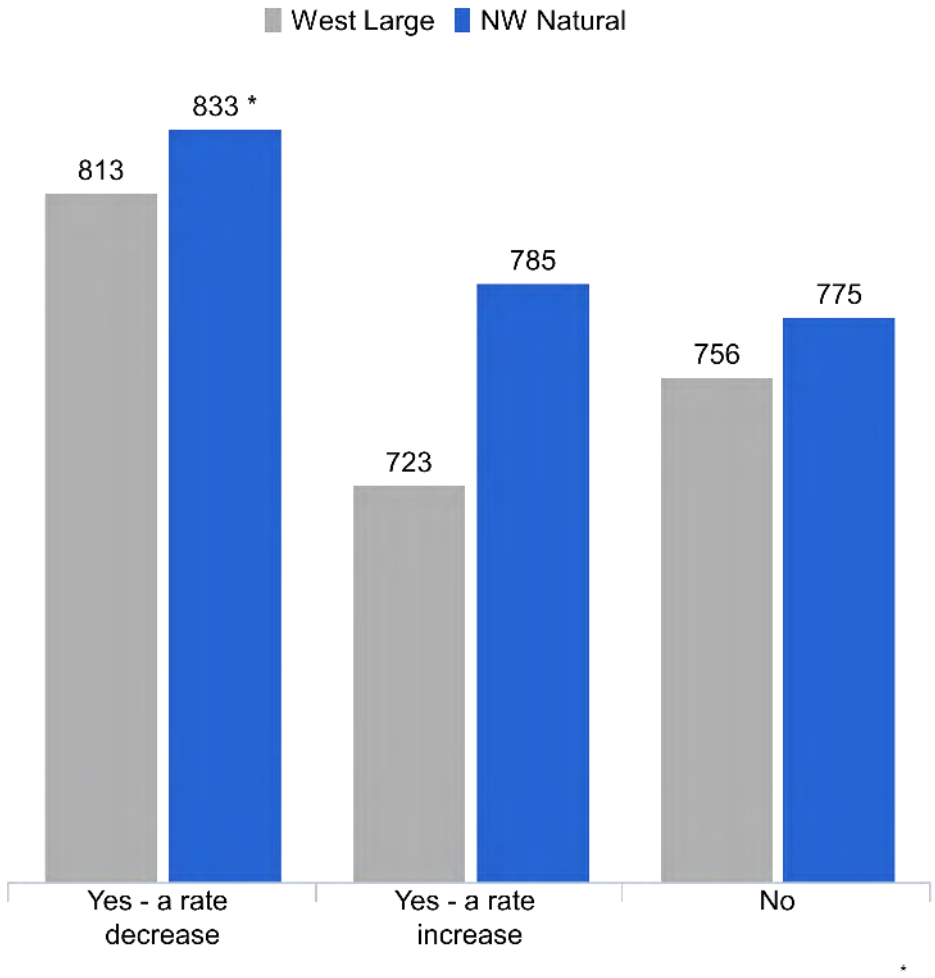


Overall CSI by Heard about Rate Changes

% Heard About Rate Increase



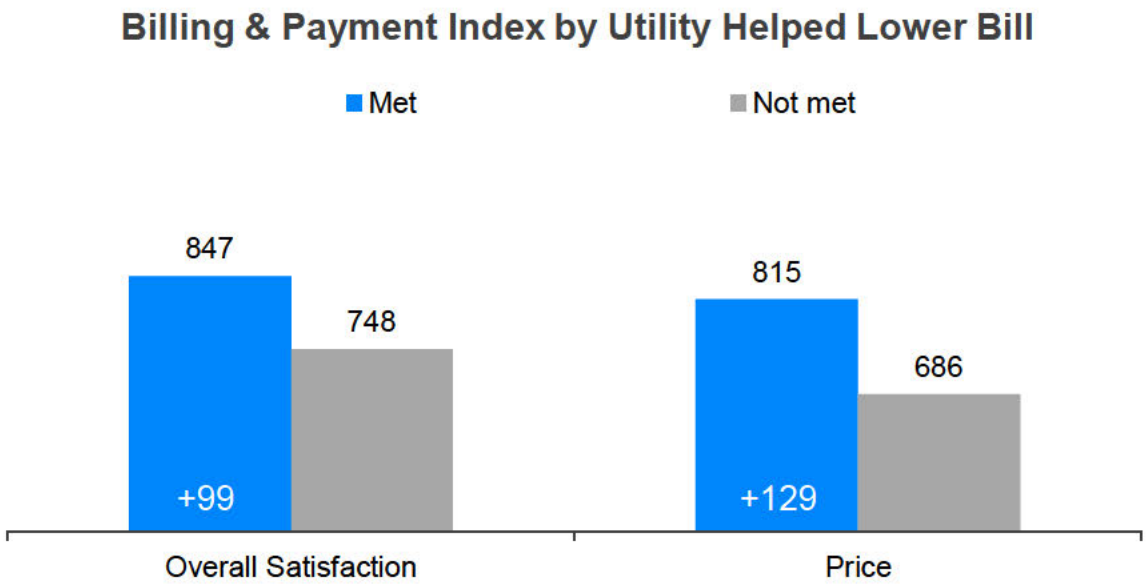
Overall Customer Satisfaction Index by Price Change

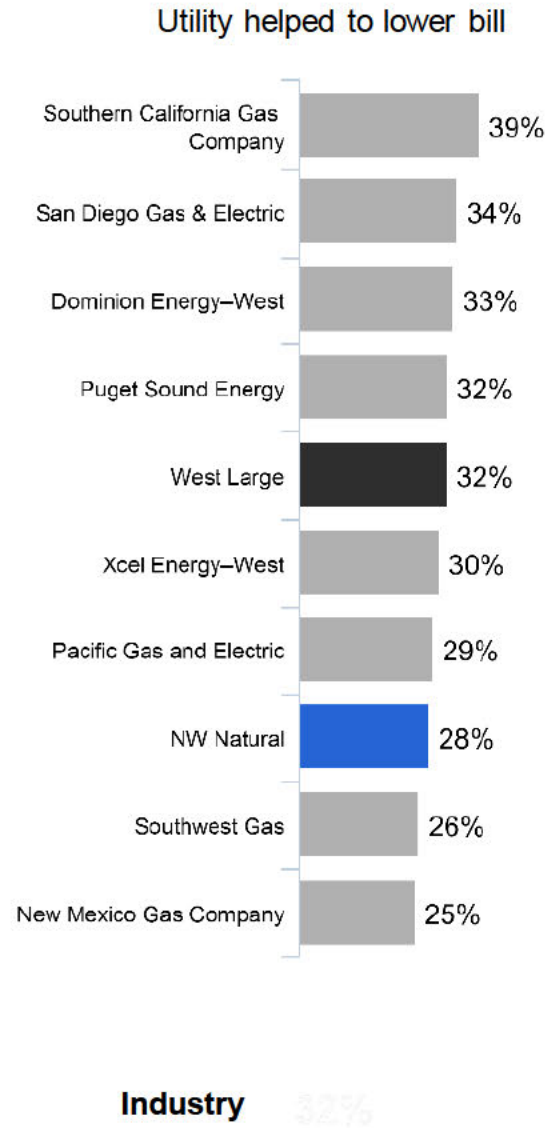


*Small sample size (n=30-99); insufficient data (n<30) not shown

Utility helped to lower bill

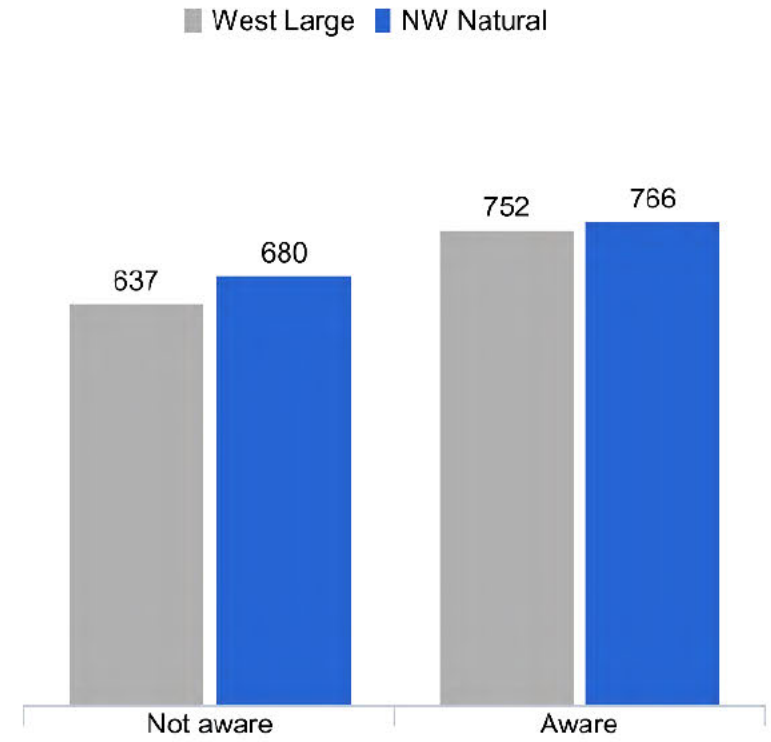
CUB/118
Jenks/134



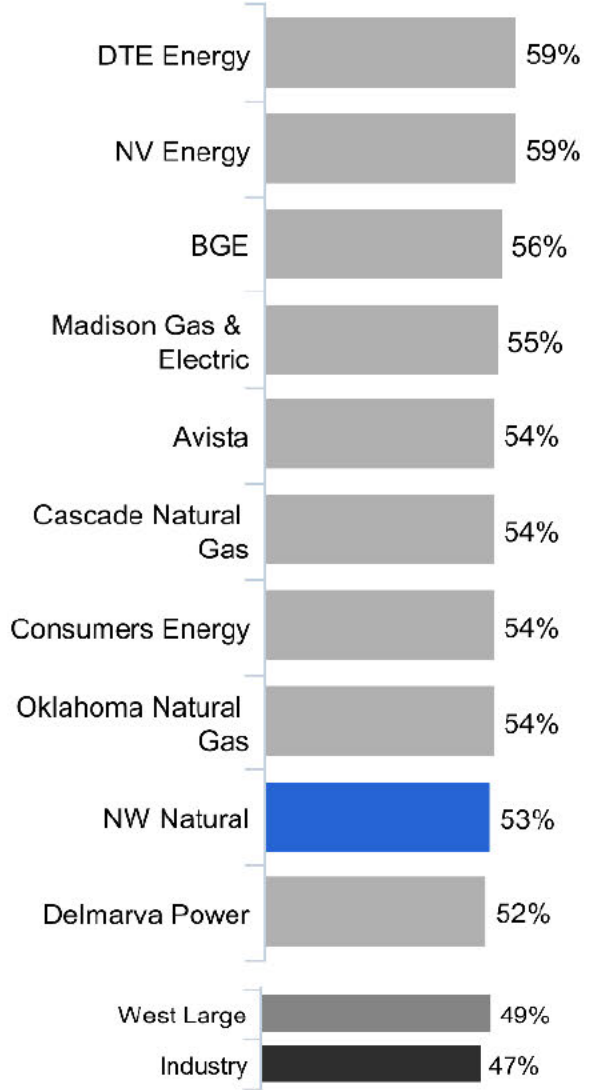


Price Index by Familiarity with Conservation Programs

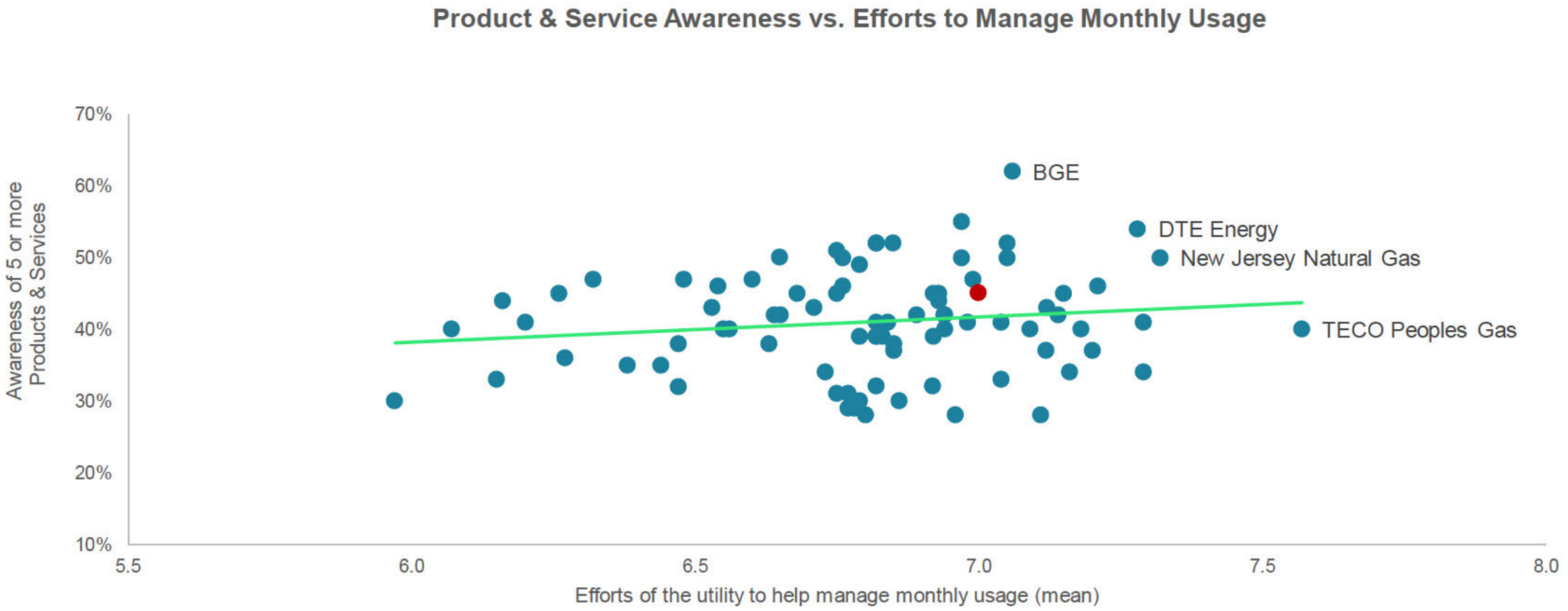
Price Index by Awareness of Conservation Programs



Top Brands - Aware of Conservation Programs

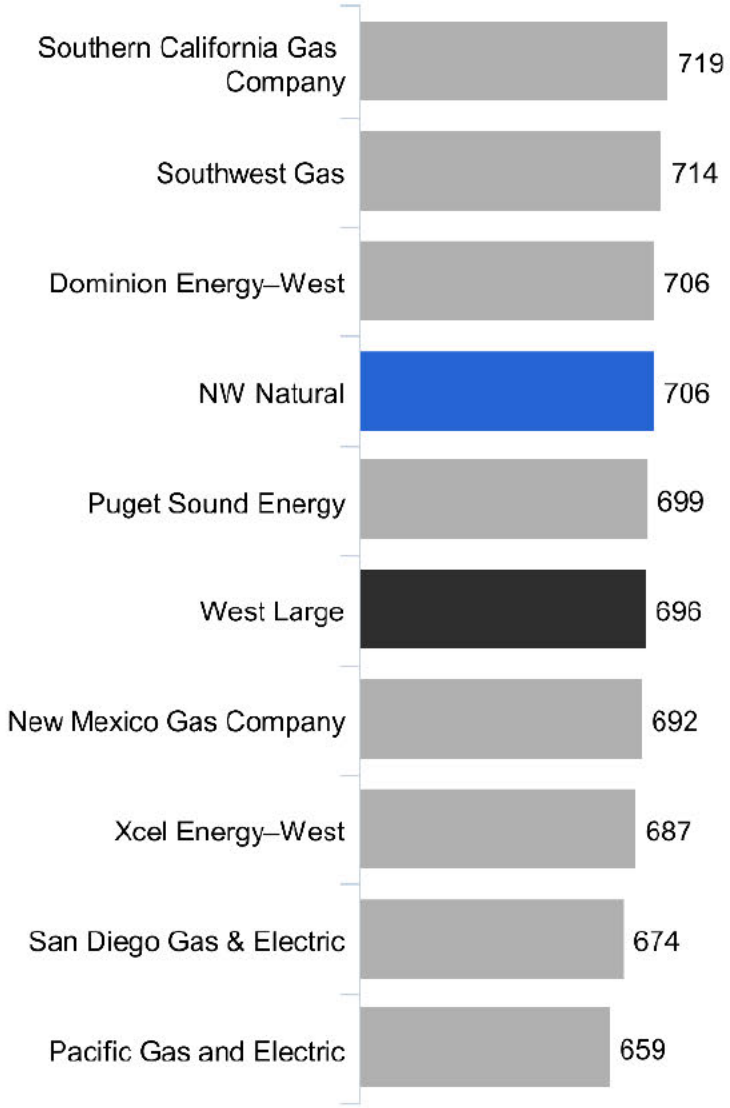


Awareness of utility offerings positively impacts Price satisfaction

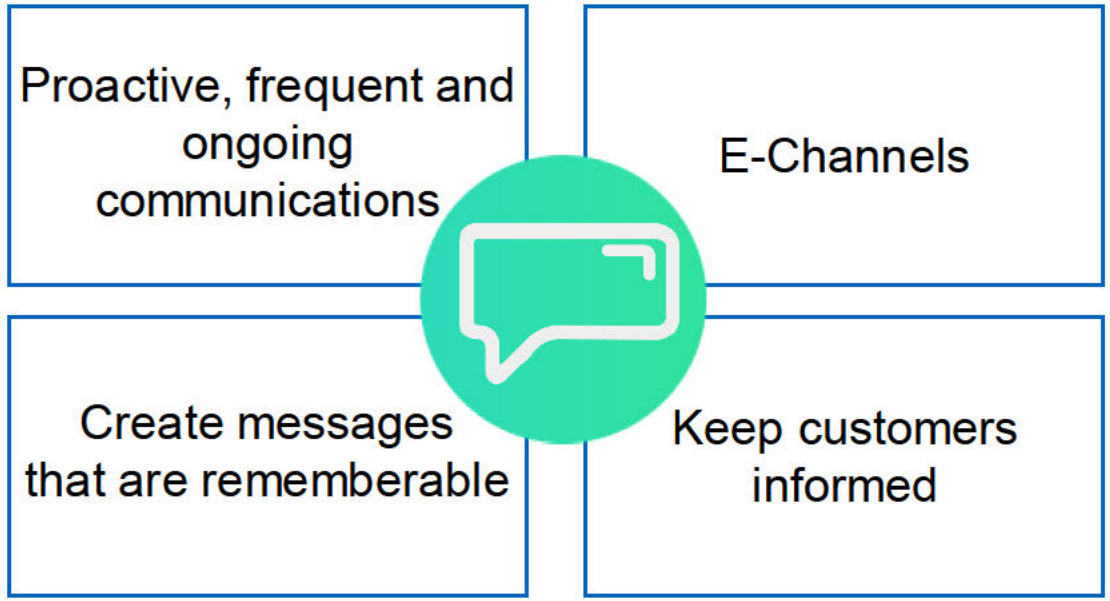


Communications - West Large

Communications



Best Practices

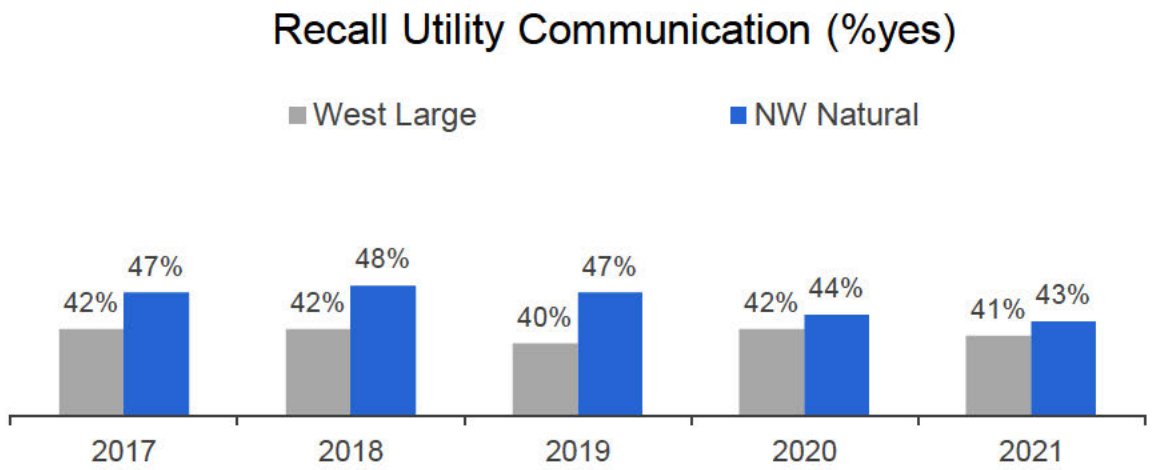


Attributes

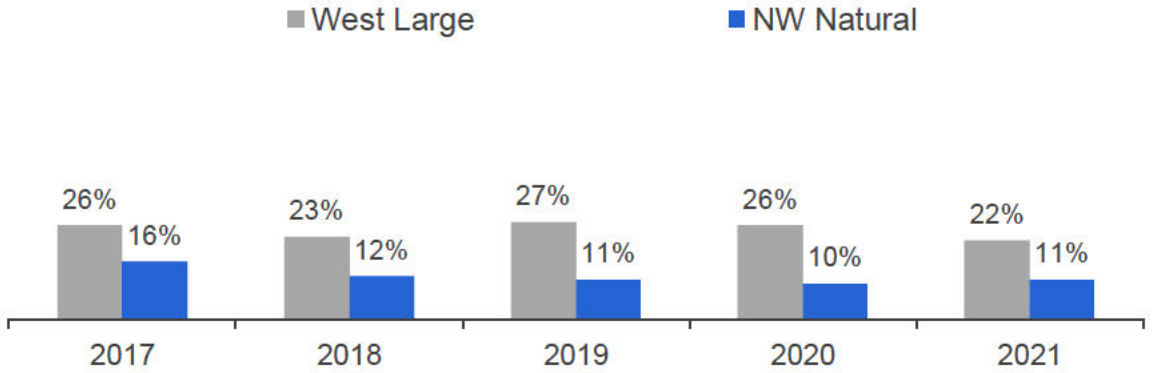
Communications and Media Recall

CUB/118
Jenks/138

Top Utility Communication Topics Recalled - West Large



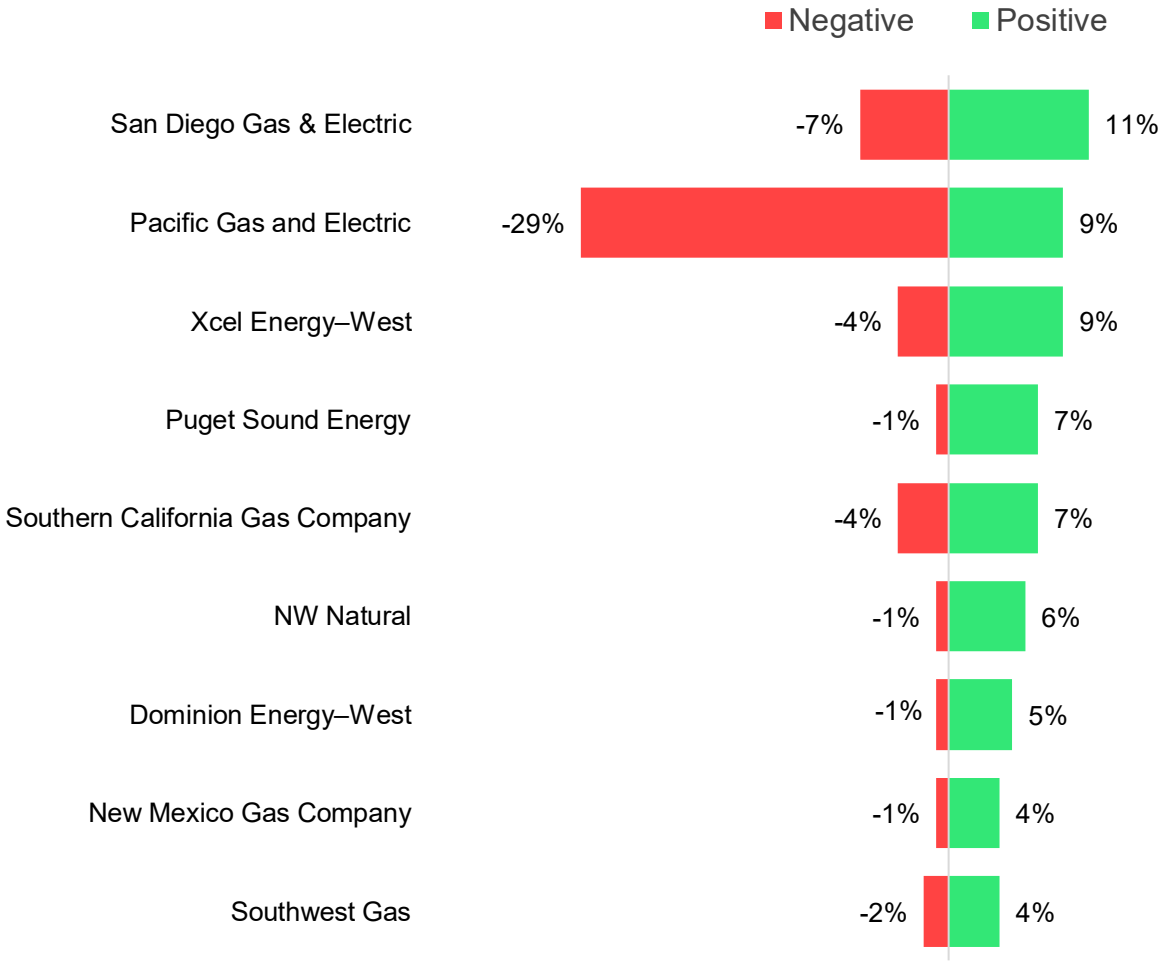
Top Media News Story Topics Recalled - West Large



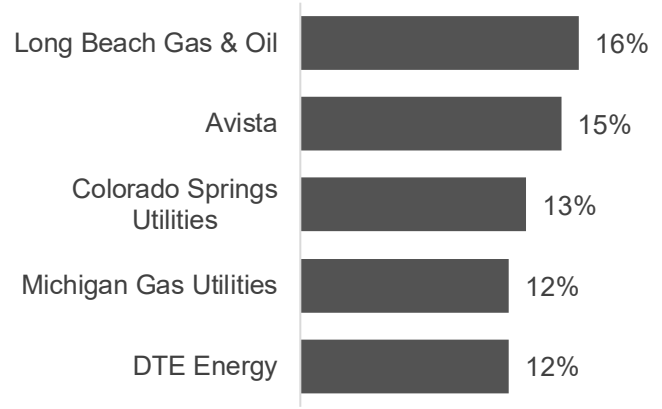
CUB/118
Jenks/139

Impact of Media News Stories – West Large

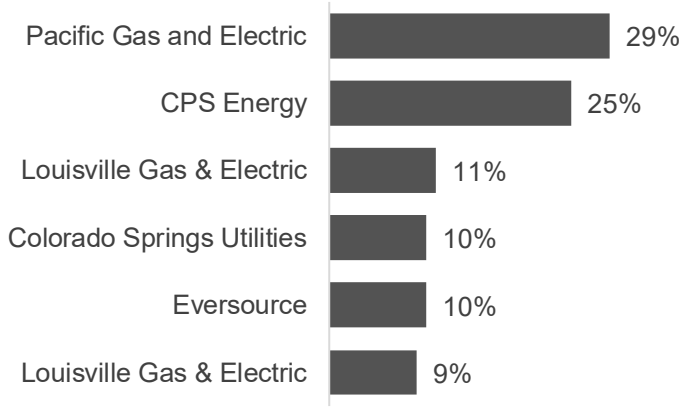
Media recall is infrequent but is often more impactful (pos. or neg.) than hearing news from the utility



Top Positive News Brands

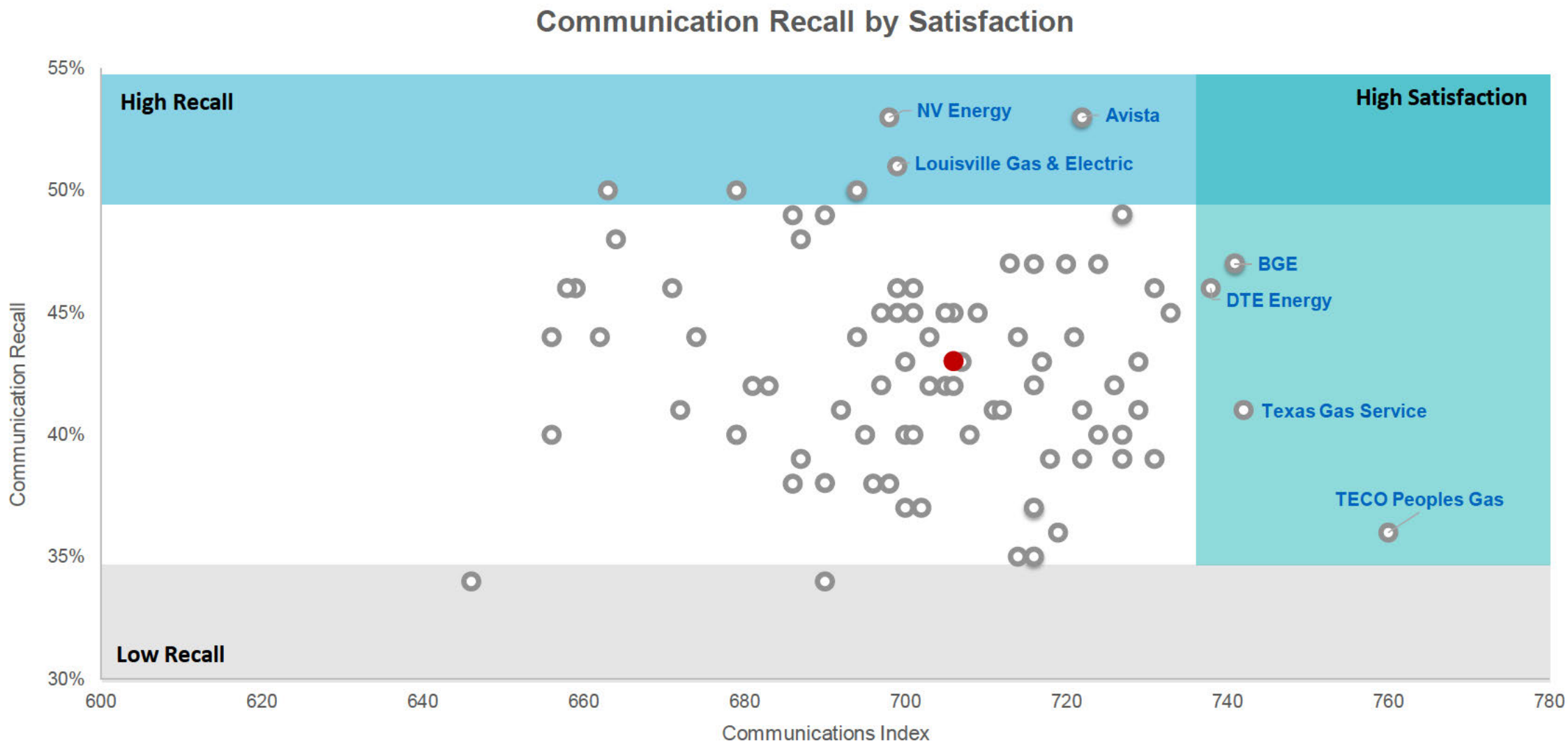


Most Negative News Brands



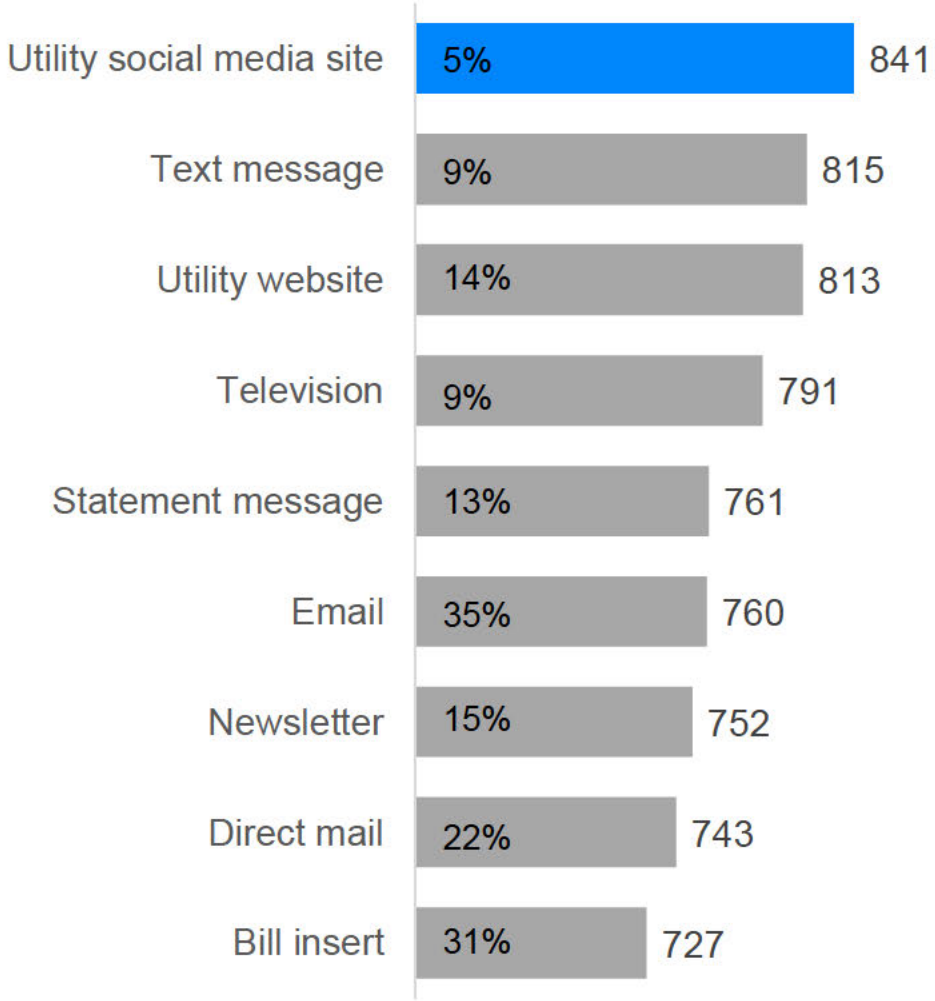
CUB/118
Jenks/140

Satisfaction with Communications



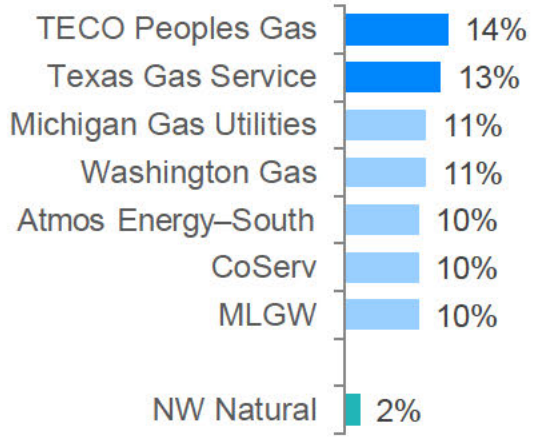
Where Communications Recalled

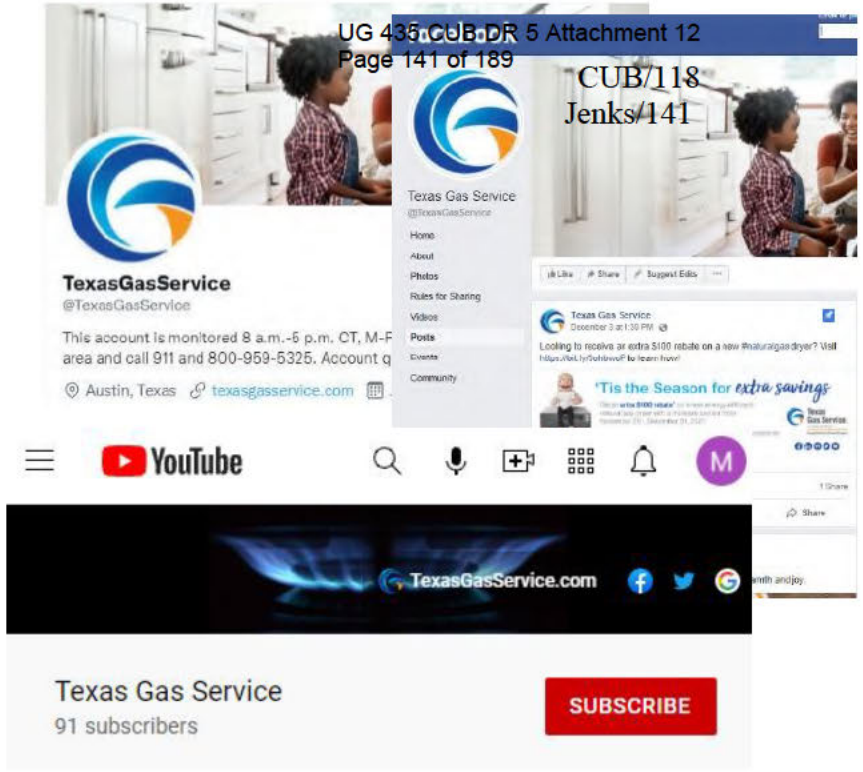
Where noticed utility communications

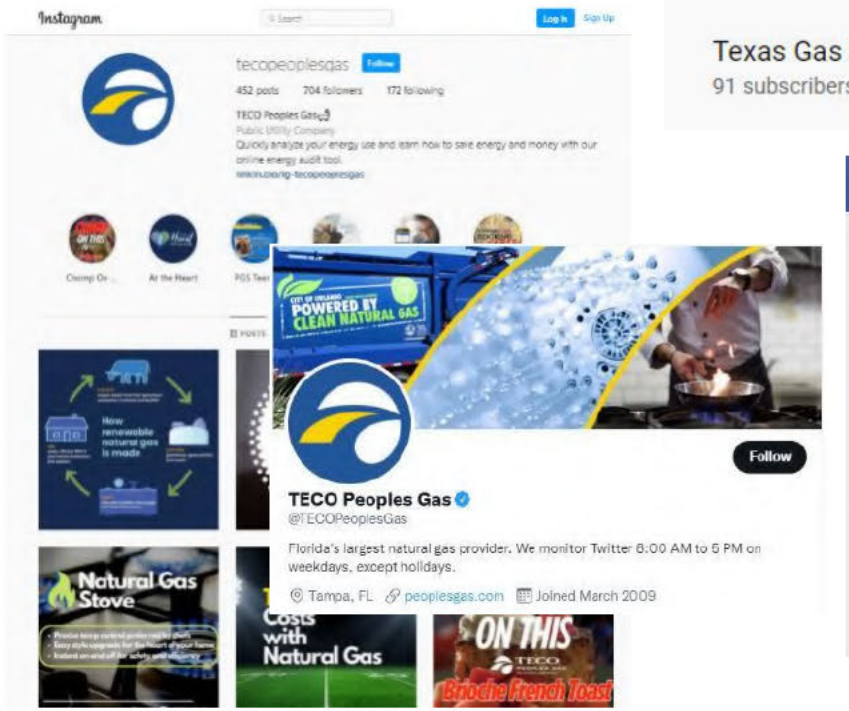


Showing responses with 5% or more recall

Top Brands – Social Media





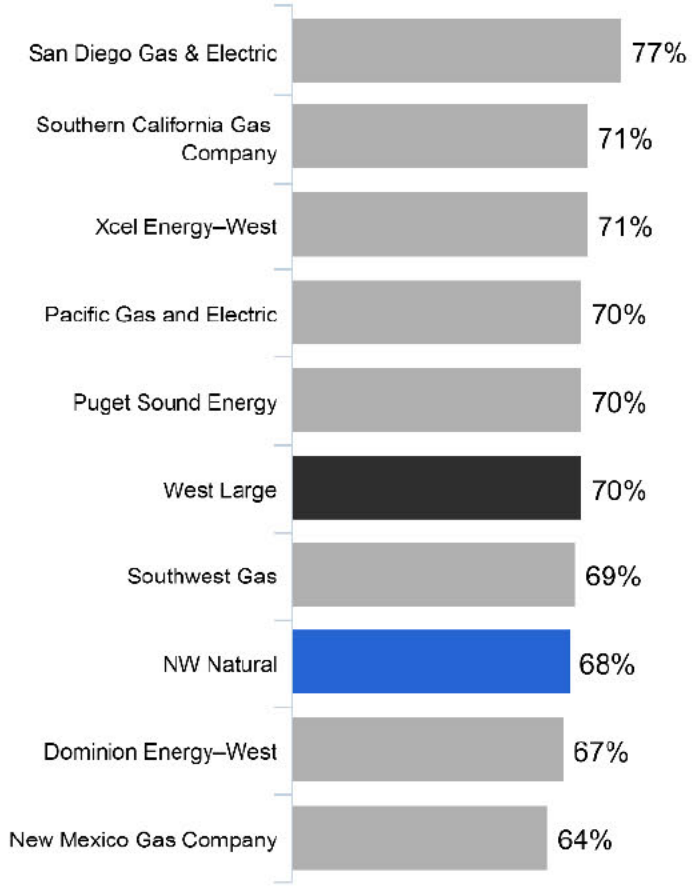


https://www.peoplesgas.com/contact/

CUB/118
Jenks/142

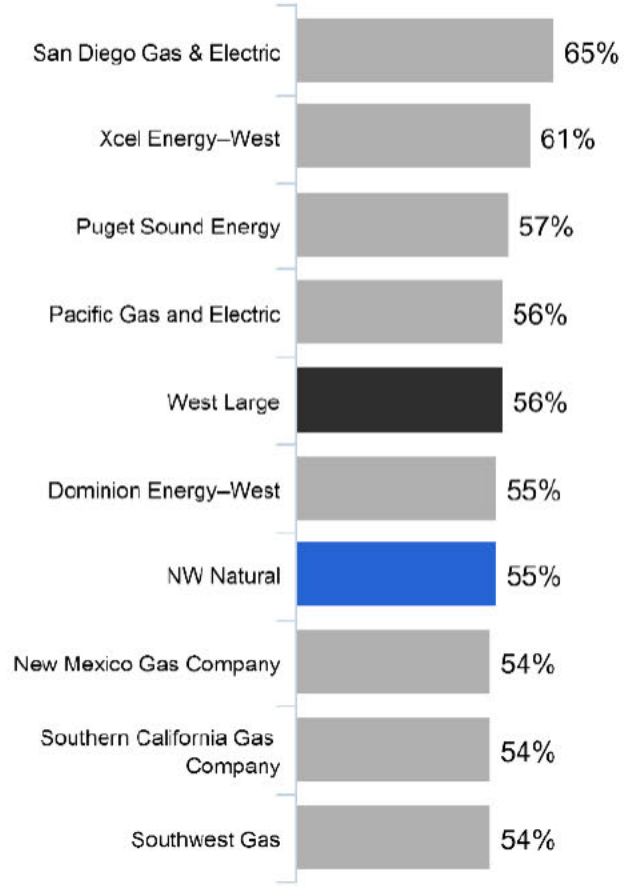
Key Performance Indicators - Communications

Receive Alerts



Industry

Aware of utility preference center

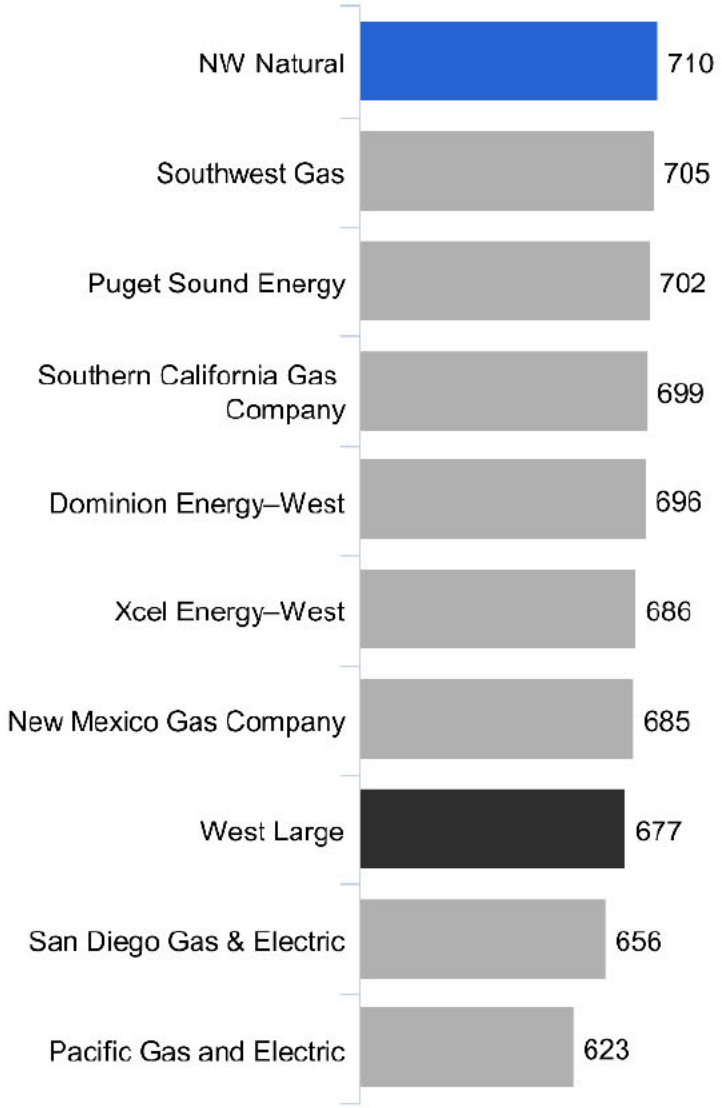


Industry

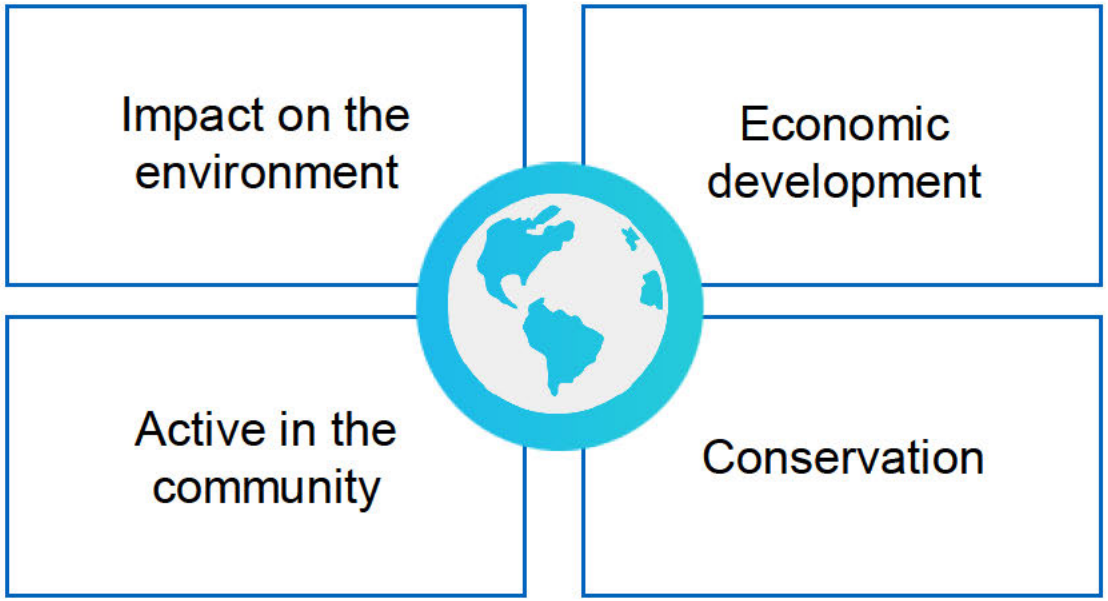
Corporate Citizenship - West Large

CUB/118
Jenks/143

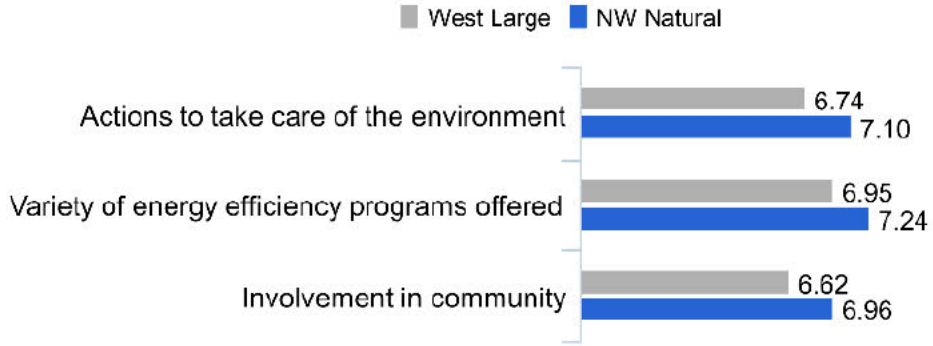
Corporate Citizenship



Best Practices

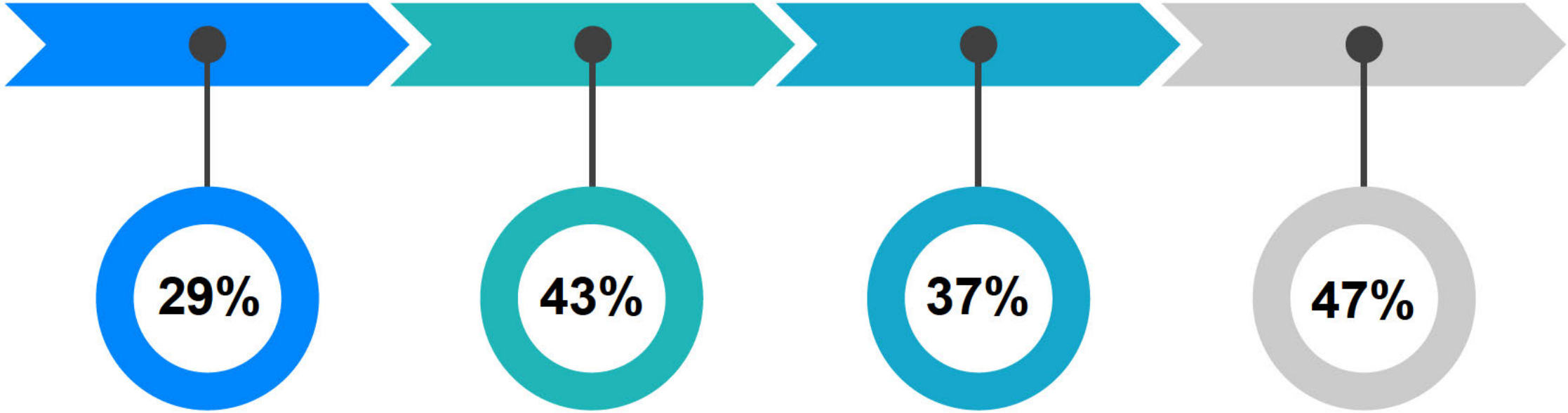


Attributes



Corporate Citizenship KPI's

Diagnostics driving overall customer satisfaction

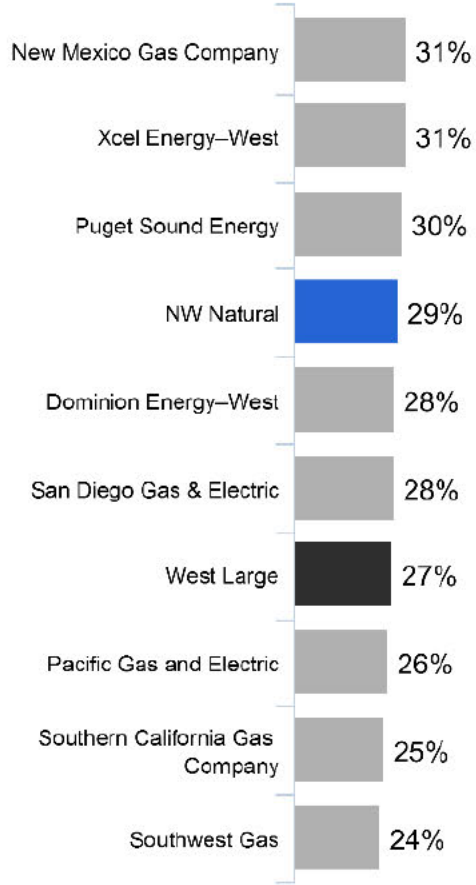


Economic development of local community	Increase safety of gas system	Improve impact on the environment	Aware of EE/ Conservation Programs
+31	+27	+26	+18

Corporate Citizenship Performance - West Large

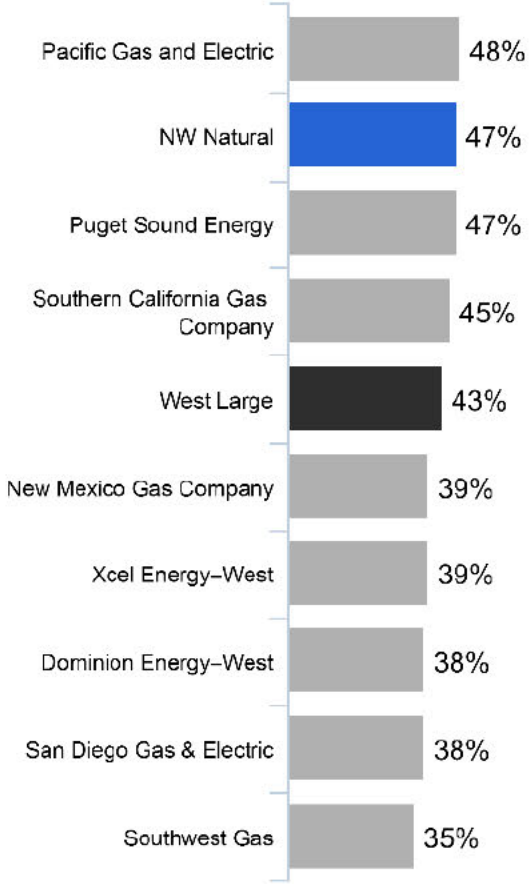
CUB/118
Jenks/145

Supports economic development



Industry

Increase general safety of gas system

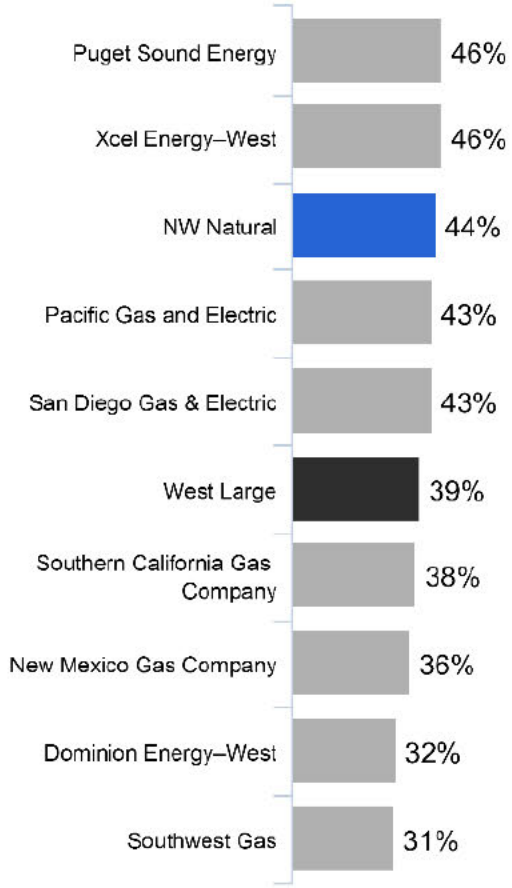


Industry

Corporate Citizenship Performance - West Large

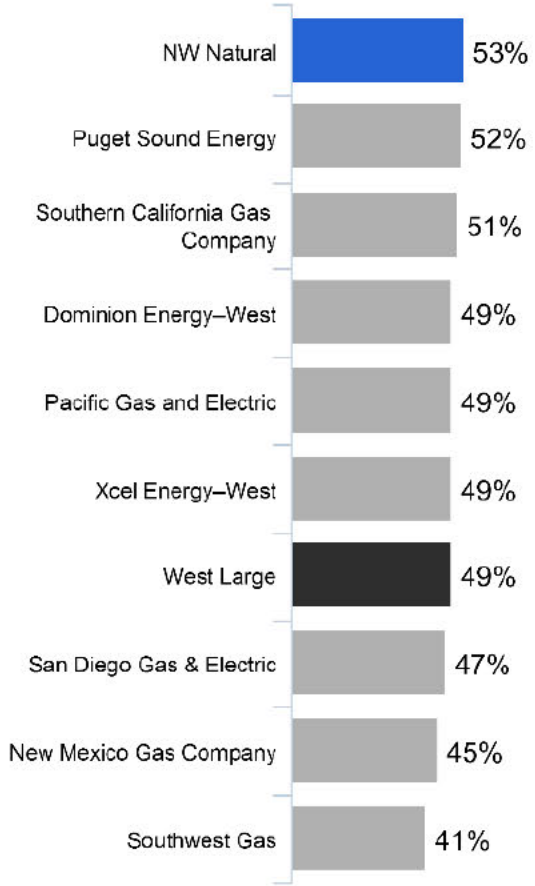
CUB/118
Jenks/146

Improve impact on environment



Industry

Energy efficiency or conservation programs

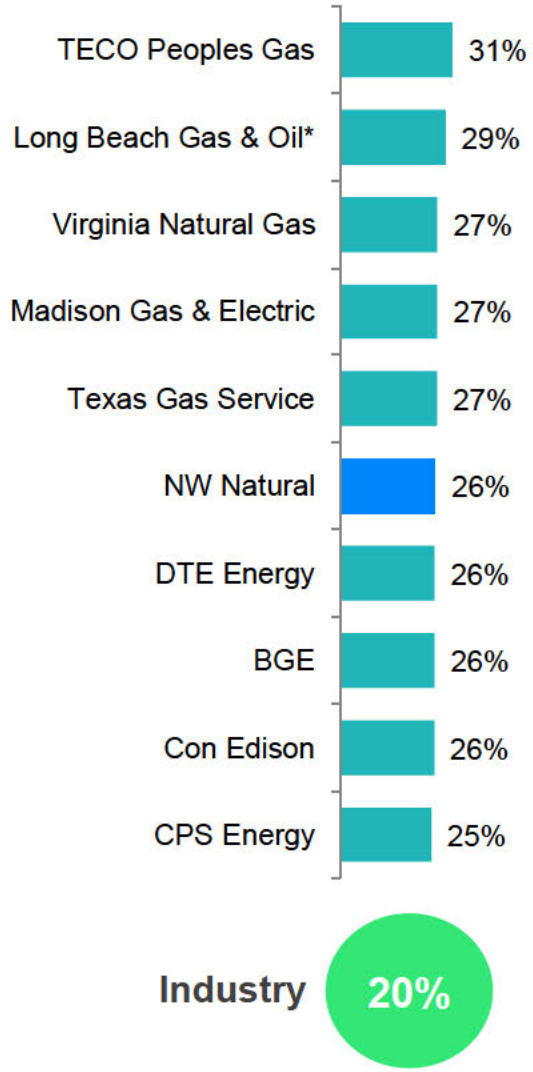


Industry

Corporate Citizenship Best Practices

What does your utility's energy future look like…?

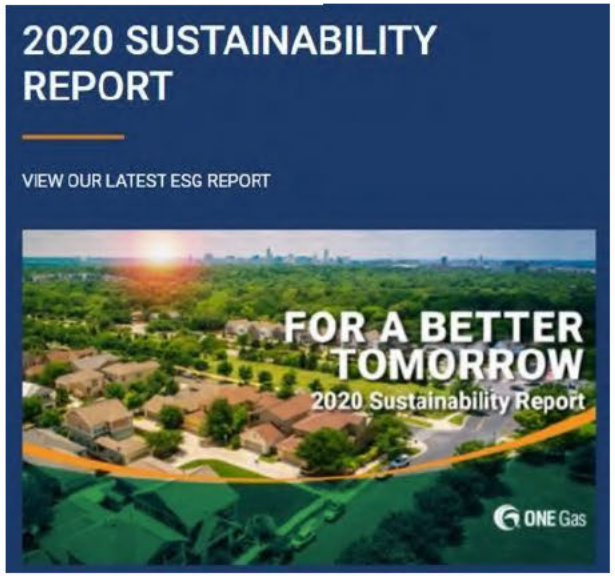
% Aware of utility efforts to use renewable natural gas

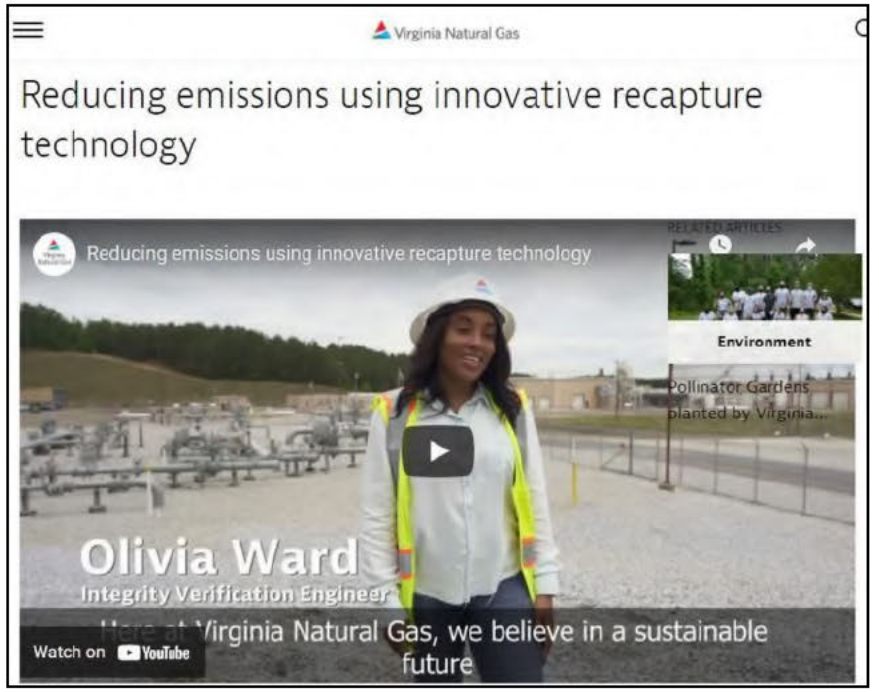


Virginia Natural Gas raises the bar on lowering emissions, signs deal for next generation natural gas

VIRGINIA BEACH, Va. – Oct. 24, 2019 – Virginia Natural Gas (VNG) announced today that it aims to be the first natural gas utility in America to provide its customers with natural gas that is 100% sourced, transported and distributed by companies that have pledged to reduce greenhouse gas emissions to less than 1% across the natural gas value chain. And as a down payment on that pledge, it announced a deal to source a large percentage of its annual gas consumption from such companies starting this year.

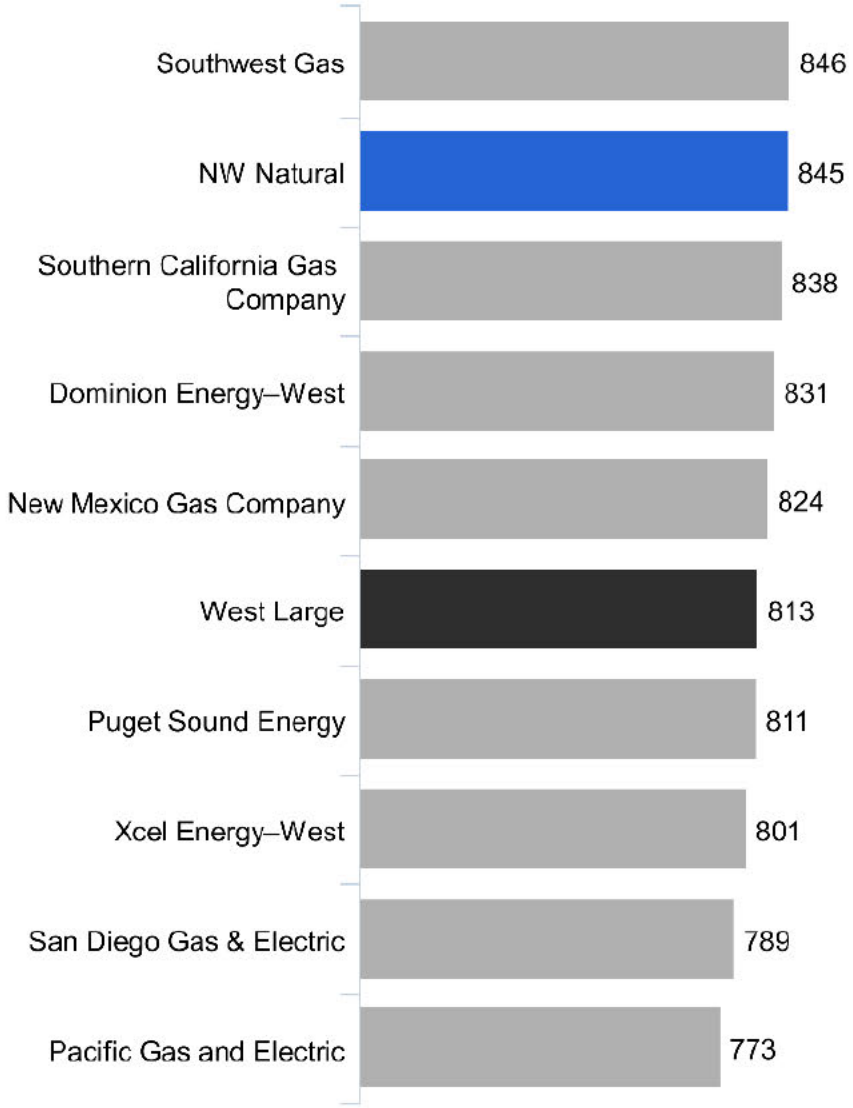
Texas Gas Service.





Customer Care - West Large

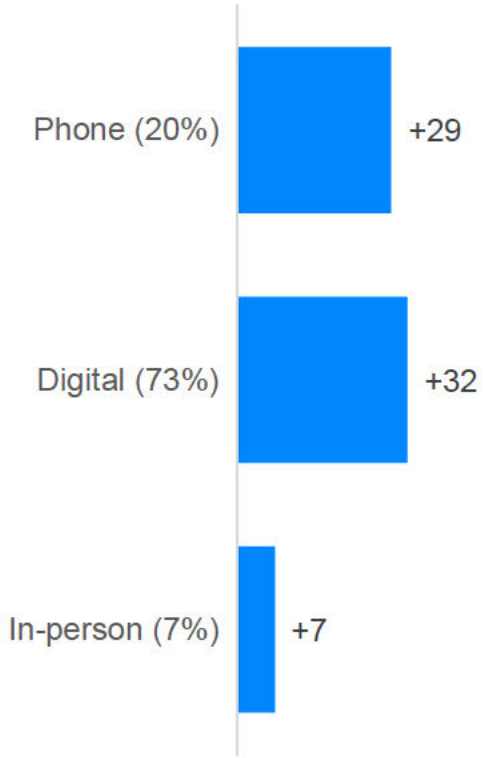
Customer Care



Best Practices

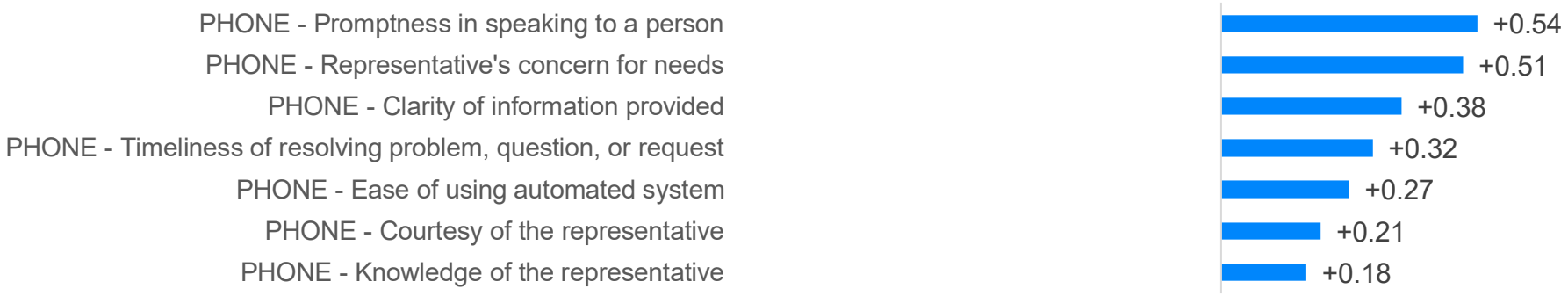
- Easy and informative online experience
- Comprehensive support for mobile devices
- Friendly and knowledgeable agents
- High first contact resolution

Factor Gap to West Large by Type of Contact

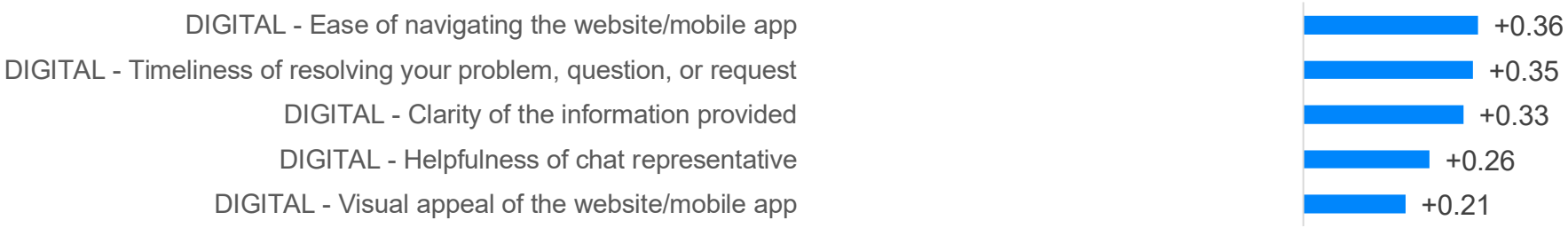


Customer Contact Attribute Gap to West Large

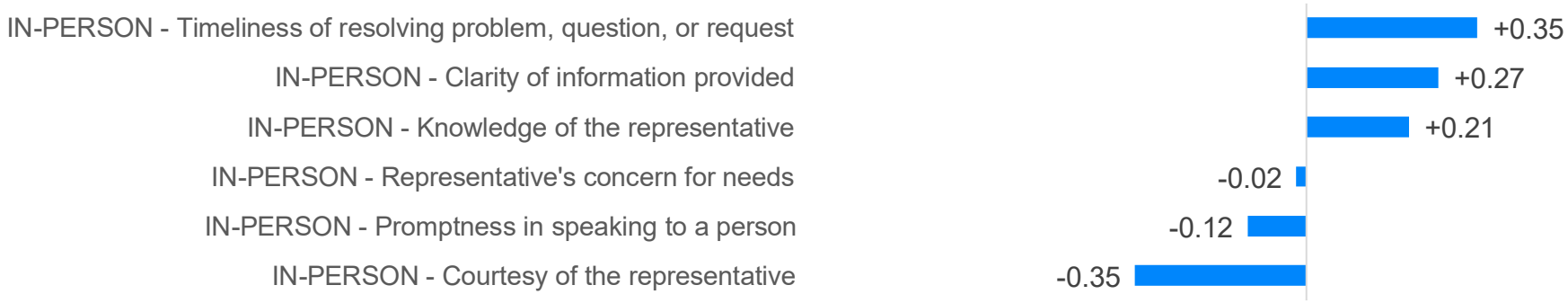
Phone



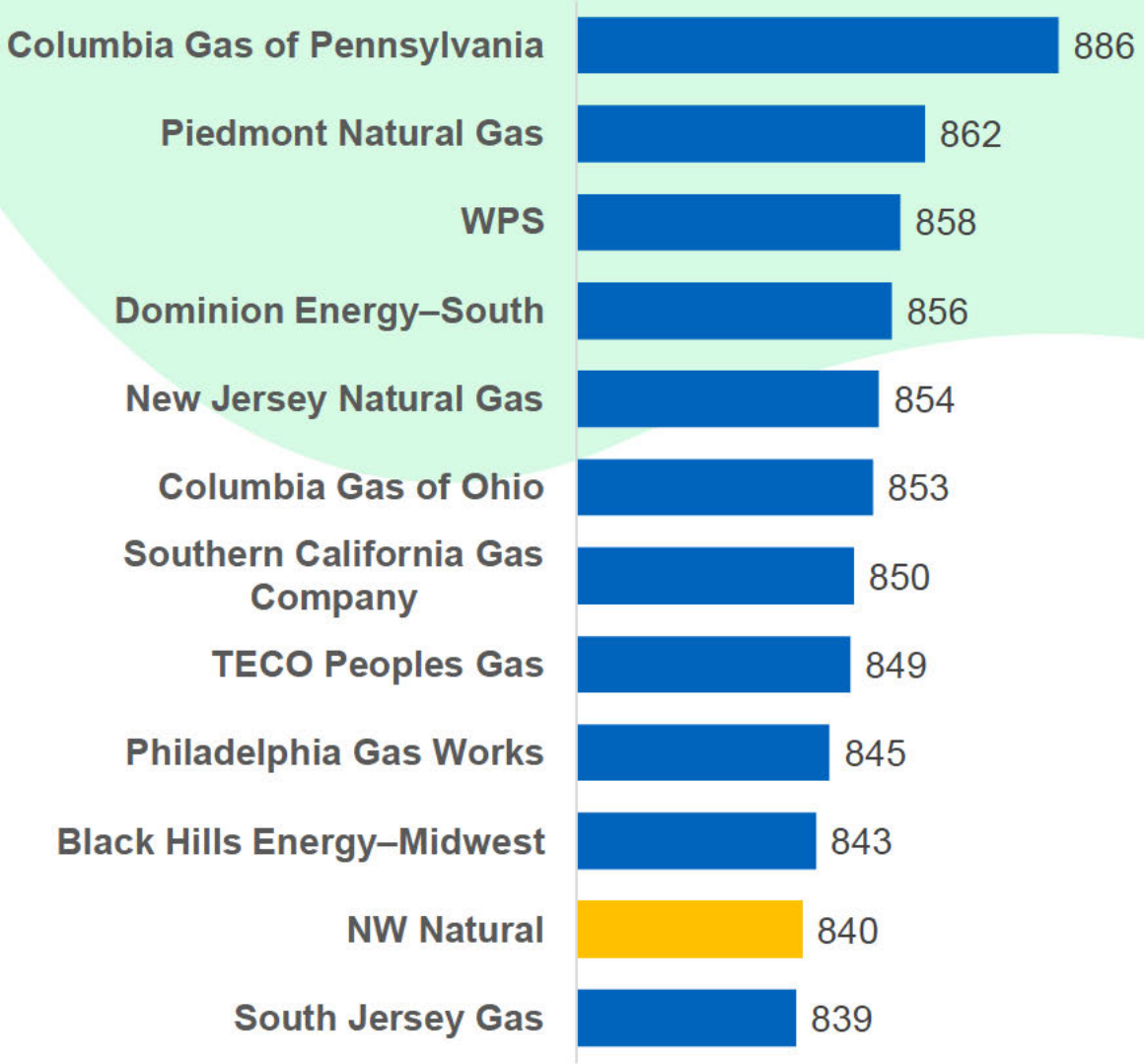
Digital



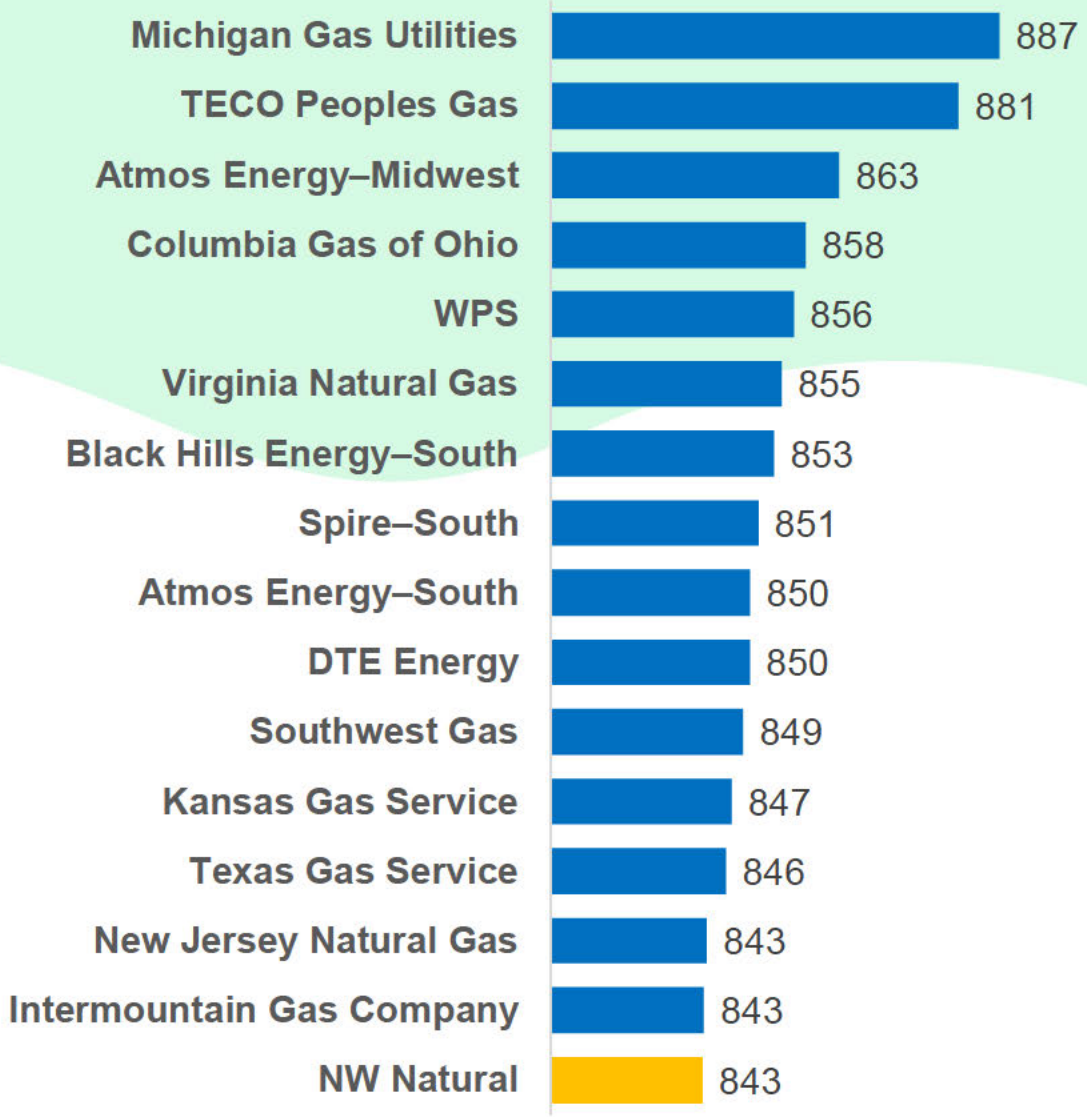
In-person



Brands with the Highest Phone Satisfaction



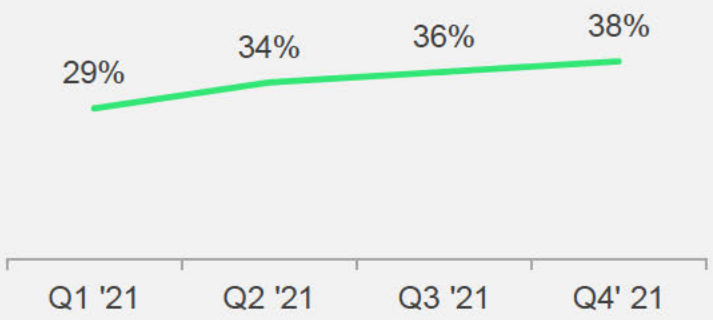
Brands with the Highest Online Satisfaction



50+ Responses

Digital Engagement

Digital Contact with Utility - Industry (past 3 months)

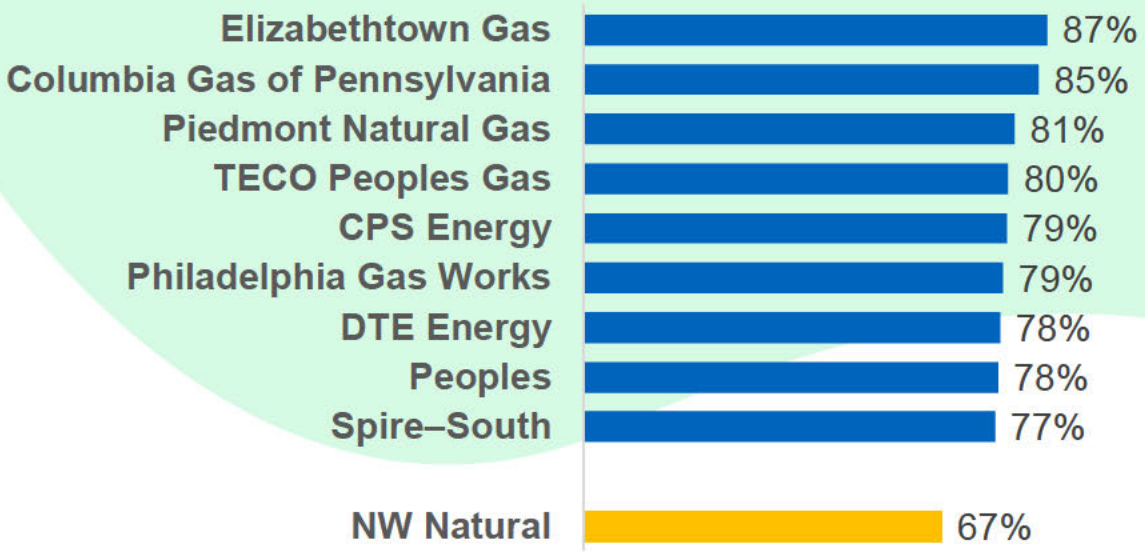


	Digitally Disengaged customers who didn't use the website or mobile app	Digital Participant customers who used the website but not the mobile app	Digitally Active customers who used the website and mobile app
% of customers:	66%	26%	8%
Overall Satisfaction:	746	772	825
Receive alerts:	60%	87%	94%
Aware conservation programs:	42%	52%	65%
Participate in Products/Services:	71%	82%	88%
Gen Y and Z:	22%	35%	61%
Gen X:	16%	19%	17%
Boomers:	49%	39%	19%
Pre-Boomers:	10%	5%	1%

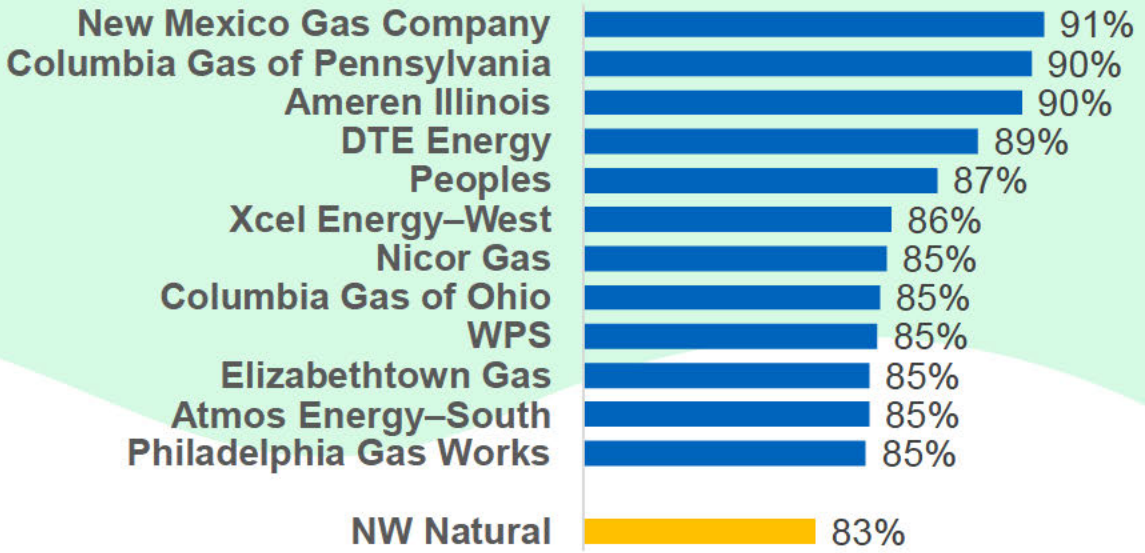
Low → Digital Engagement → **High**

Note: Digital includes website and mobile app contacts.

Brands with the Highest % Addressed by Name



Brands with the Highest % Thanked for Being a Customer



50+ Responses

Customer service is outstanding. They are eager to help.

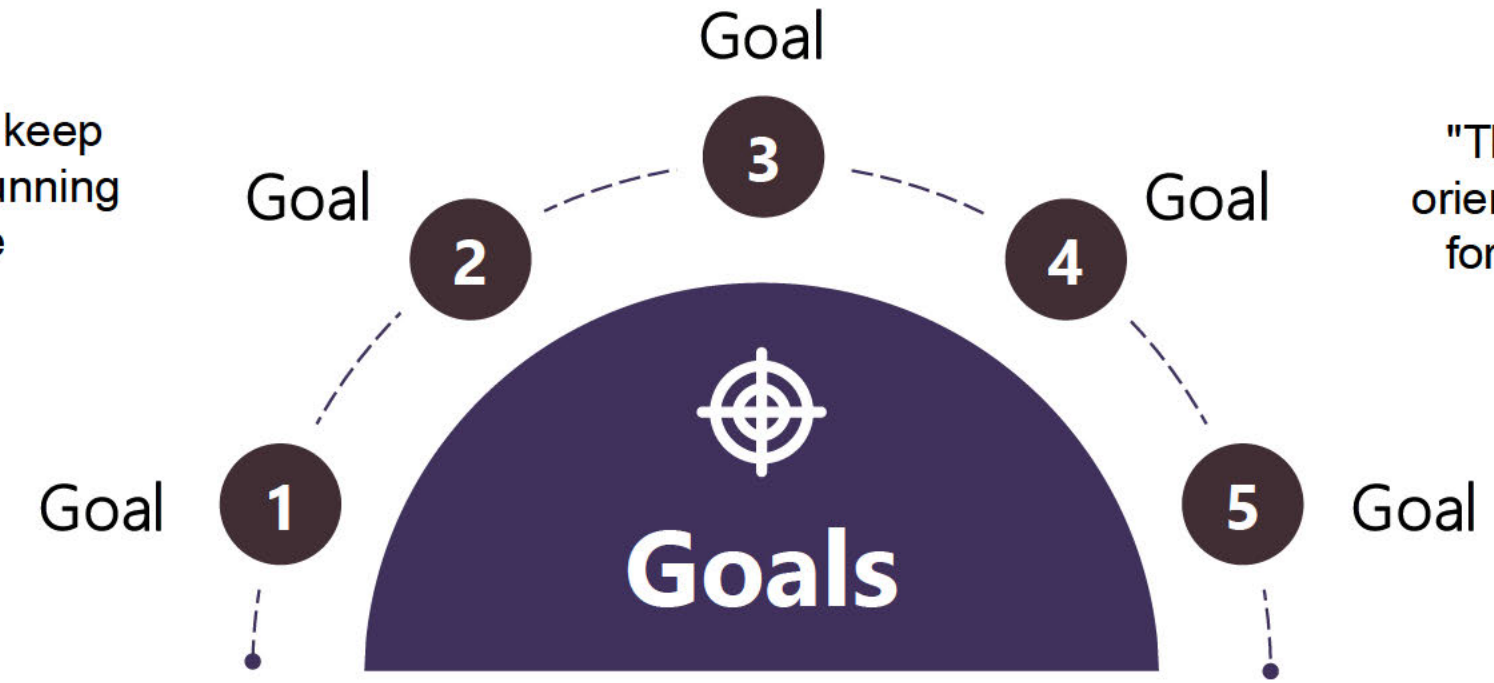
"They have excellent customer service representatives who are knowledgeable and willing to help however possible. They are quick in repairing any problems that may arise. They are overall a reliable company."

"Service is always consistent. When I've had financial issues in the past, they've always been helpful in setting up payment plans. Customer service is always helpful & friendly."

"If you ever call in an emergency they are there within a half hour. Customer Service is very excellent when you call."

What 3-5 Initiatives will NW Natural Roll Out in 2022 to Improve Customer Experience?

"They work hard to keep everything up and running and safe in the community."

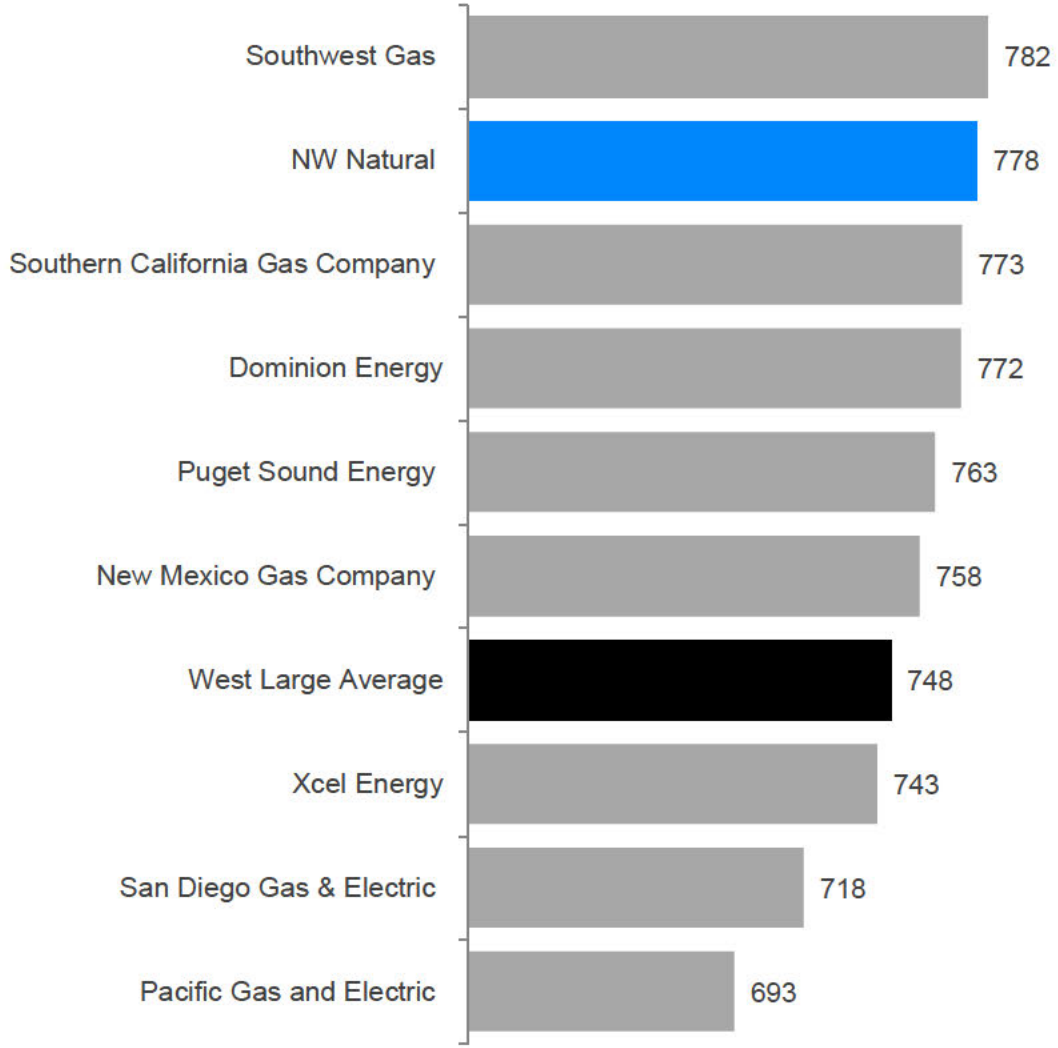


"They are very customer oriented and always looking for ways to improve their service."

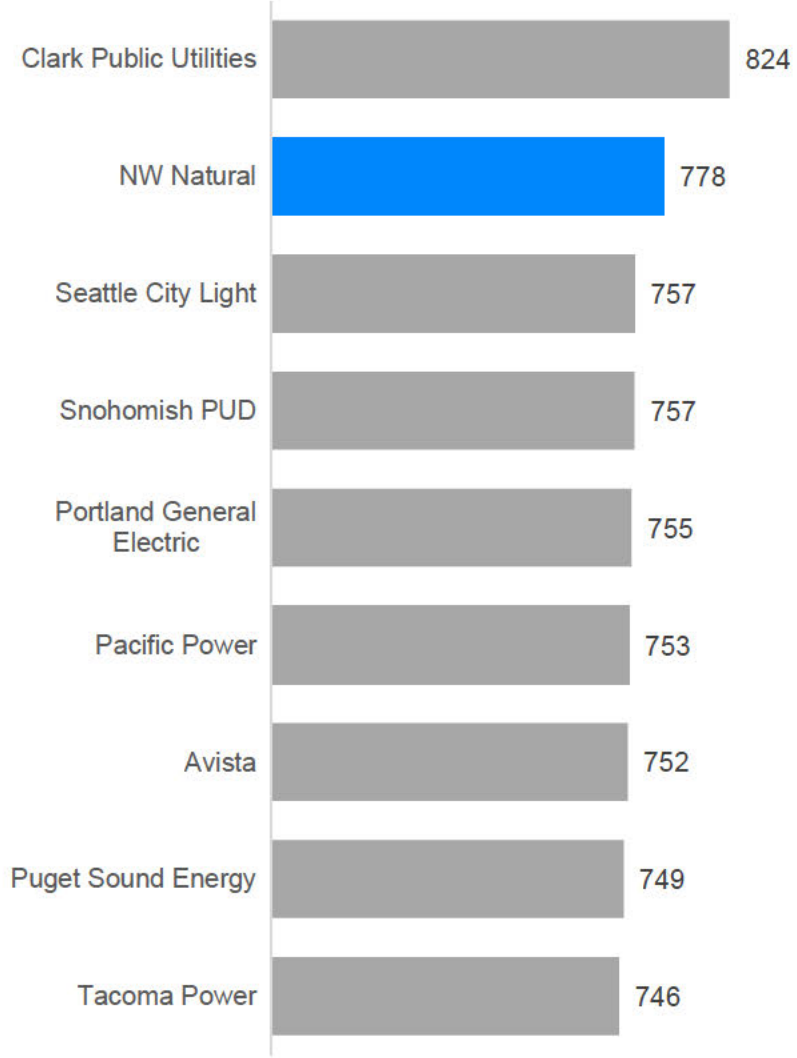
2021 Brand Satisfaction – NW Natural vs Electric Brands

CUB/118
Jenks/154

2021 Gas Residential West Large

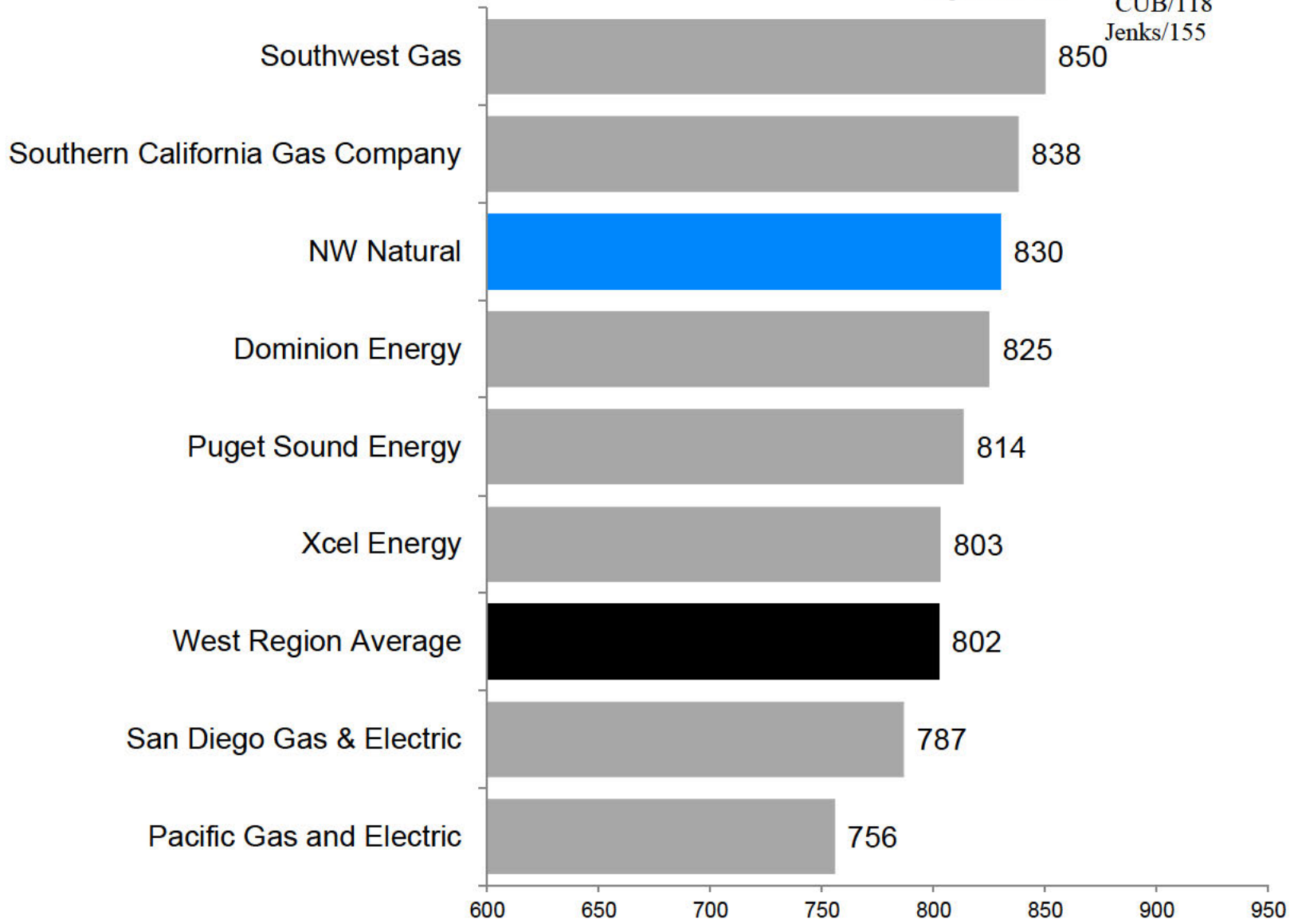


2021 Electric Residential Comparison



2021 Overall CSI Gas Business Performance

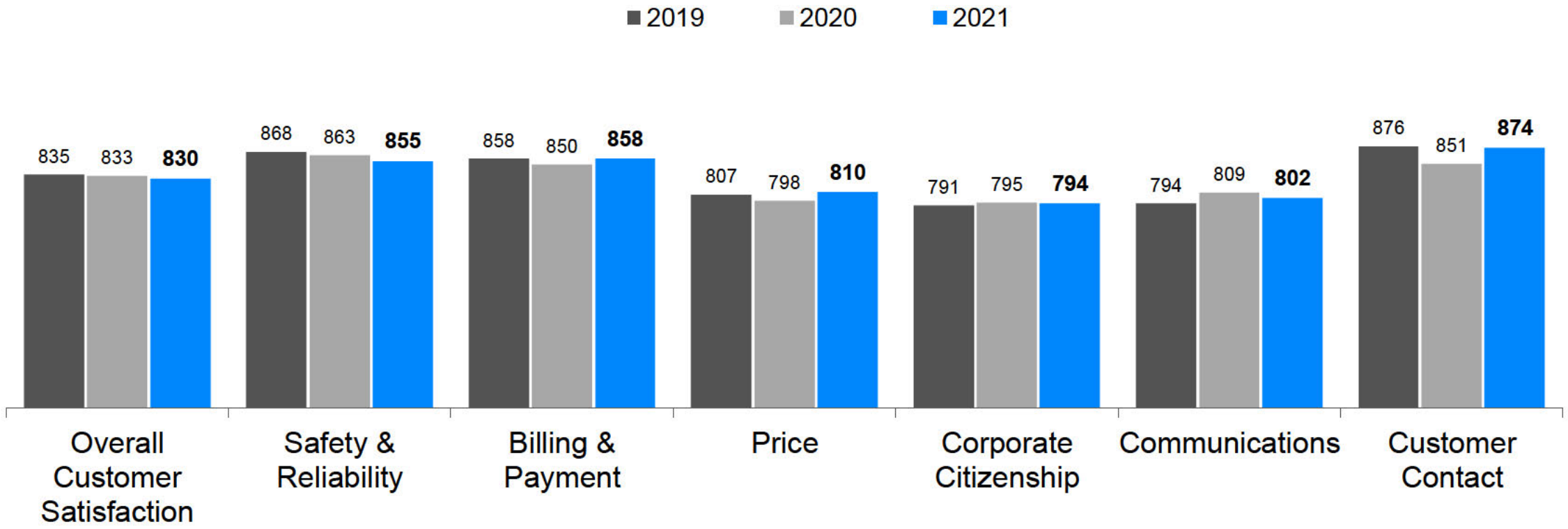
West Region



Note: Only showing ranked brands

Satisfaction Trend – Gas Business

CUB/118
Jenks/156



J.D. POWER

Thank You!

KPI Simulator

2021 Gas Residential Customer Satisfaction Study Simulator

	Index	Billing	Price	Corp	Communications	Safety	CustServ
Baseline	778	825	726	710	706	825	845
Benchmark Brand	14	12	18	14	18	11	10
	792	837	744	723	724	836	855

W - NW Natural (L) | Reset | Best West Large by Diagnostic

Diagnostics	Baseline	Target	Benchmark	Index	Billing	Price	Corp	Communications	Safety	CustServ
Utility very helpful in preparing for safety issue	26%	26%	26%	0	0	0	0	0	0	0
Utility helped to lower bill	28%	39%	39%	7	5	11	7	9	5	5
Not aware of a rate increase	85%	86%	86%	0	0	1	0	0	0	0
Aware utility supports economic development of local community	29%	31%	31%	1	0	1	1	1	0	0
It required little effort to resolve my recent issue	51%	51%	51%	0	0	0	0	0	0	0
Awareness of utility efforts to increase general safety of gas system	47%	48%	48%	0	0	0	0	0	0	0
Aware of utility efforts to improve impact on environment	44%	46%	46%	1	0	1	1	1	0	0
Better E-bill design compared to others	16%	22%	22%	2	2	2	2	2	1	2
Aware of energy efficiency/conservation programs	53%	53%	53%	0	0	0	0	0	0	0
Receive alerts	68%	77%	77%	2	2	1	2	3	1	1
Aware of utility preference center	55%	65%	65%	2	2	2	1	2	2	1

2021 Gas Residential Customer Satisfaction Study Simulator

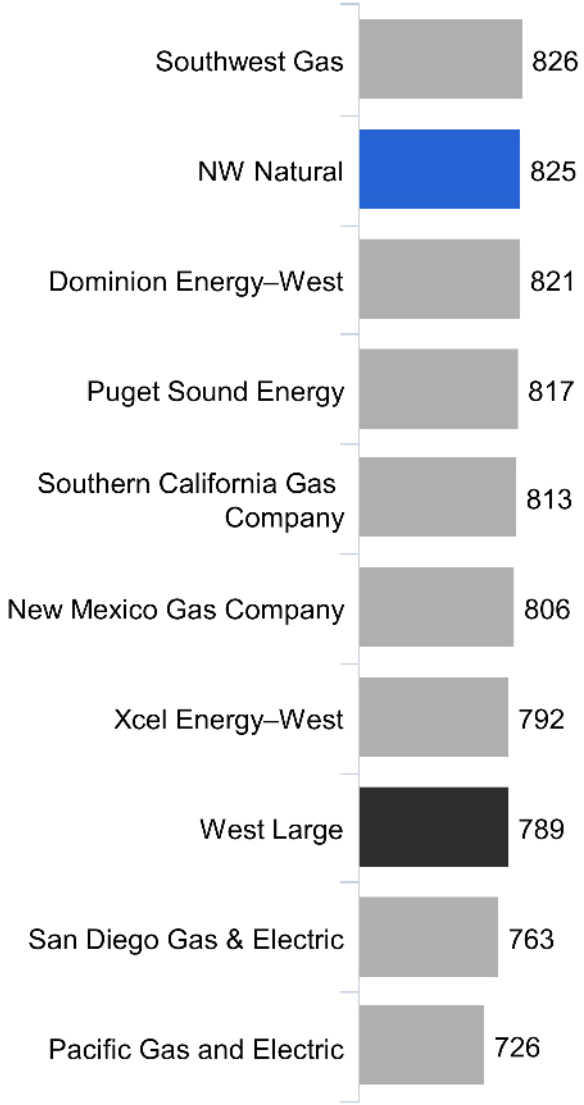
	Index	Billing	Price	Corp	Communications	Safety	CustServ
Baseline	778	825	726	710	706	825	845
Benchmark Brand	3	2	4	2	3	2	2
	781	827	730	712	710	827	847

W - NW Natural (L) | Reset | West Large

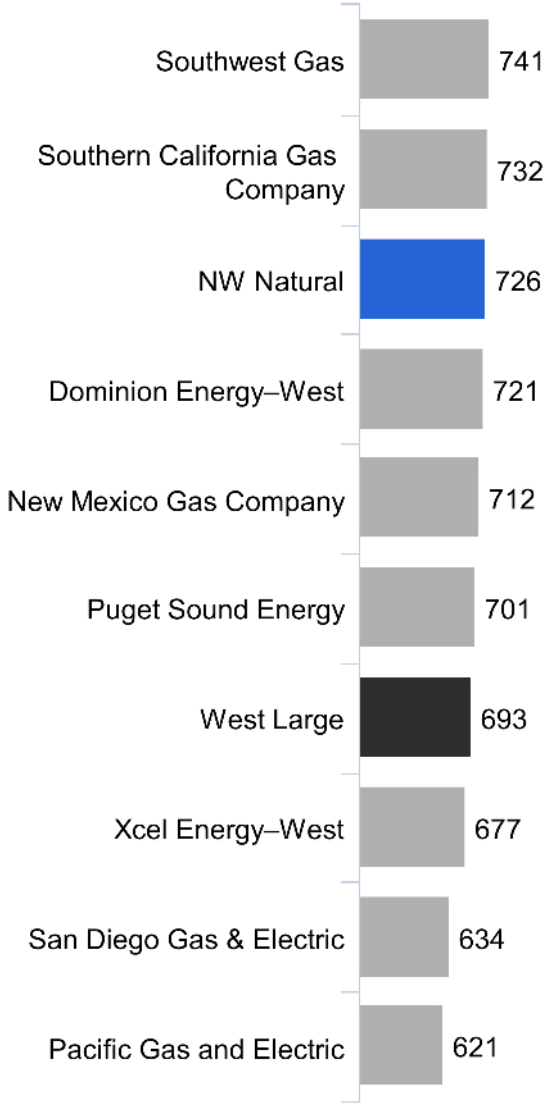
Diagnostics	Baseline	Target	Benchmark	Index	Billing	Price	Corp	Communications	Safety	CustServ
Utility very helpful in preparing for safety issue	26%	26%	22%	0	0	0	0	0	0	0
Utility helped to lower bill	28%	32%	32%	3	2	4	2	3	2	2
Not aware of a rate increase	85%	85%	74%	0	0	0	0	0	0	0
Aware utility supports economic development of local community	29%	29%	27%	0	0	0	0	0	0	0
It required little effort to resolve my recent issue	51%	51%	42%	0	0	0	0	0	0	0
Awareness of utility efforts to increase general safety of gas system	47%	47%	43%	0	0	0	0	0	0	0
Aware of utility efforts to improve impact on environment	44%	44%	39%	0	0	0	0	0	0	0
Better E-bill design compared to others	16%	16%	18%	0	0	0	0	0	0	0
Aware of energy efficiency/conservation programs	53%	53%	49%	0	0	0	0	0	0	0
Receive alerts	68%	68%	70%	0	0	0	0	0	0	0
Aware of utility preference center	55%	55%	56%	0	0	0	0	0	0	0

Factor Satisfaction

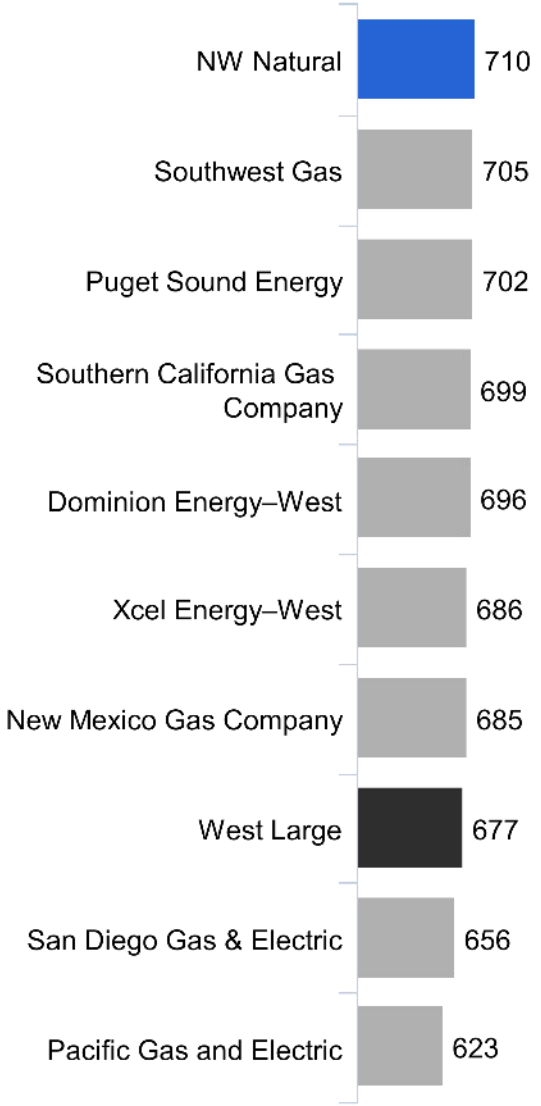
Safety & Reliability



Price



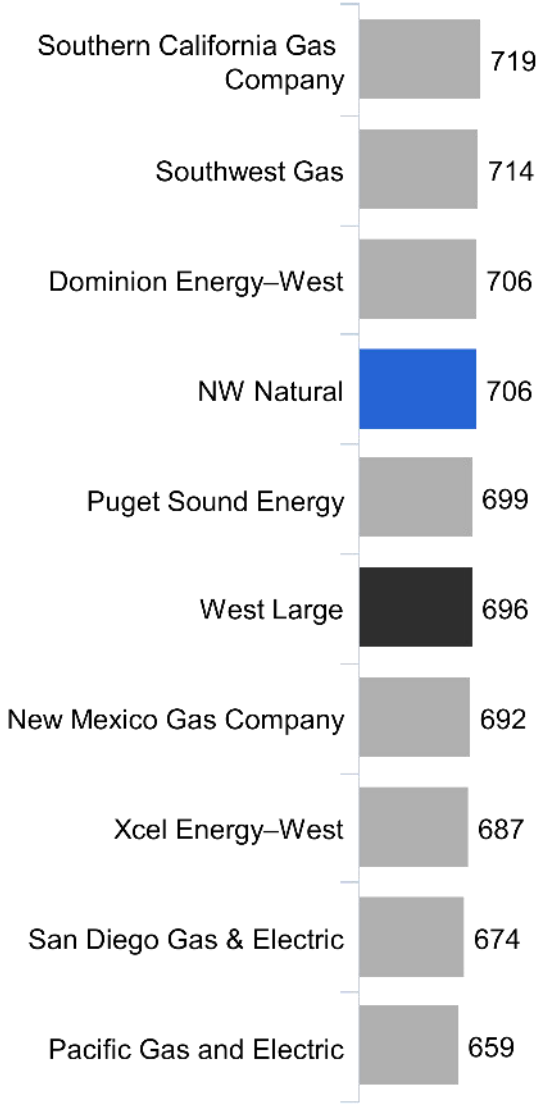
Corporate Citizenship



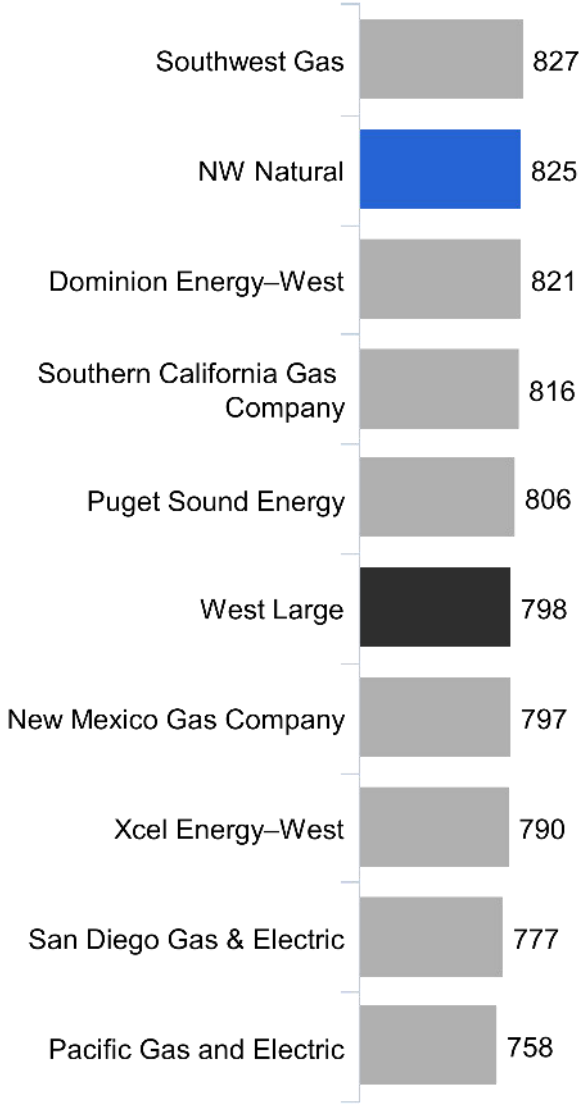
Factor Satisfaction

CUB/118
Jenks/160

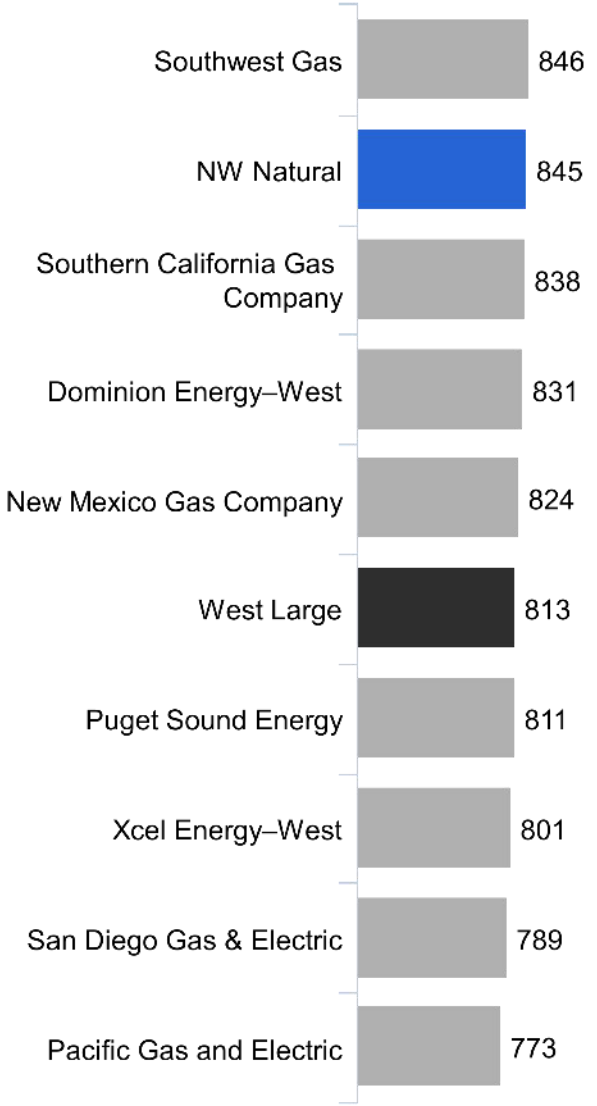
Communication



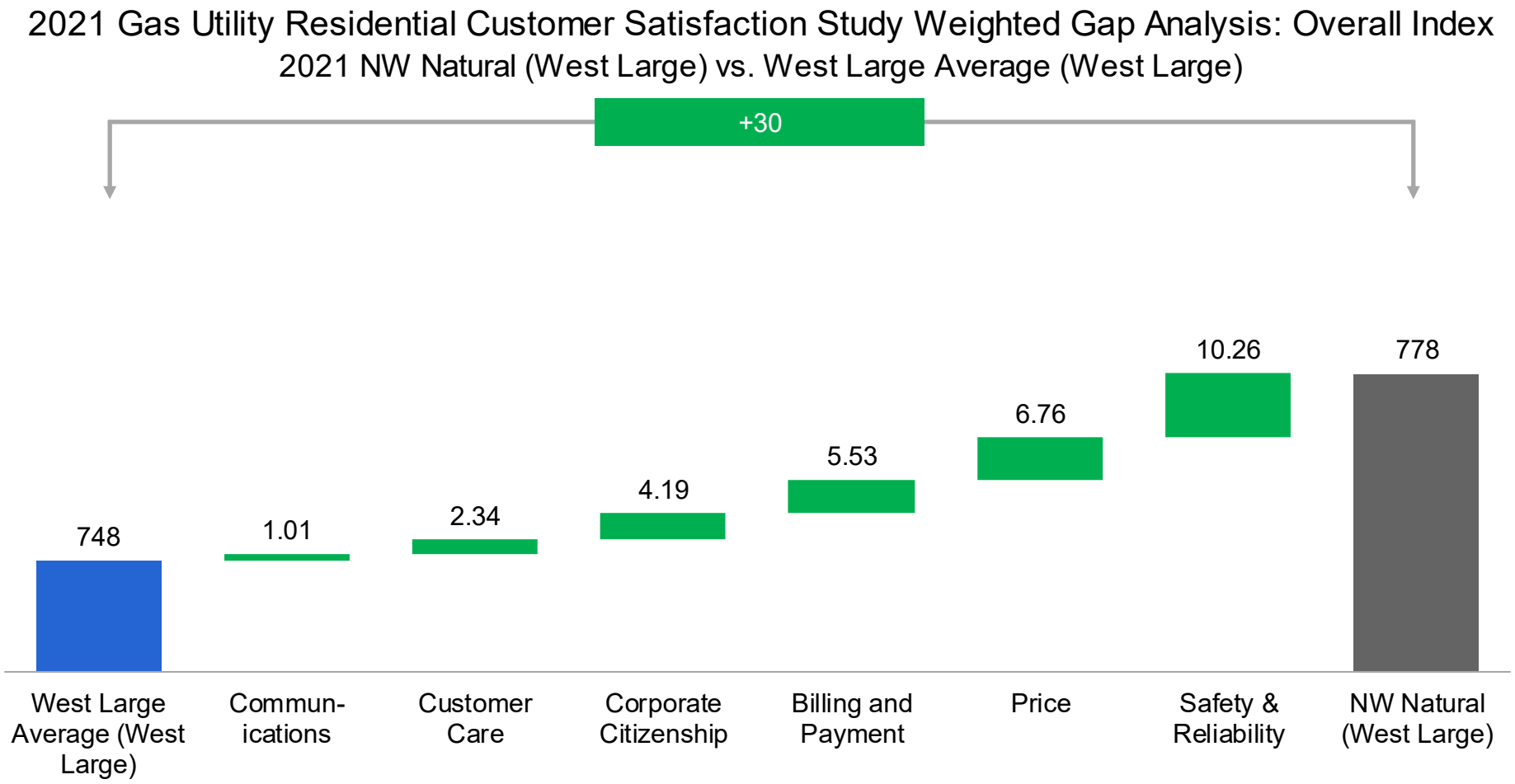
Billing & Payment



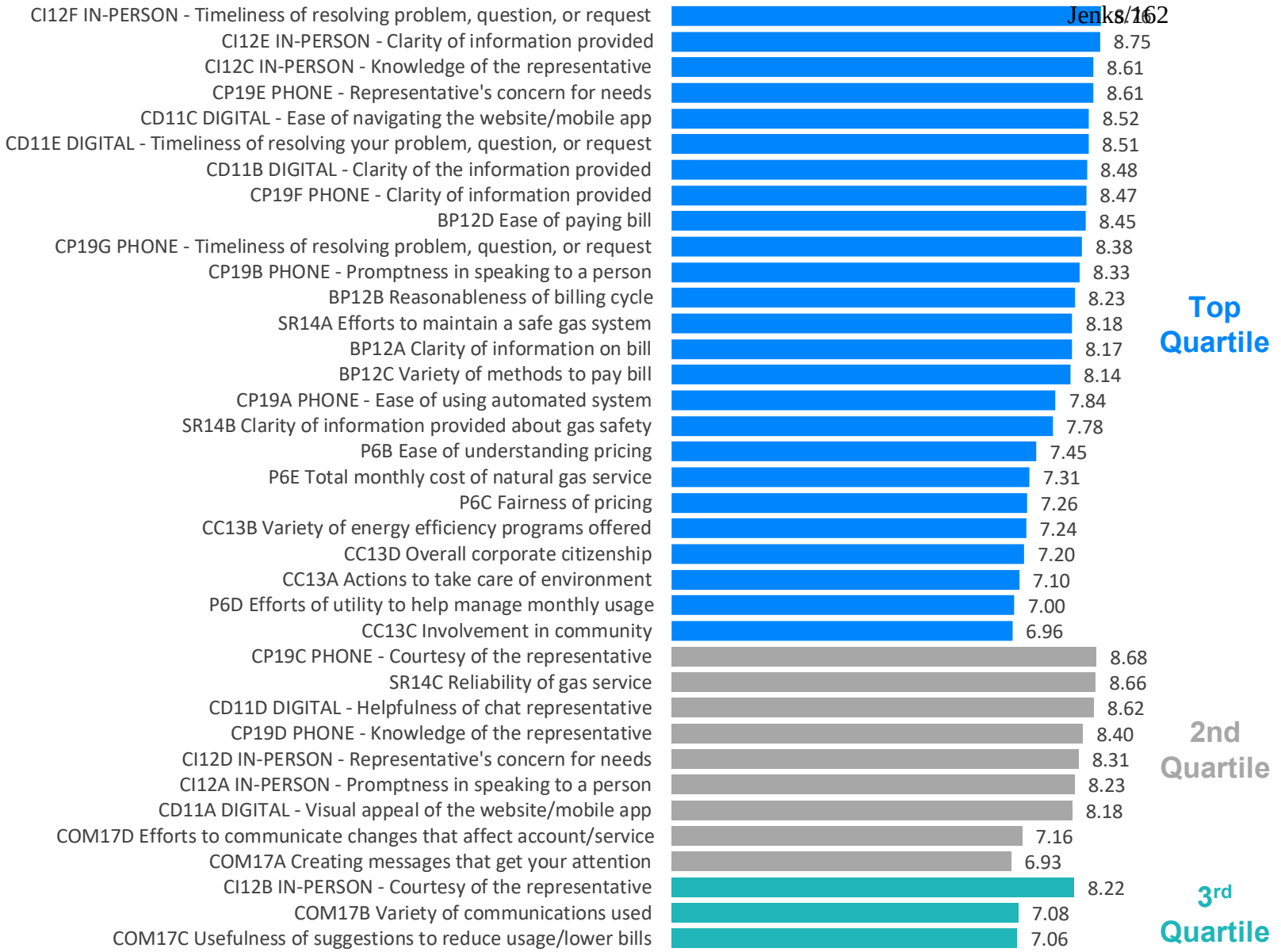
Customer Care



Weighted Gap vs. NW Natural

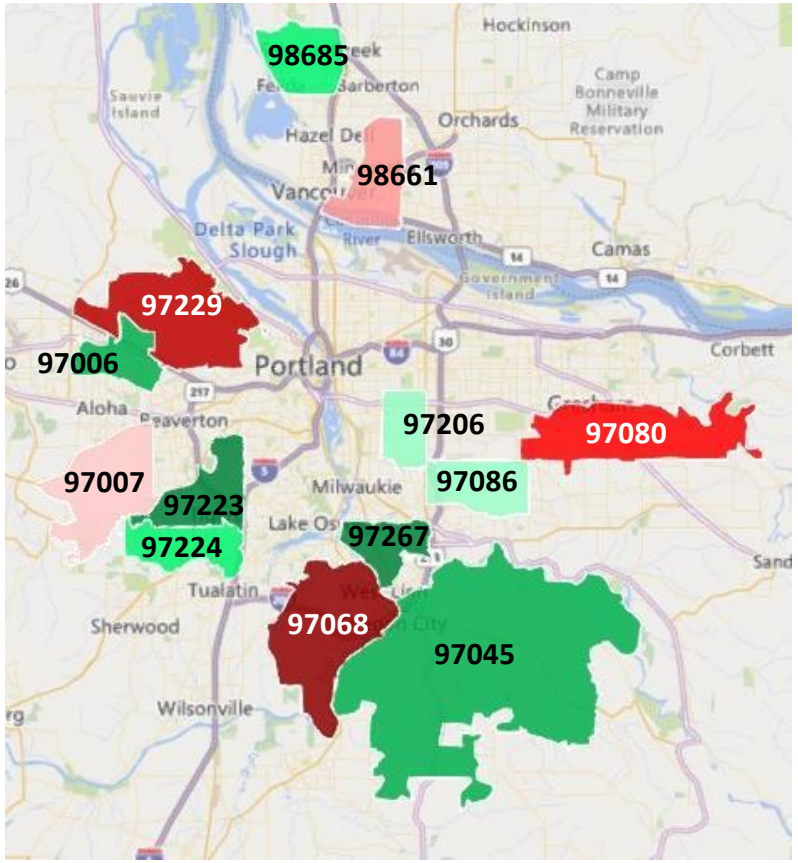


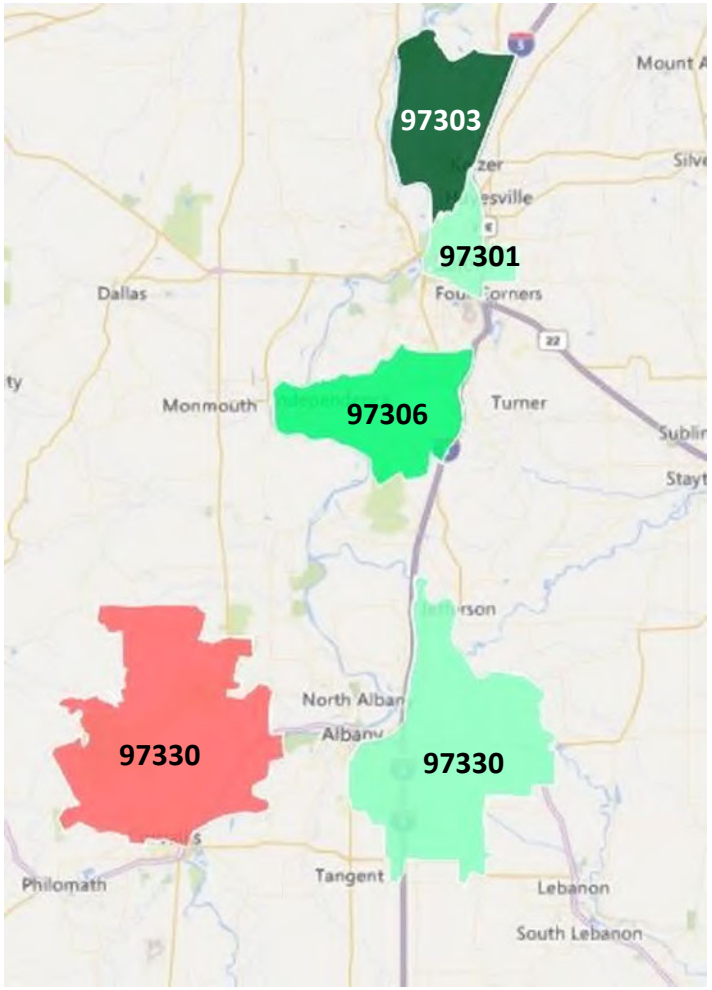
Attributes compared to industry shown by quartile ranking



Overall Satisfaction by Zip Code - NW Natural

CUB/118
Jenks/163





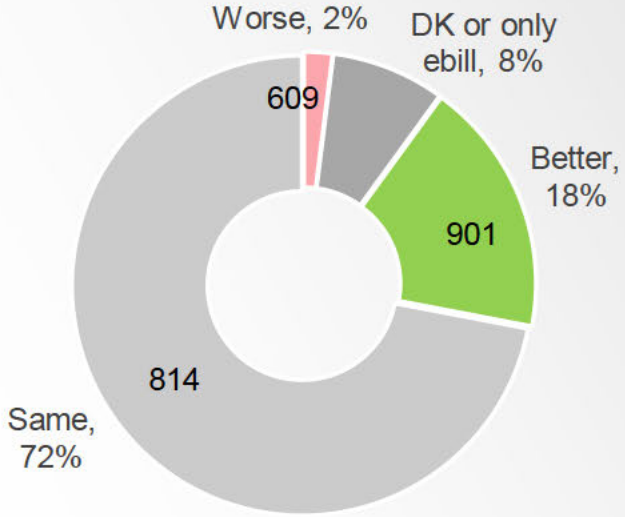
Zip Code	Overall Satisfaction	Count
97303	835	15
97267	819	16
97223	812	15
97006	810	17
97045	806	18
97306	804	24
98685	802	16
97224	793	26
97322	790	24
97206	788	18
97301	787	24
97086	786	15
97007	777	22
98661	771	15
97330	746	19
97080	717	18
97229	709	33
97068	689	15

Note: Any zip code highlighted in green is above brand average; any zip code in red is below brand average; some zip codes have been omitted due to low sample.

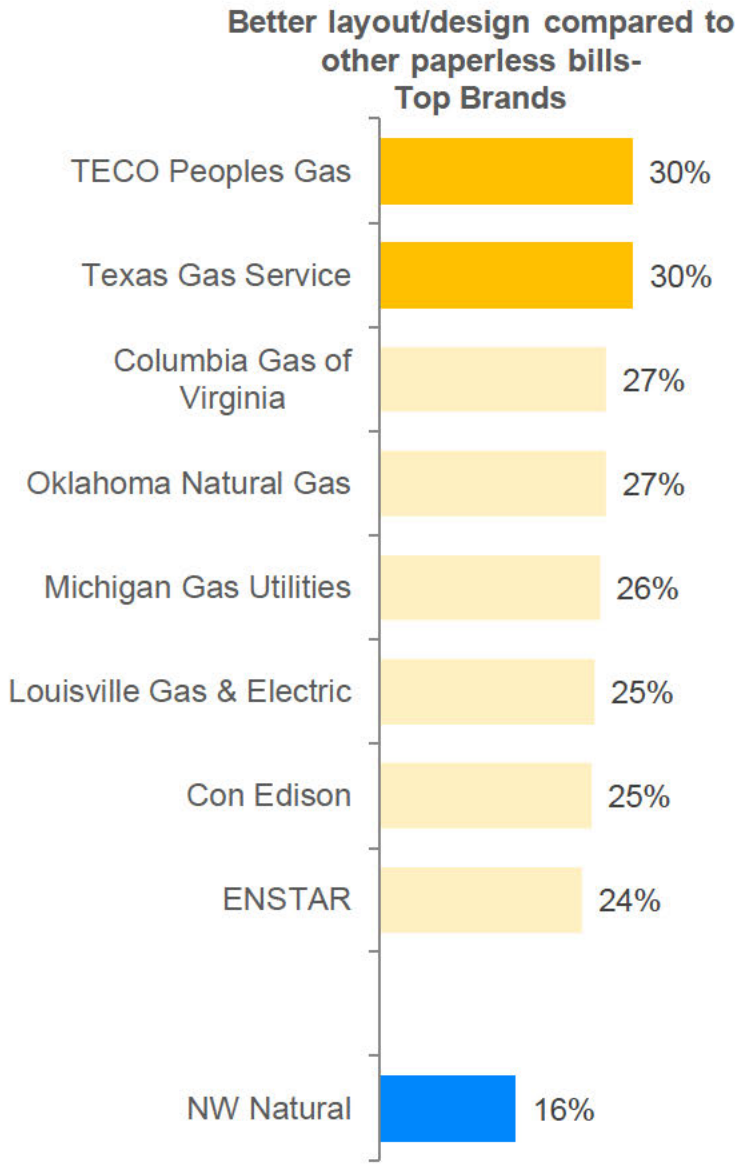
Good layout and design of electronic bills improves billing & payment satisfaction

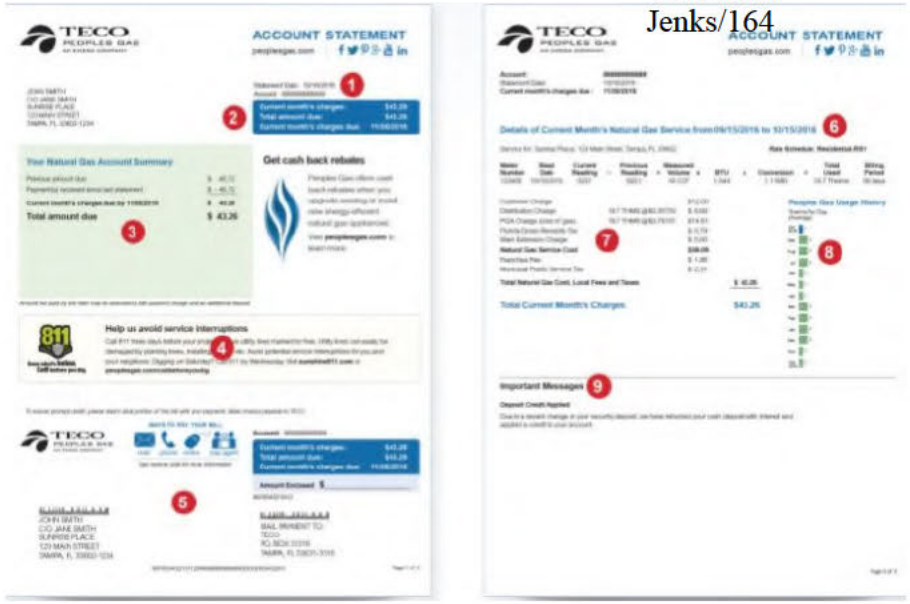
On average, only 18% of customers say their electronic natural gas bill is better than other electronic bills.

But when they do it increases billing & payment satisfaction from 609 for customers that say it's worse to 901 when customer say it's better.



Satisfaction and percentage of customers comparing natural gas eBill to other eBill



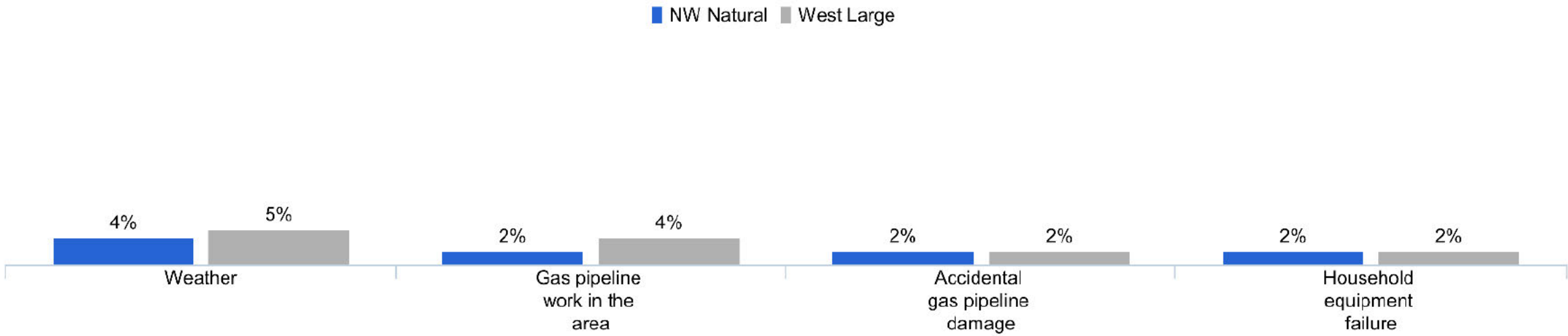


www.peoplesgas.com/files/content/residentialbill.pdf

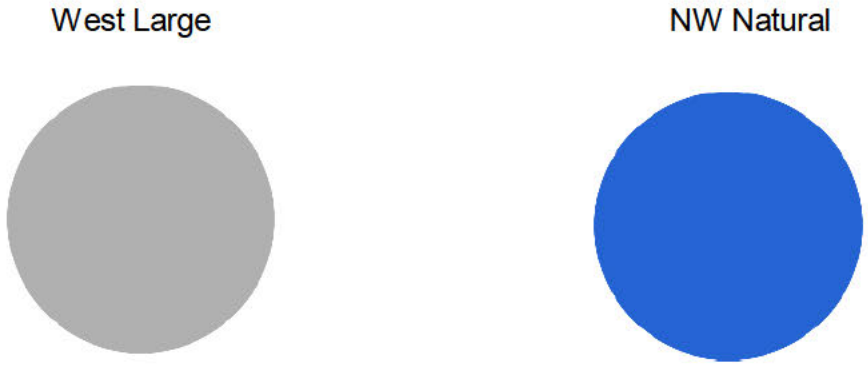
www.youtube.com/watch?v=IrXQuC4nCMw

Service Interruptions

CUB/118
Jenks/165

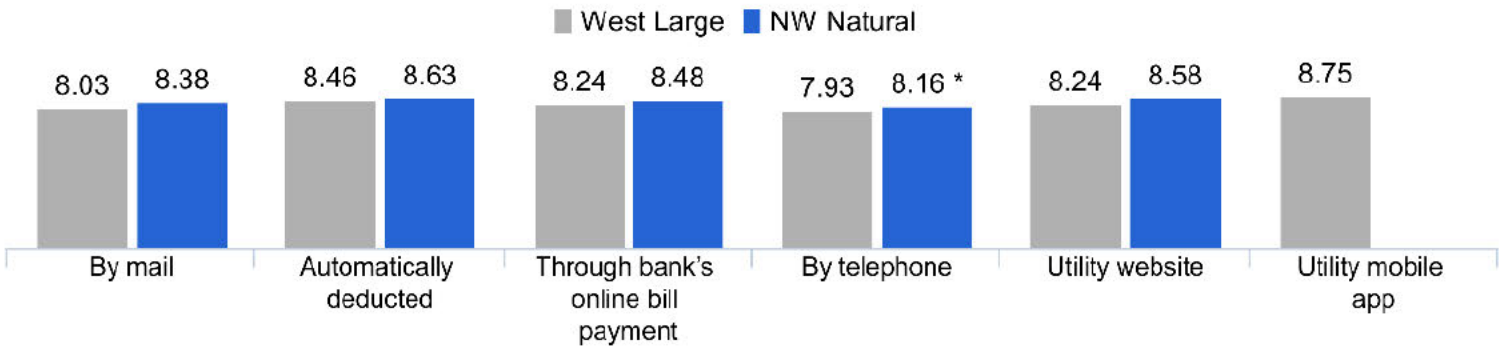


% Did not experience any gas service interruptions

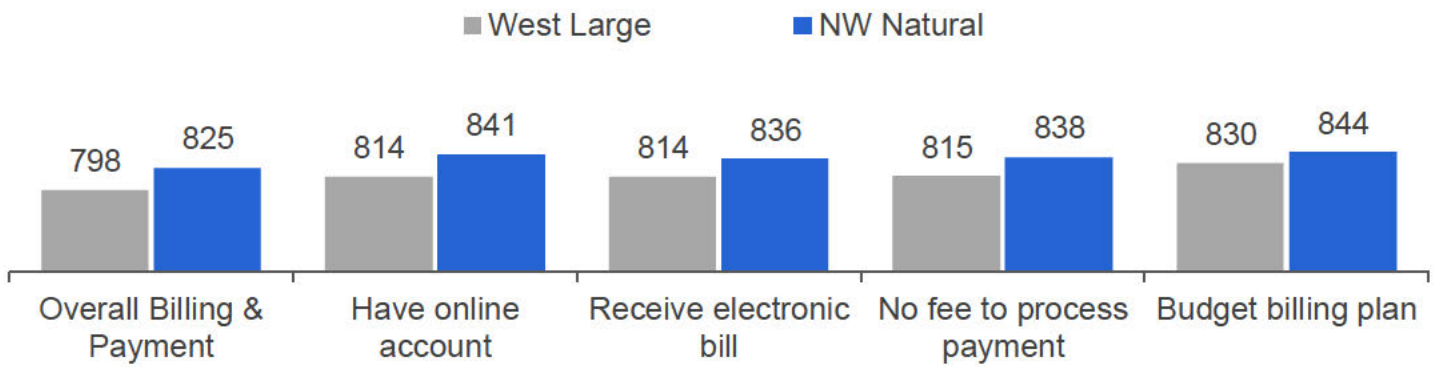


Paying the Bill

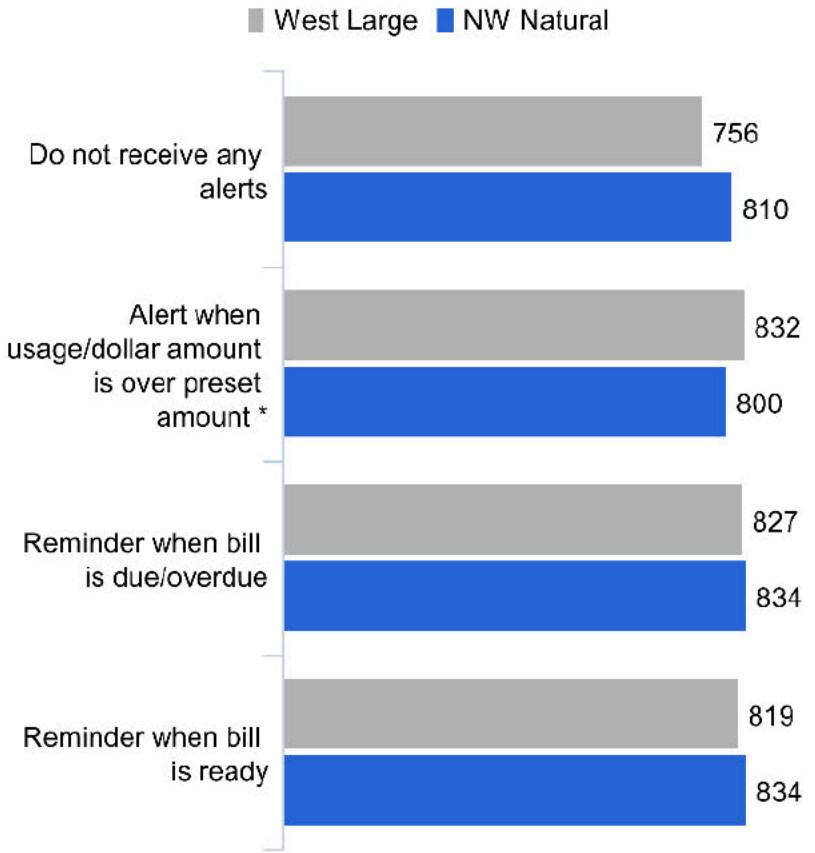
Ease of Paying by Payment Method



Key Billing Indicators

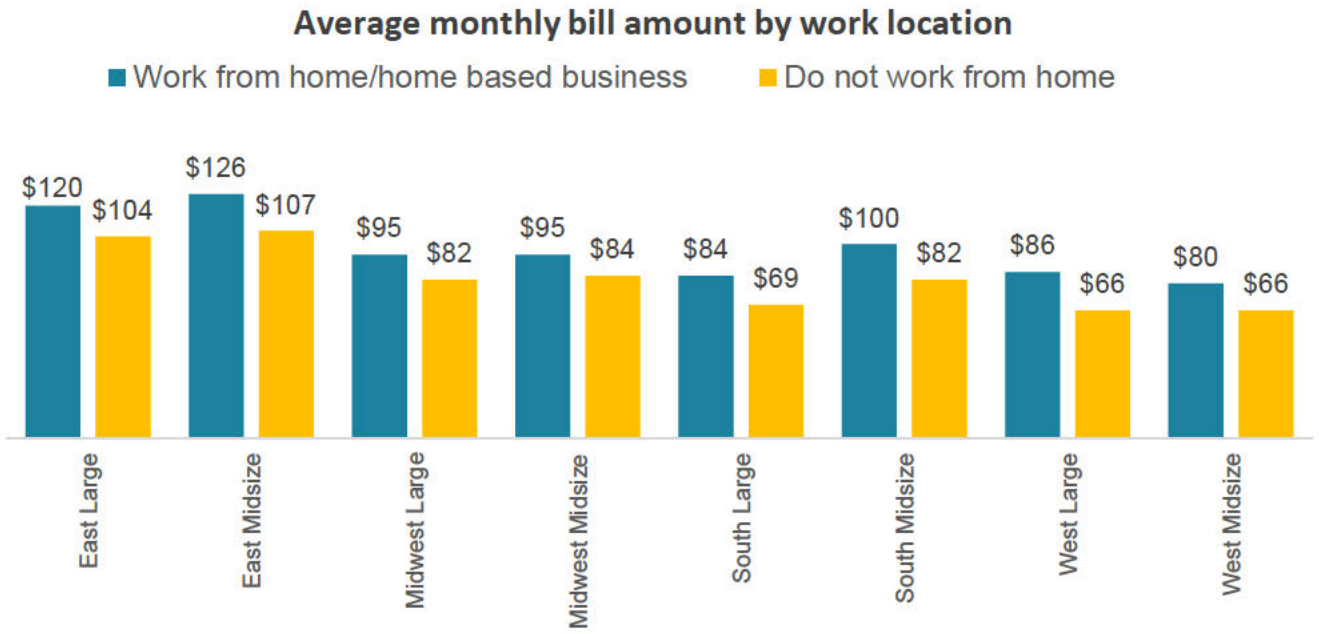


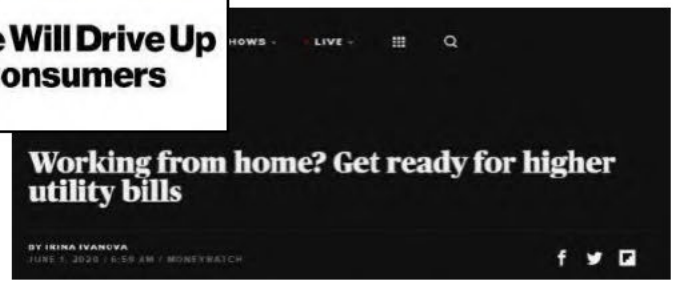
Impact of Billing Alerts

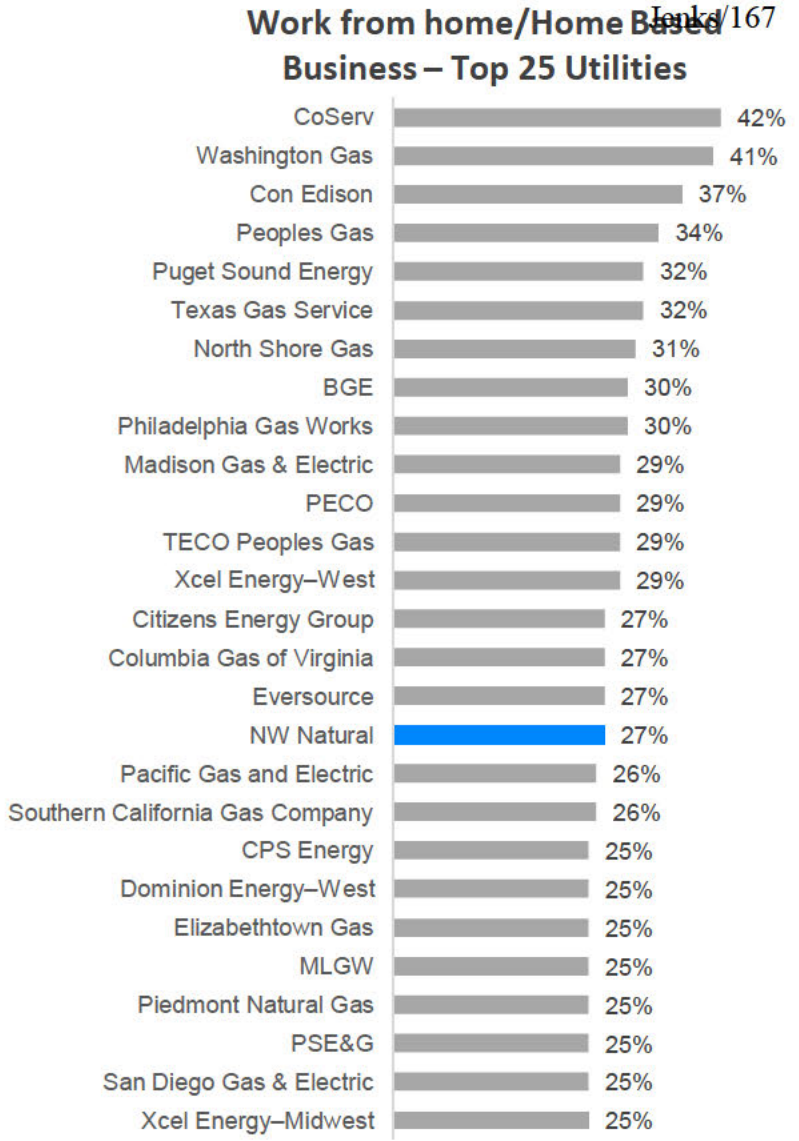


*Small sample size (n=30-99); insufficient data (n<30) not shown

Higher bills are being reported by those customers working from home



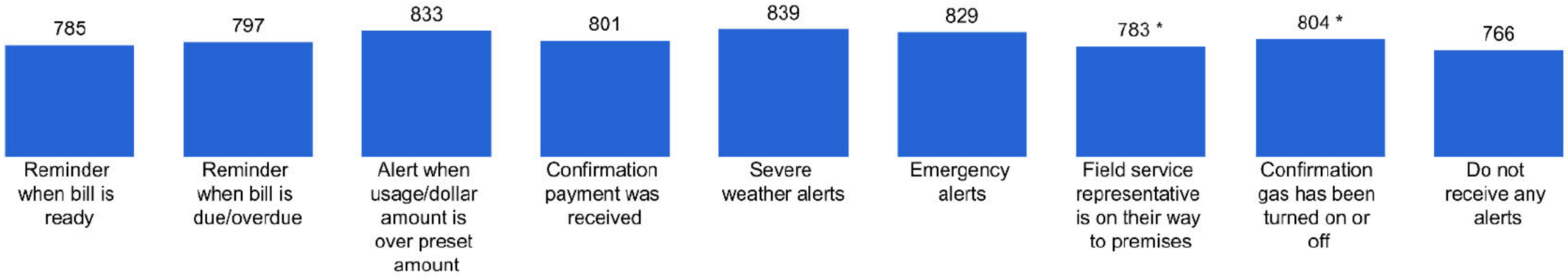




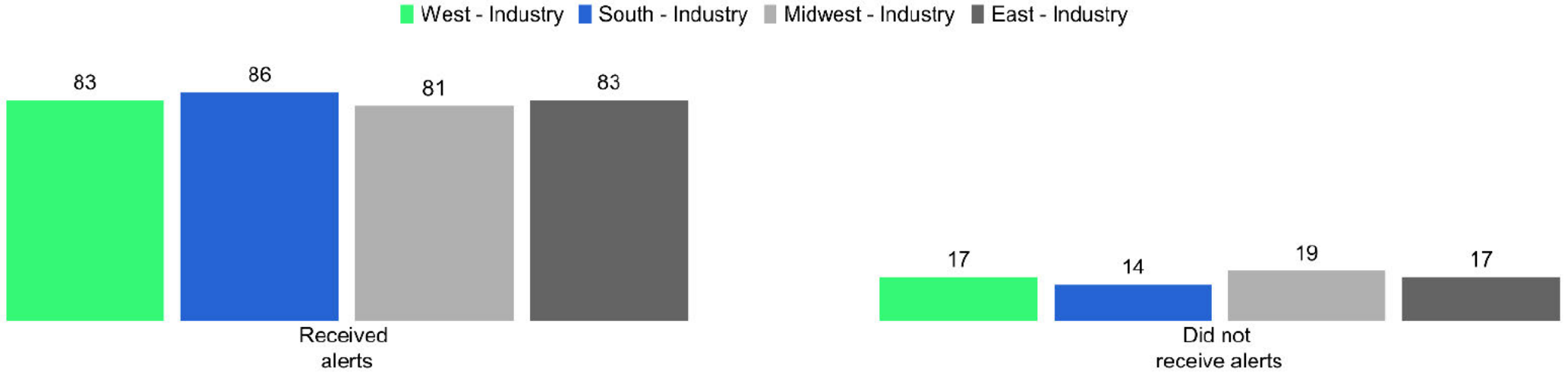
Alerts

CUB/118
Jenks/168

Satisfaction of Alerts Received - NW Natural



Communications - Receive 1 or More Alerts



Communication Index

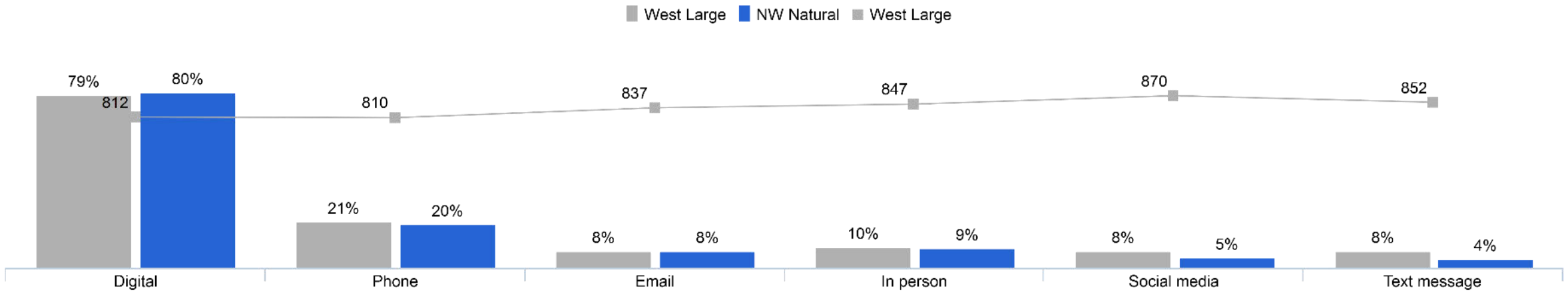
*Small sample size (n=30-99); insufficient data (n<30) not shown

Customer Contact Channels – National Rankings and Quartiles

NW Natural

Customer Contact Channel	National Rank	Quartile
Phone	15 of 73	1st
Digital	14 of 83	1st

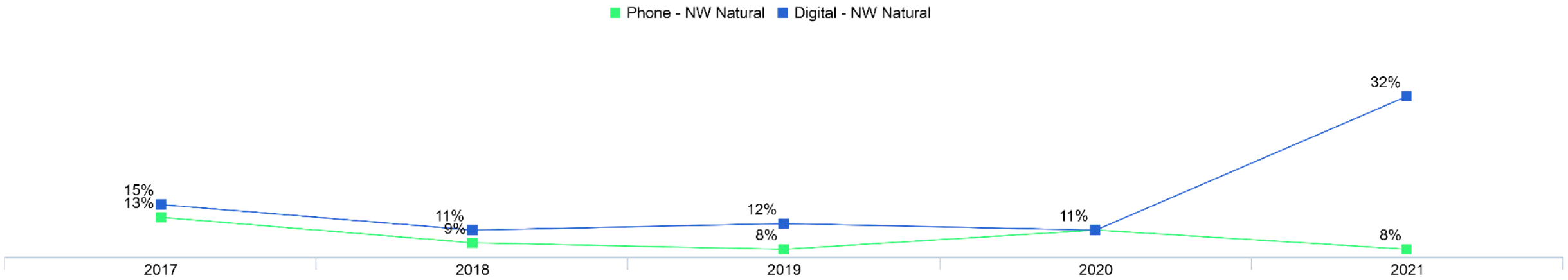
Customer Contact Channel - Frequency and Impact on Customer Care



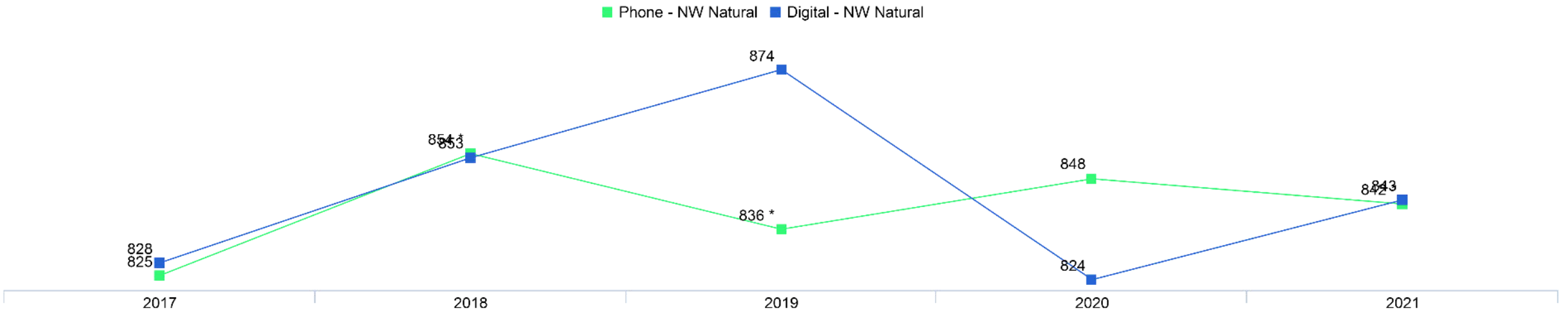
Customer Care Method of Contact Trend - NW Natural

CUB/118
Jenks/170

2017-2021 Method of Contact



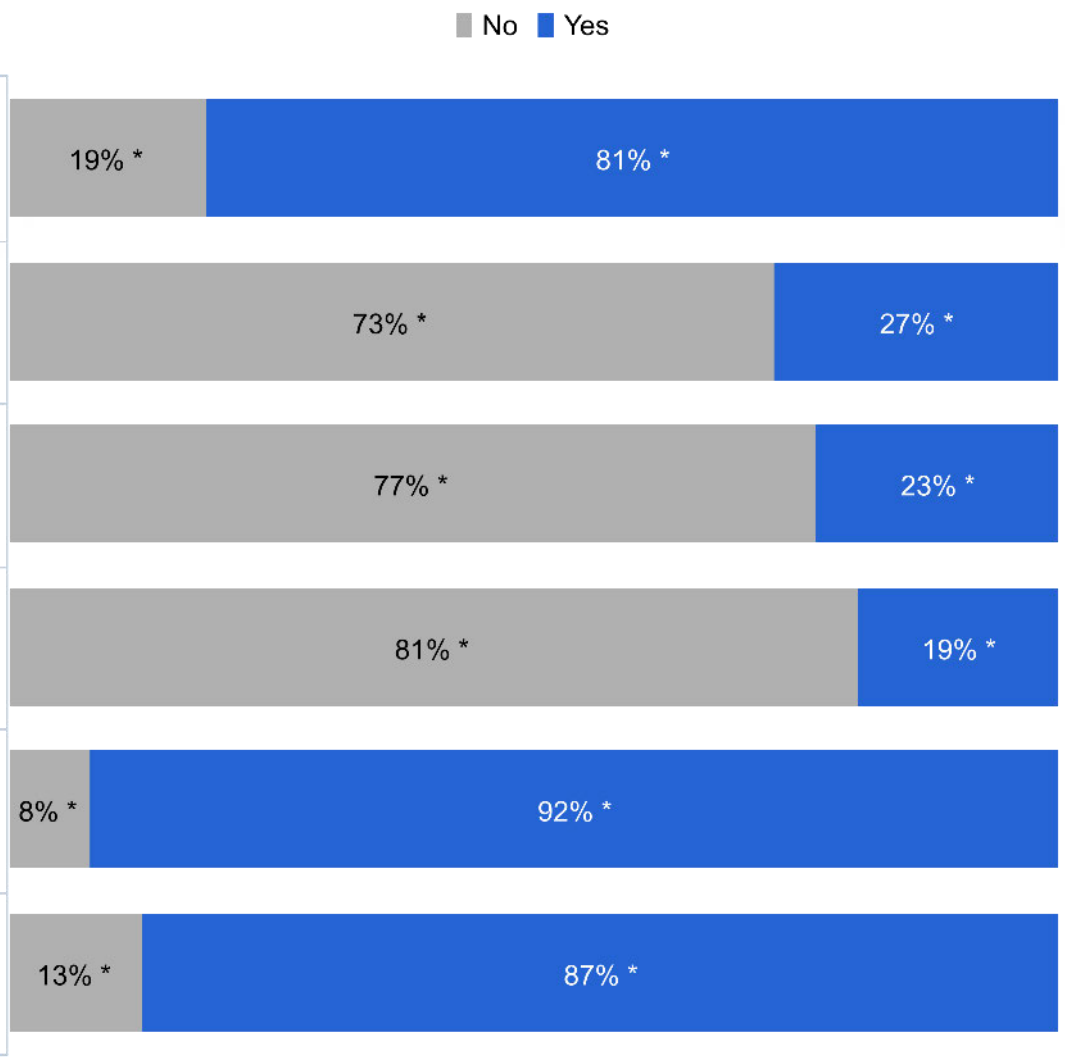
2017-2021 Customer Care Index by Method of Contact



Phone Representative Summary - NW Natural

CUB/118
Jenks/171

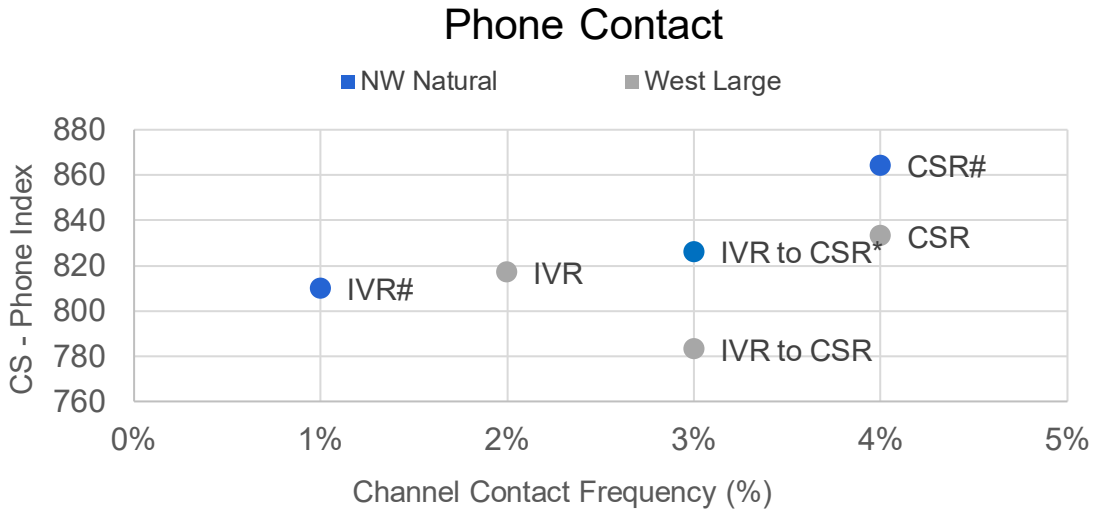
	OSAT Impact	Gap to West Large
Addressed by name	+96 *	-5%
Provided same infor more than once	+4 *	+5%
Rep put me on hold	+28 *	+6%
Transferred on most recent call	-25 *	+8%
Thanked for being customer	+109 *	-7% *
Offered to assist with other issues	+55 *	-7% *

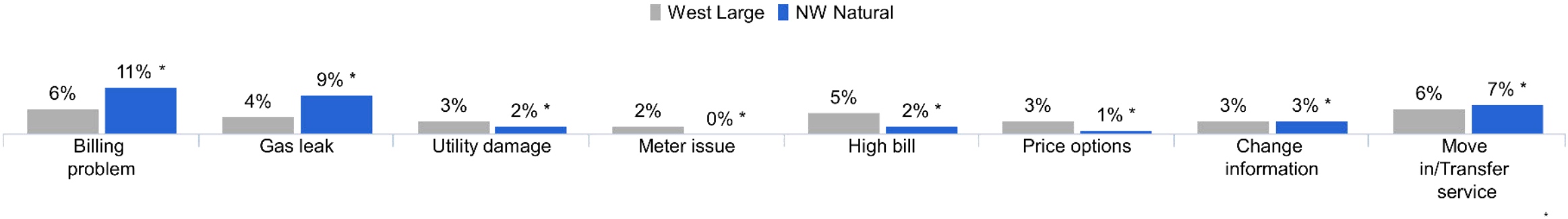


*Small sample size (n=30-99); insufficient data (n<30) not shown

Phone Contact Customer Care

CUB/118
Jenks/172



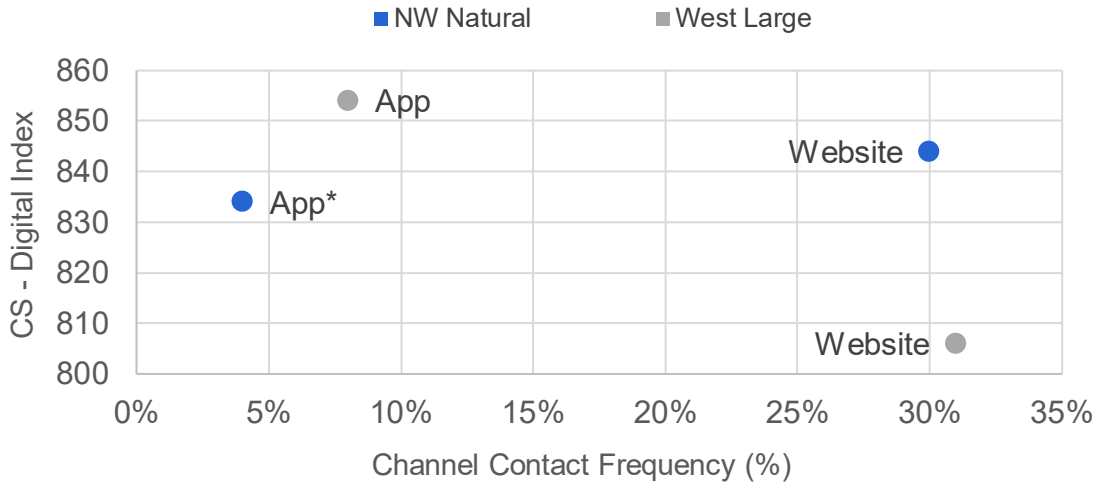


*Small sample size (n=30-99); insufficient data (n<30) not shown

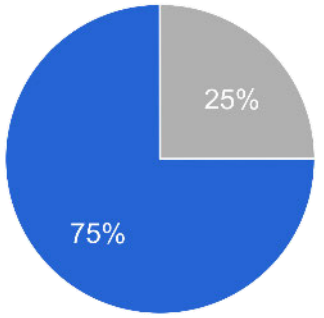
Digital Contact Customer Care

CUB/118
Jenks/173

Type of Digital Contact

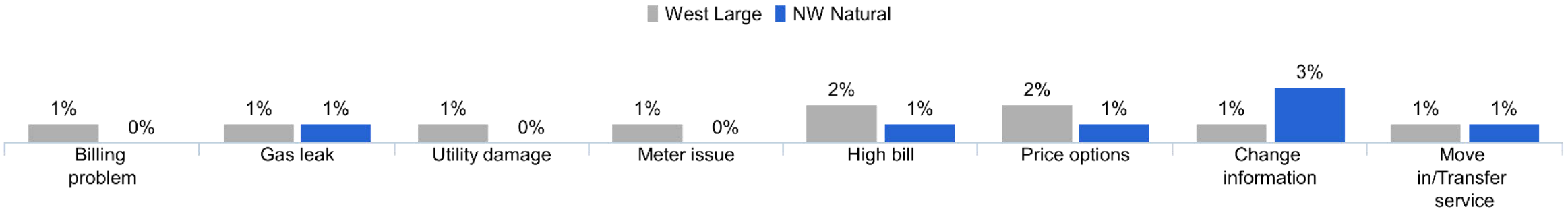


First Contact Resolution



813 Overall Satisfaction 780

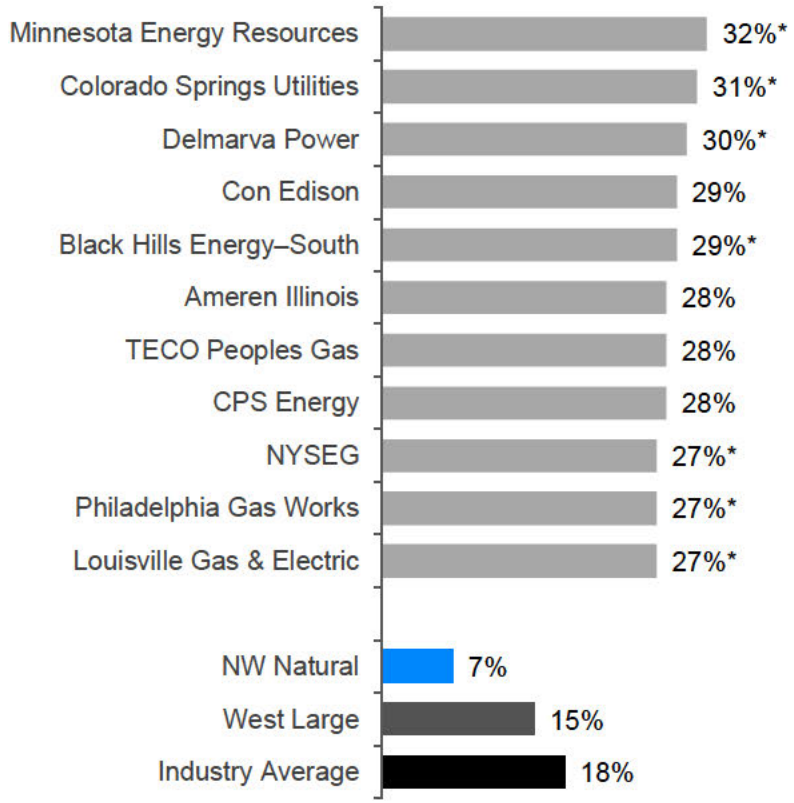
Primary Reason for Contact



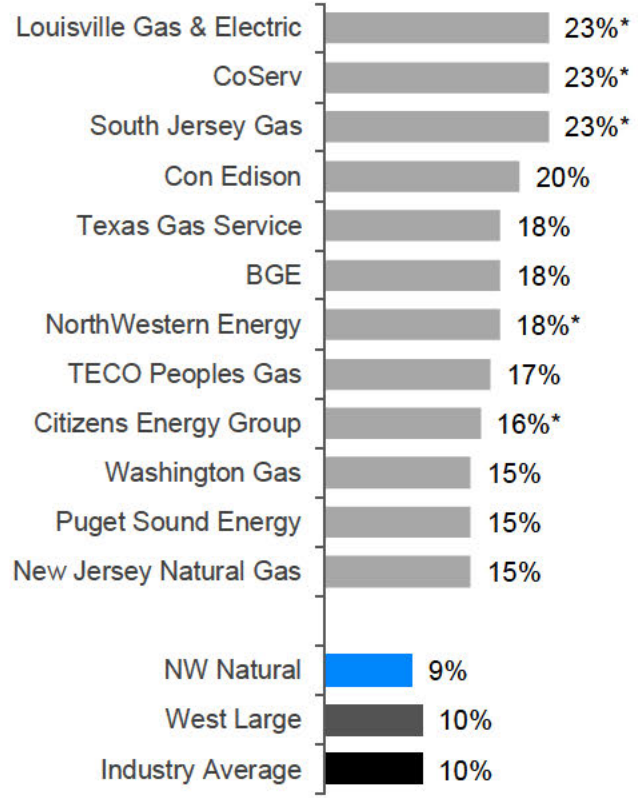
Top Performers – Proactive Contacts

CUB/118
Jenks/174

Proactive Calls



Proactive Emails

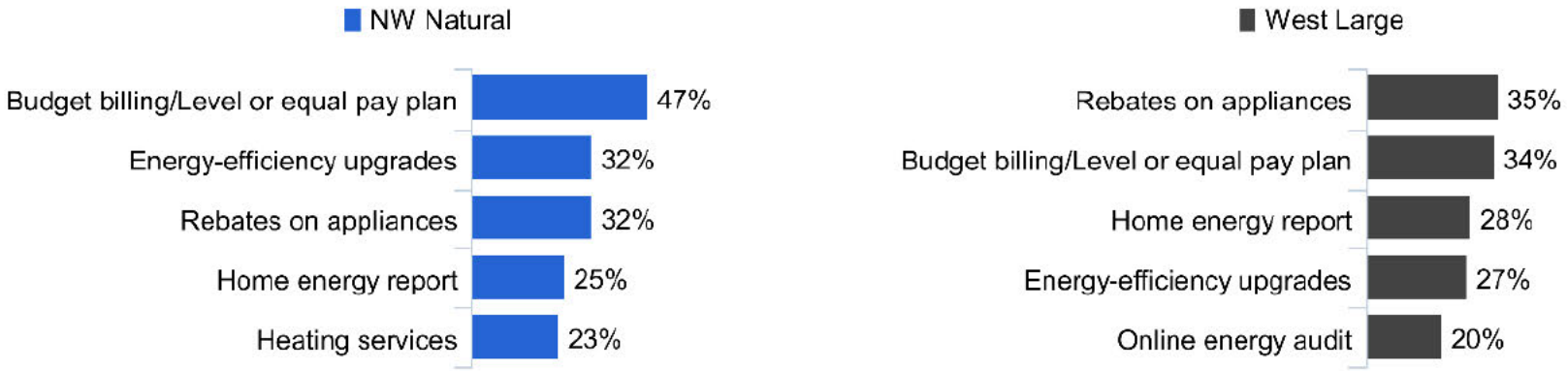


*Small sample size (n=30-99); insufficient data (n<30) not shown

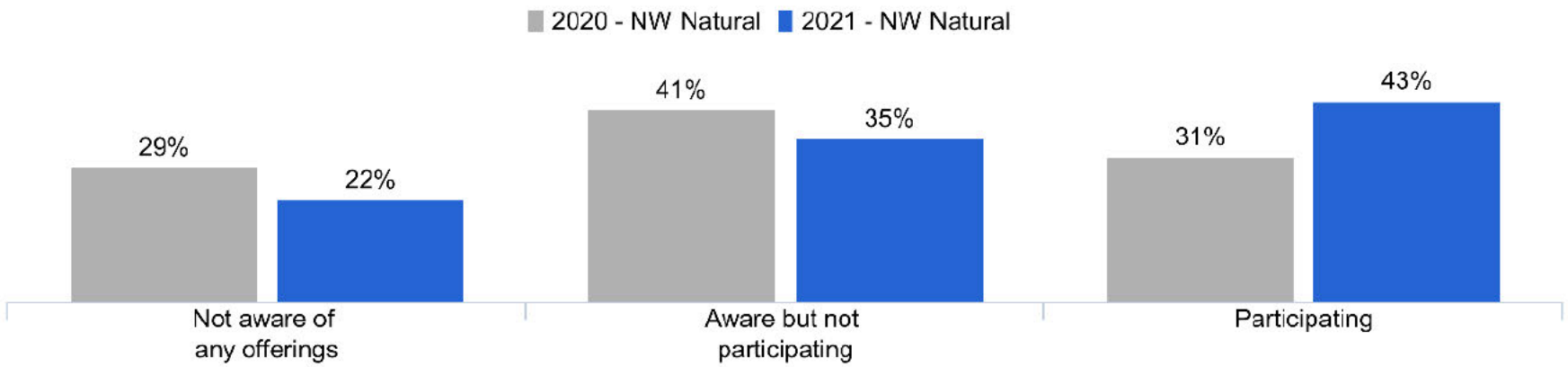
Products & Services

CUB/118
Jenks/175

Top Products & Services - Awareness



Product & Services Awareness and Participation



Product & Services Awareness Impact - NW Natural

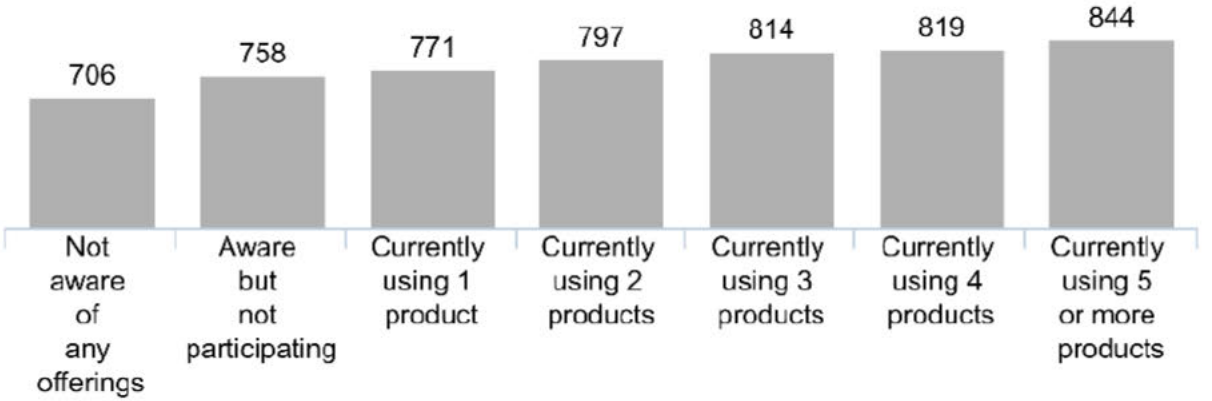
Overall Customer Satisfaction

Price

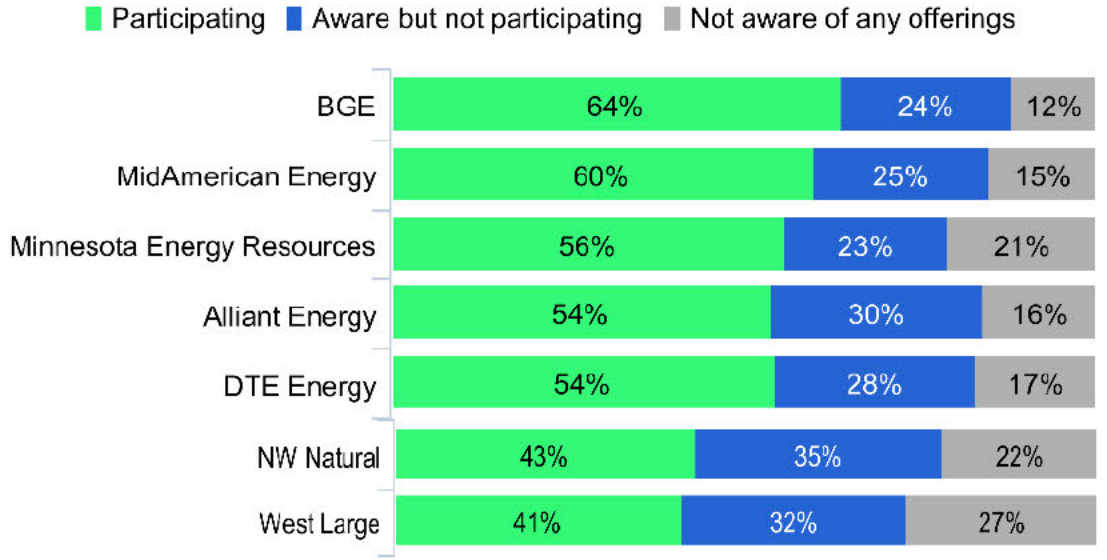
Communications

Engagement In Products & Services

Impact on Overall Satisfaction - Industry



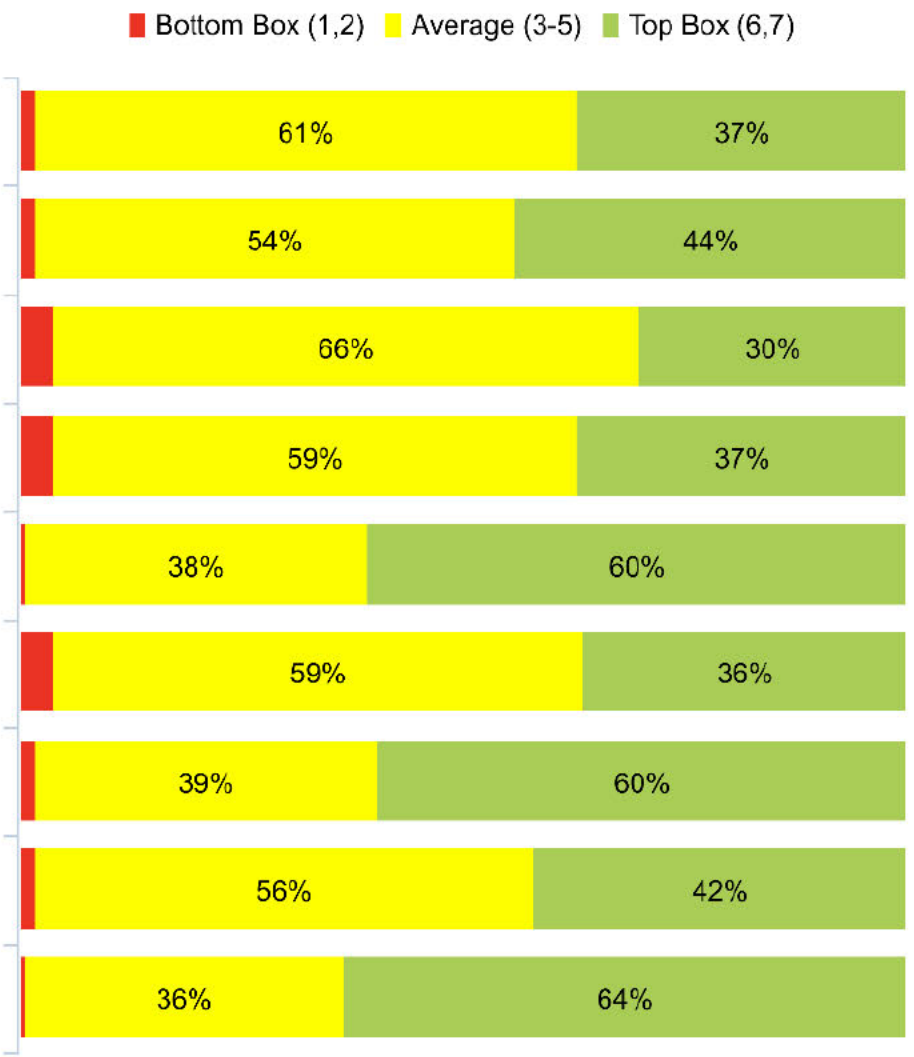
Products & Services - Top Participating Brands



Brand Image Analysis

CUB/118
Jenks/177

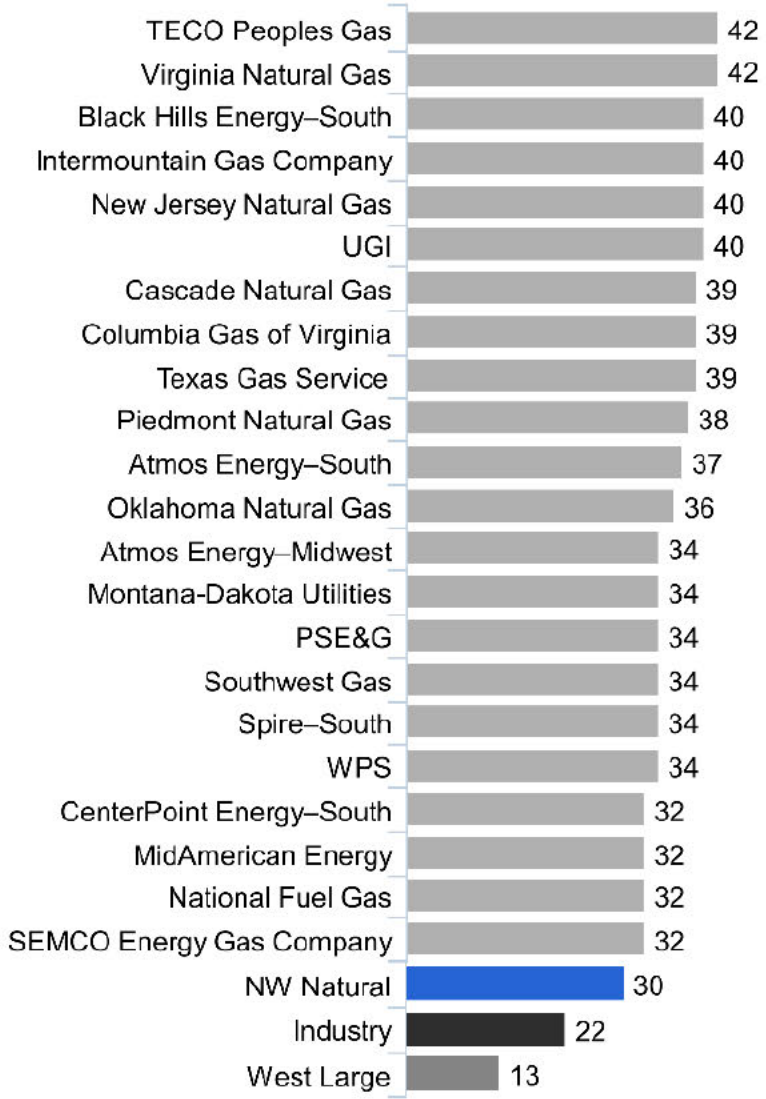
	OSAT Impact	Mean	Mean Gap to 2020	Mean Gap to West Large
Rigid vs. Flexible				
Environmentally unconcerned vs. Environmentally concerned				
Conventional vs. Innovative				
Bottom line focused vs. Customer focused				
Rude vs. Friendly				
Expensive vs. Affordable				
Untrustworthy vs. Trustworthy				
Reactive vs. Proactive				
Bad reputation vs. Good reputation				



NPS shows why Promoters are important

CUB/118
Jenks/178

Top Brands - Industry



18%

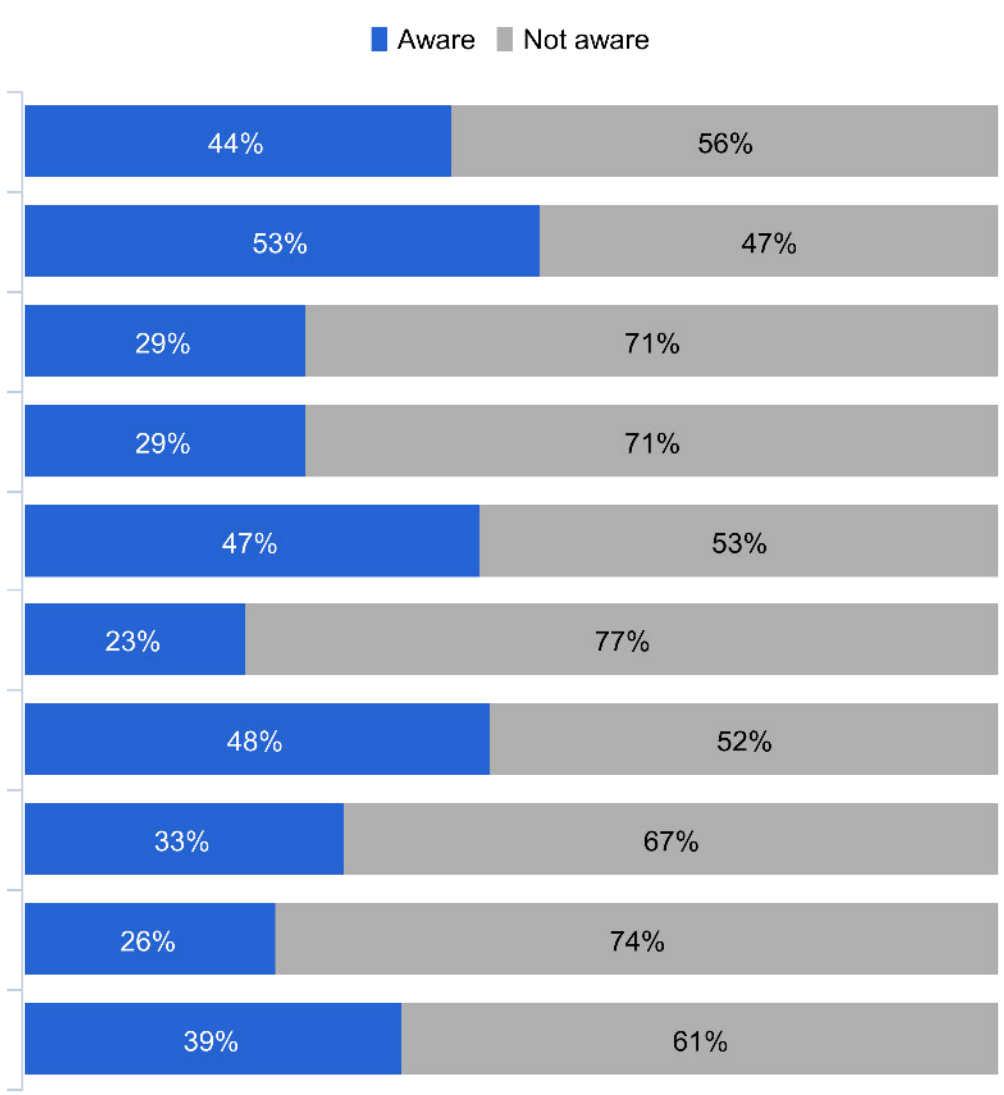
49%

Percentage of Promoters — **Percentage of Detractors** = **Net Promoter Score (NPS)**

Corporate Citizenship Awareness - NW Natural

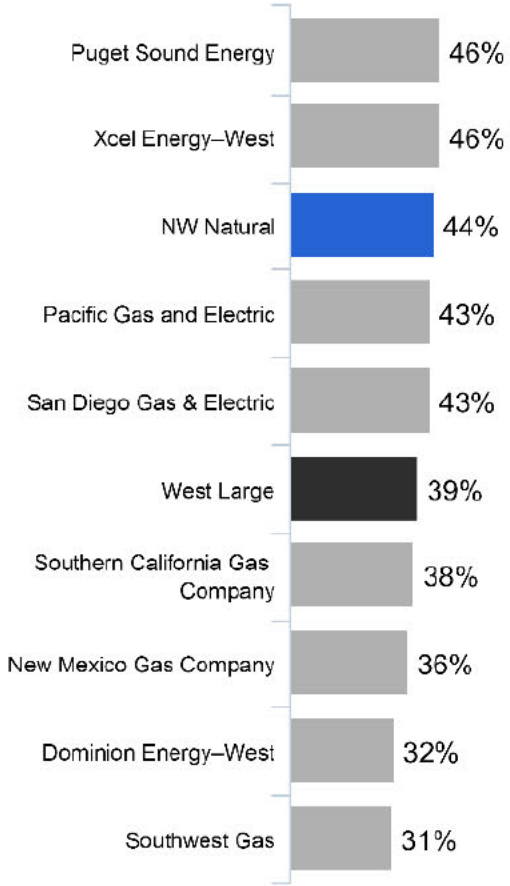
CUB/118
Jenks/179

	OSAT Impact	Awareness Gap from 2020	Gap to West Large
Improve impact on environment	+100	+14%	+5%
Energy efficiency or conservation programs	+81	+11%	+4%
Donations or sponsorships	+81	+9%	+7%
Supports economic development	+91	-46%	+2%
Increase general safety of gas system	+97	-	+4%
Observed utility volunteers	+71	0%	+5%
Assistance programs	+62	+1%	+13%
Protect and restore wildlife	+97	+4%	+1%
Use renewable natural gas	+70	-	+4%
Prepare for natural disasters	+93	-	-4%



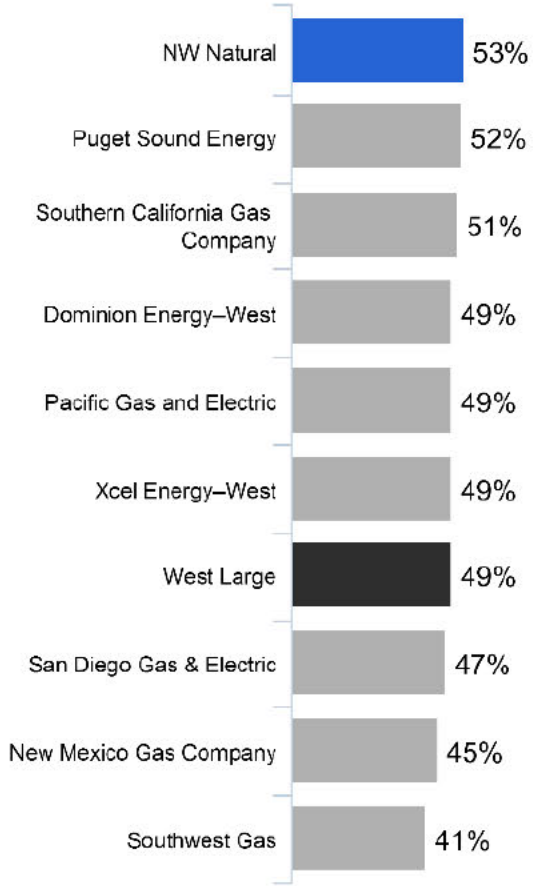
Corporate Citizenship Performance - West Large

Improve impact on environment



Industry 37%

Energy efficiency or conservation programs



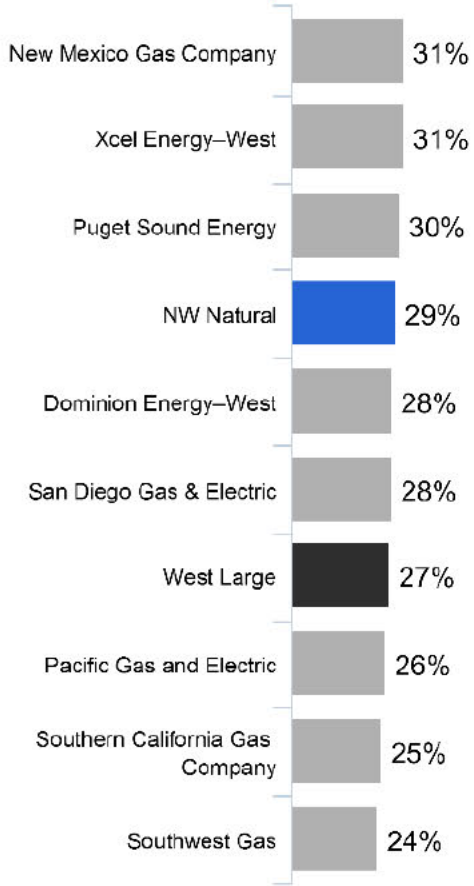
Industry

Donations / sponsorships

Industry 26%

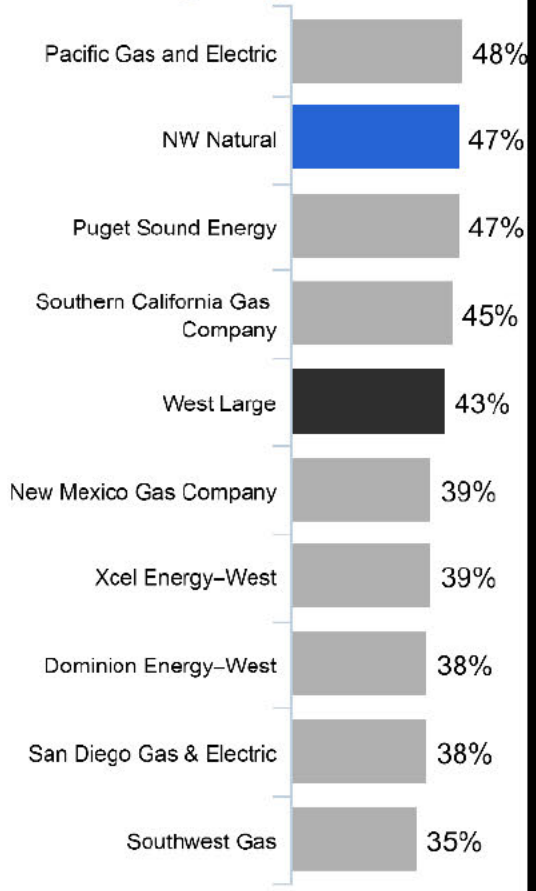
Corporate Citizenship Performance Continued - West Large

Supports economic development



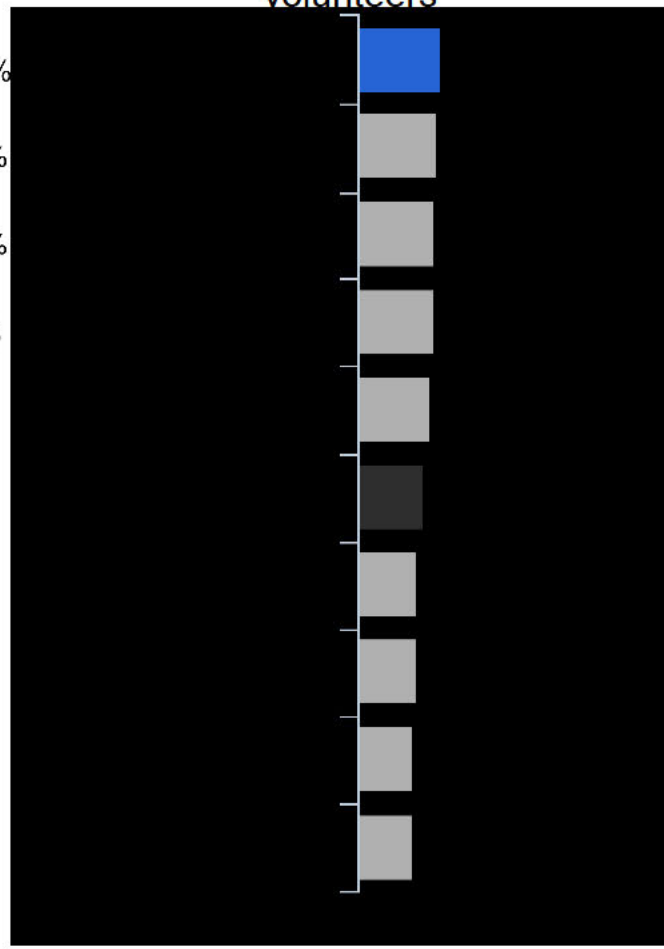
Industry

Increase general safety of gas system



Industry

Observed utility volunteers

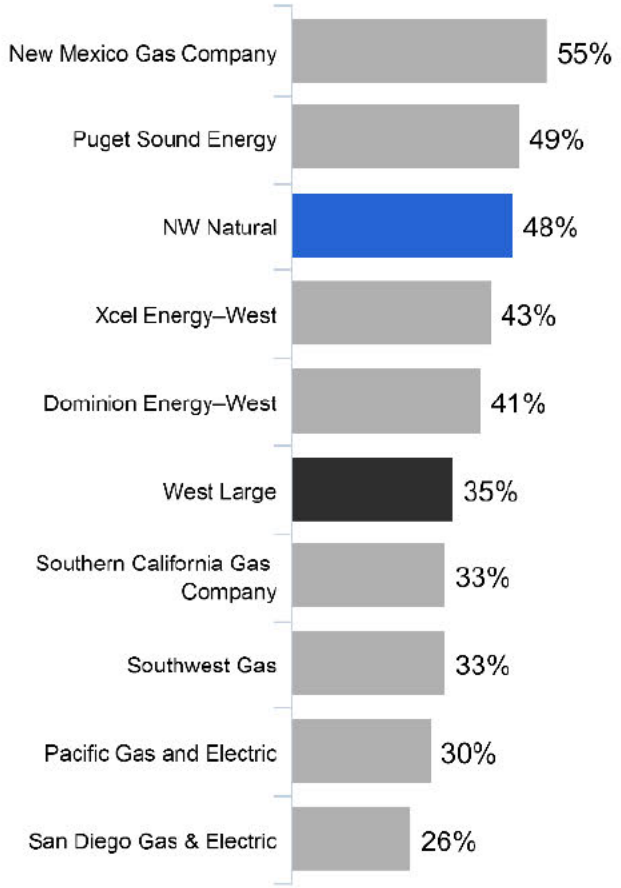


Industry

CUB/118
Jenks/182

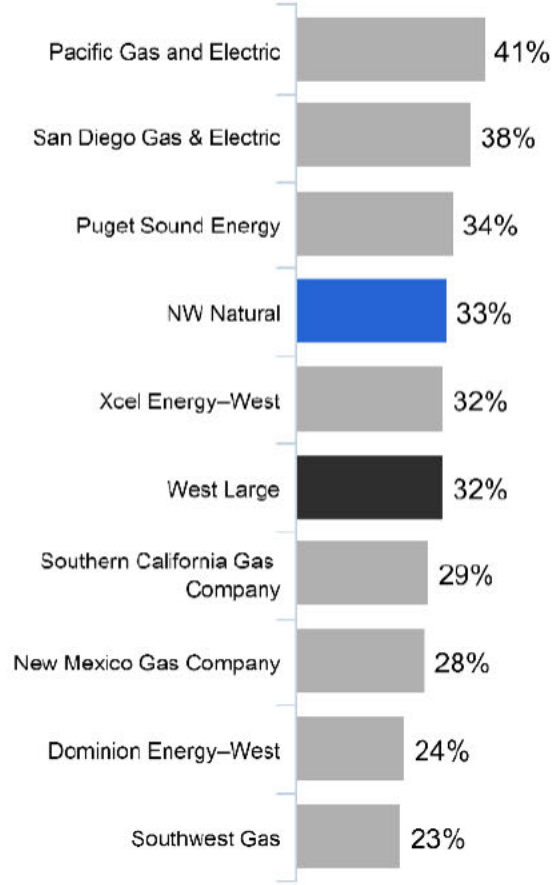
Corporate Citizenship Performance Continued - West Large

Assistance programs



Industry 39%

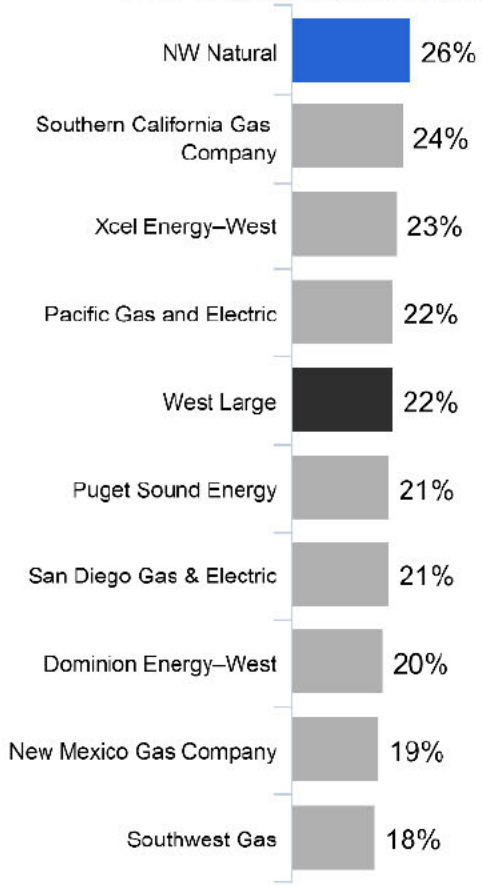
Protect and restore wildlife



Industry 28%

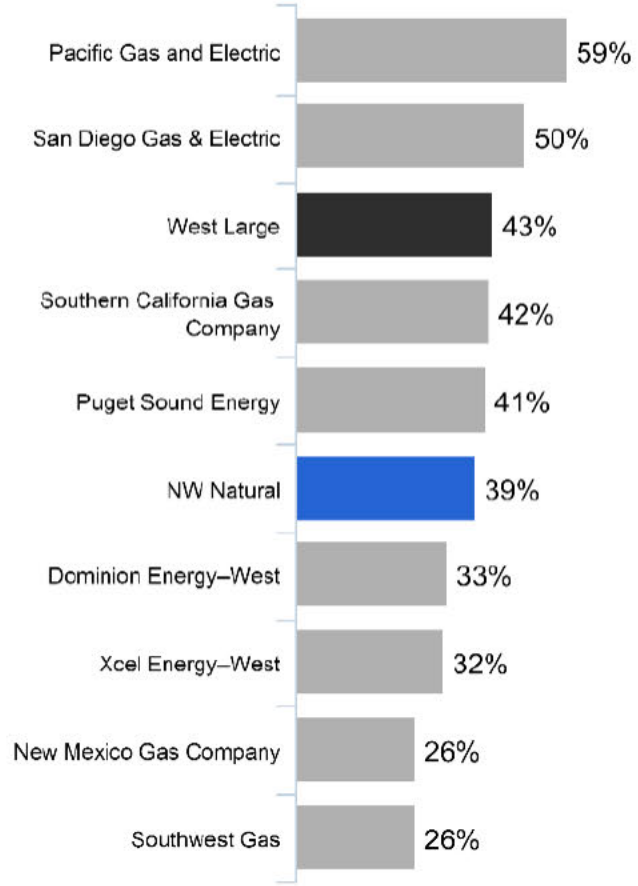
Corporate Citizenship Performance Continued - West Large

Use renewable natural gas



Industry 20%

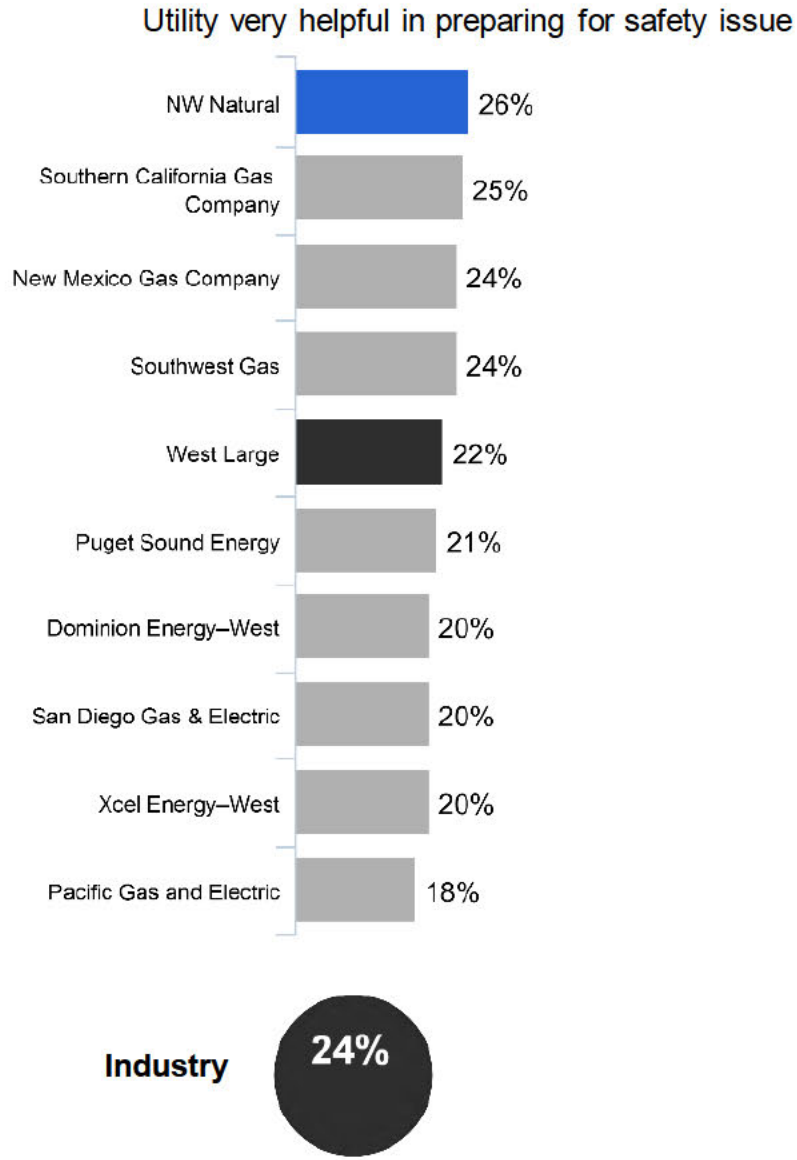
Prepare for natural disasters



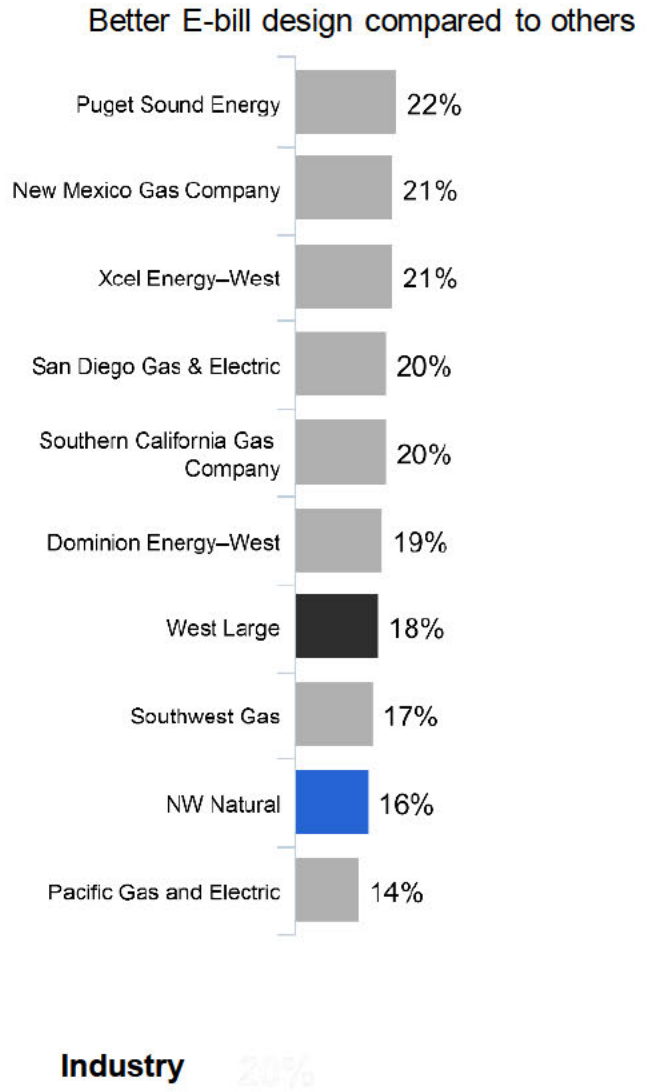
Industry 35%

CUB/118
Jenks/184

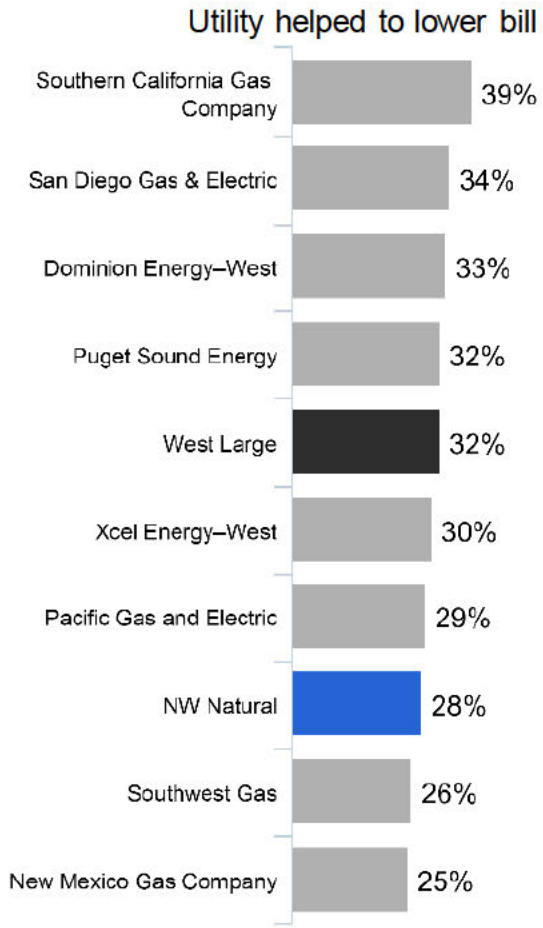
Key Performance Indicators - Safety & Reliability



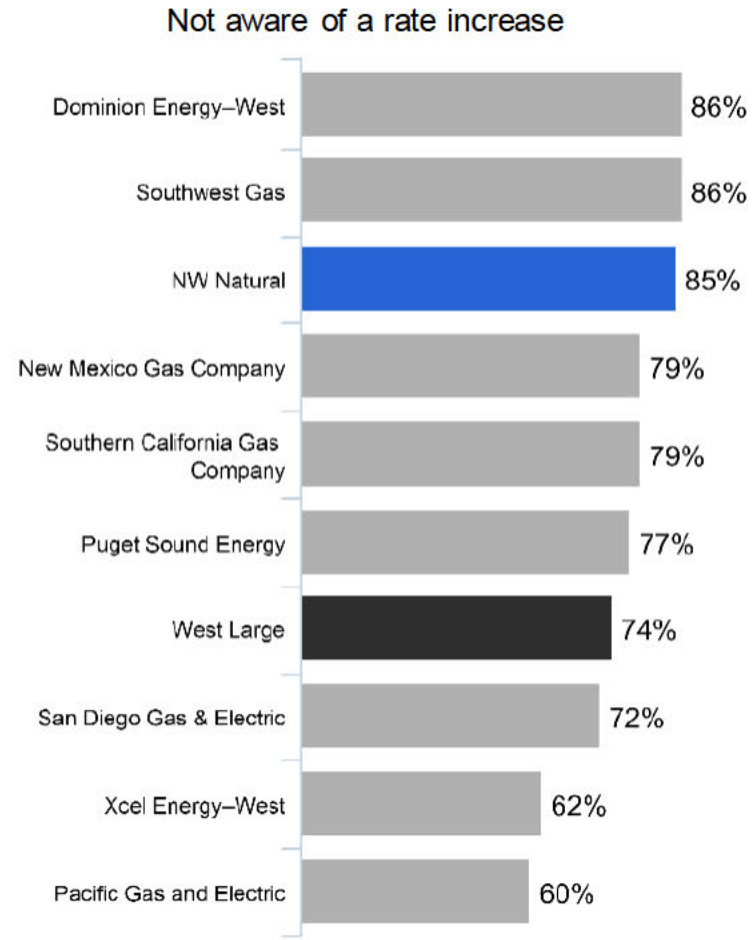
Key Performance Indicators - Billing & Payment



Key Performance Indicators - Price



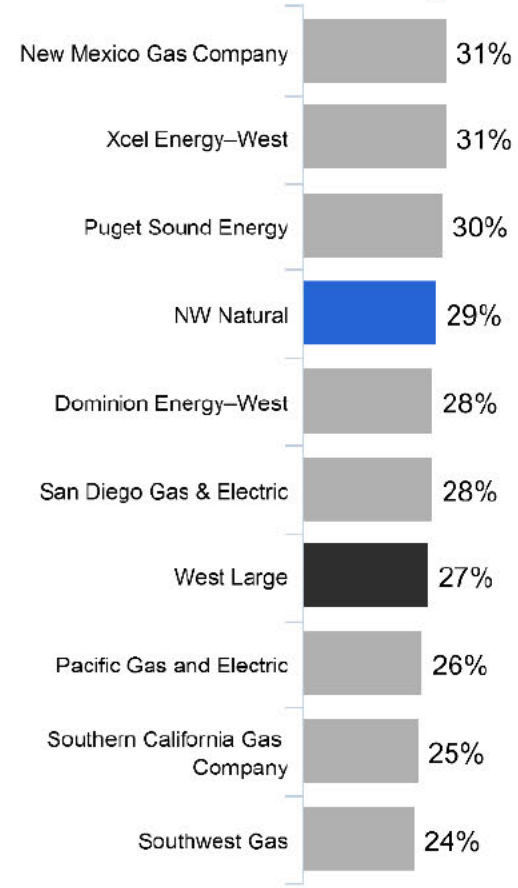
Industry 32%



Industry 73%

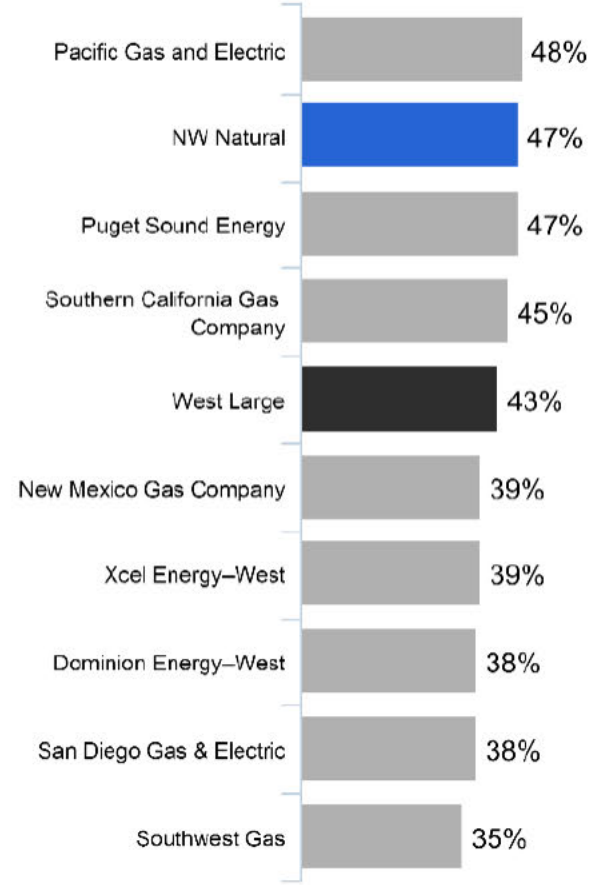
Key Performance Indicators - Corporate Citizenship

Aware utility supports economic development of local community



Industry

Awareness of utility efforts to increase general safety of gas system

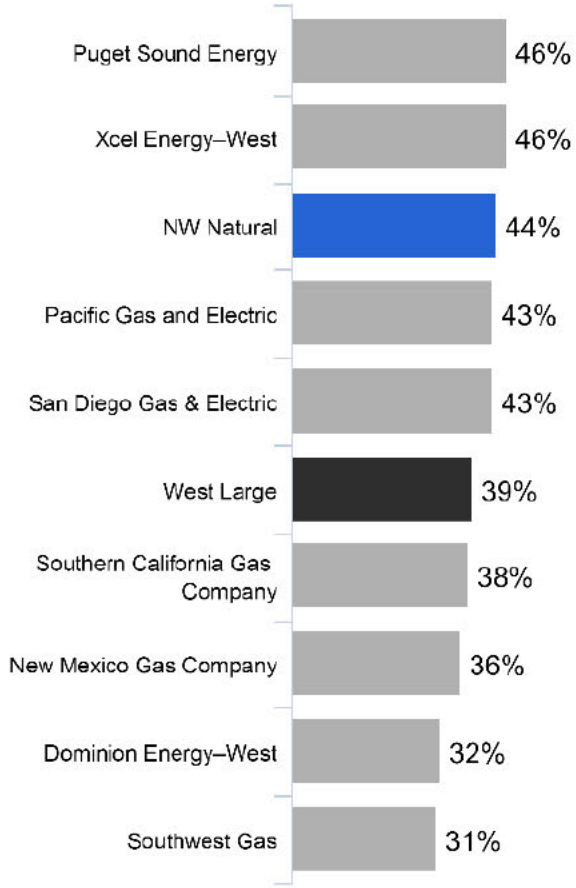


Industry

CUB/118
Jenks/188

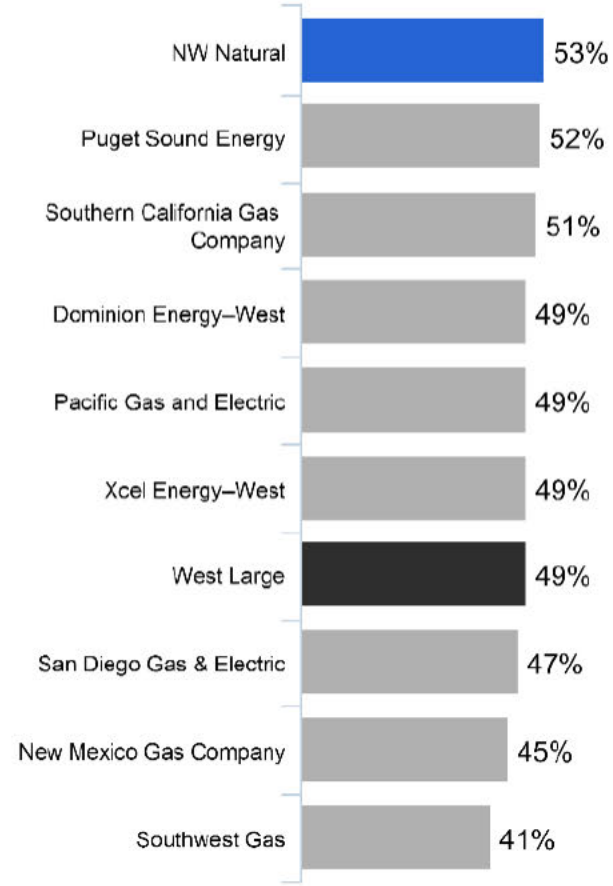
Key Performance Indicators - Corporate Citizenship (Continued)

Aware of utility efforts to improve impact on environment



Industry

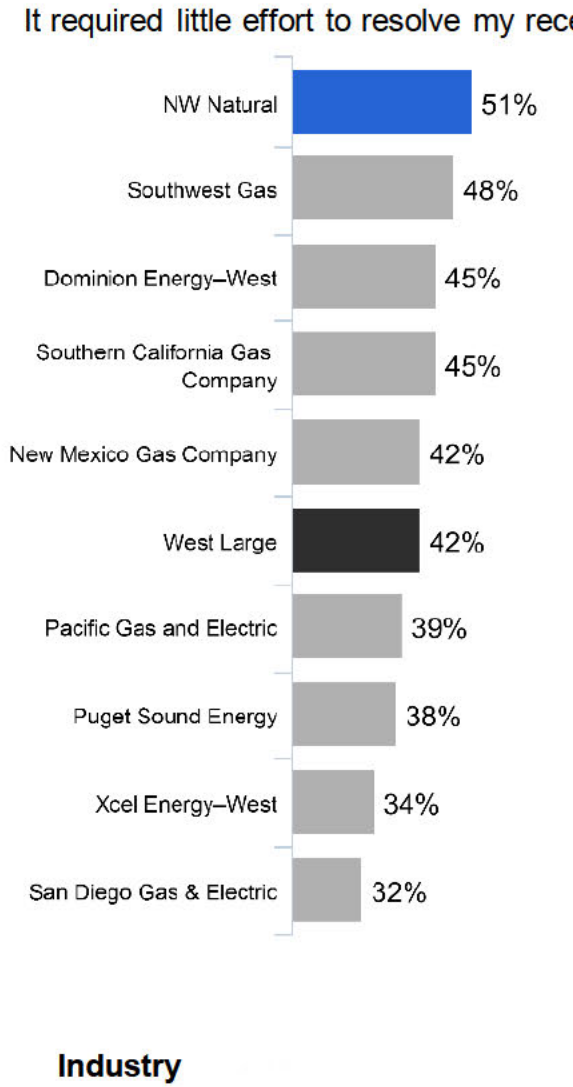
Aware of energy efficiency/conservation programs



Industry

CUB/118
Jenks/189

Key Performance Indicators - Customer Care



Quarterly Public Sentiment and Advertising Awareness Tracking

I. Screeners

II. General assessment
   a. All things considered, would you say that your local community is headed in the right direction, or have things gotten off on the wrong track?

III. Advertising awareness
   a. In the past three months, how many advertisings did you recall seeing, reading, or hearing any advertisement from NW Natural/[your electric provider]?
   b. Think about the advertising you recall from NW Natural, what was/were the message(s) about? Mark all that apply.
      i. Renewable natural gas
      ii. Natural gas is environmentally friendly
      iii. Natural gas plays a role in reducing greenhouse gas emission
      iv. Natural gas is safe
      v. Natural gas is affordable
   c. Where did you see or hear this/these communication(s)? Mark all that apply.

IV. Environmental awareness
   a. Which statement comes closest to your point of view? [Rotate A and C, ask B second]
      i. Not enough is being done to reduce carbon emissions in my city. This needs to be a higher priority.
      ii. The right amount of effort is being spent to reduce carbon emissions in my city.
      iii. Too much effort is being spent to reduce carbon emissions in my city. There are other higher priorities.
   b. The following are a few statements that people sometimes make about natural gas. None may match your opinion exactly, but please tell me which is closest to what you think.
      i. Natural gas is a fossil fuel that is contributing to the climate change. It should be banned now.
      ii. Natural gas is critical to helping us lower emissions and achieve our climate goals.
      iii. Natural gas should be used because it's affordable and reliable.
   c. Berkeley, California, recently passed a law to ban new natural gas hookups for homes and buildings. Several other West Coast cities are considering similar laws. Would you support or oppose your local government banning new natural gas hookups in homes and buildings?

V. Product positioning
   a. If you were looking for a new home, how important would it be to you that the new home have natural gas appliances
   b. Opinion about the following features of natural gas vs. electricity
      i. Affordable
      ii. Reliable
      iii. Efficient
      iv. Safe
      v. Environmentally friendly
   c. How would you rate NW Natural on its…
      i. Efforts to move toward clean energy
      ii. Investments made in renewable resources
      iii. Overall actions on environmental issues

VI. Demographics
   a. Gender
   b. Age
   c. Education
   d. Income

e. Rent/own

NW Natural Quarterly Advertising Awareness and Public Sentiment Tracking - Q2 2020

Methodology

- Online research panels
- Primary residence within NW Natural service territory
- 250 respondents each quarter
  - 125 gas customers
  - 125 non-gas customers
- Repeat every three months
  - June
  - September
  - December
  - March

Executive Summary – Ad Awareness

- 48% of all respondents recalled seeing NW Natural ads during the past three months.
  - 56% of NW Natural customers vs. 39% of non-customers.
  - This quarter's NW Natural ad awareness is higher than other local utilities among their own customers: PGE 44%, Pacific Power 43%, and Clark PUD 39%.
- Among those recalled seeing NW Natural ads, close to half saw Natural Gas is Safe or Natural Gas is environmental friendly.
- 59% of the recalls were from TV, followed by websites 25% and social media 22%.

Executive Summary –Public Sentiment

- 42% thought that our local community is headed towards the right direction (37% customers vs 48% non-customers)
- Nearly half believe that the right amount efforts is being spent on carbon reduction, 39% said not enough and 14% too much.
  - The following groups demand more carbon reduction efforts: non-customers (45%), democrats (46%), Multnomah county residents (50%).

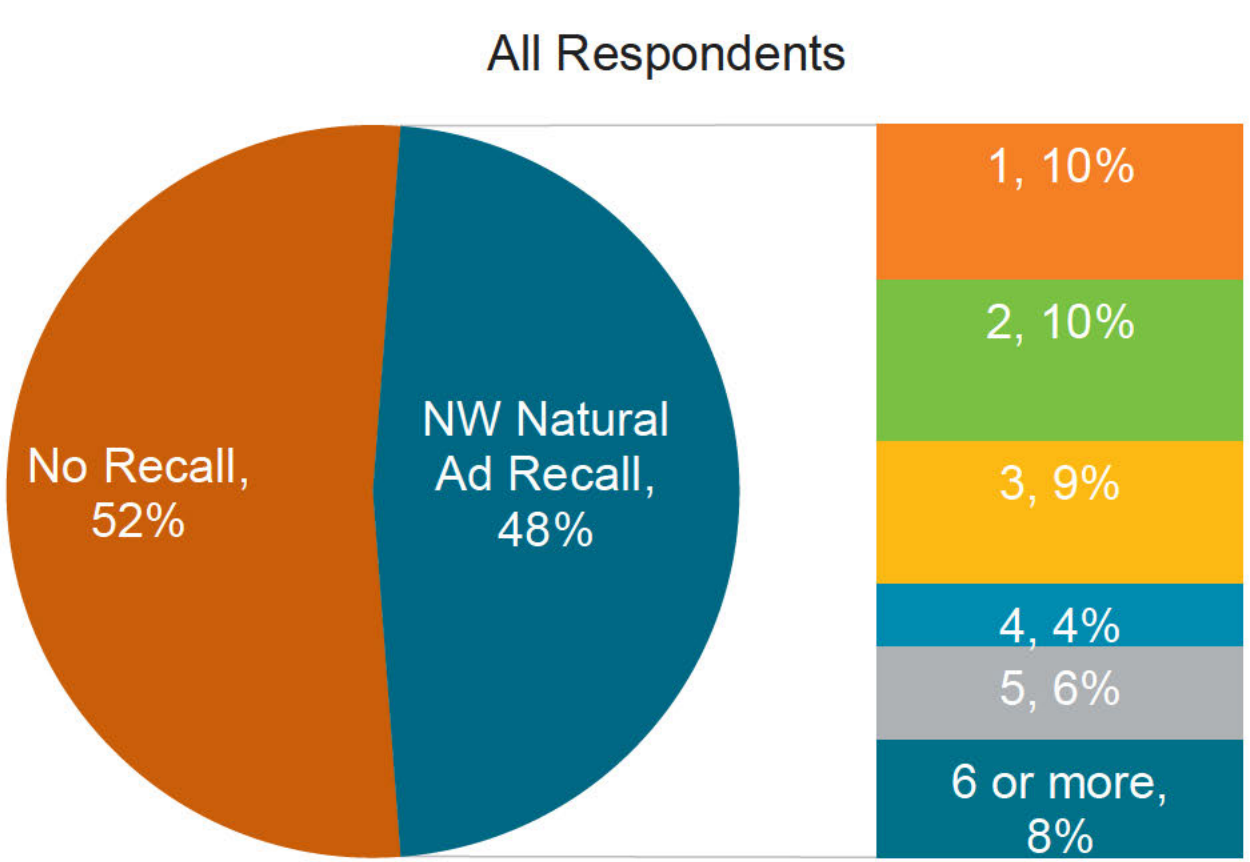
Executive Summary – Natural Gas Preference

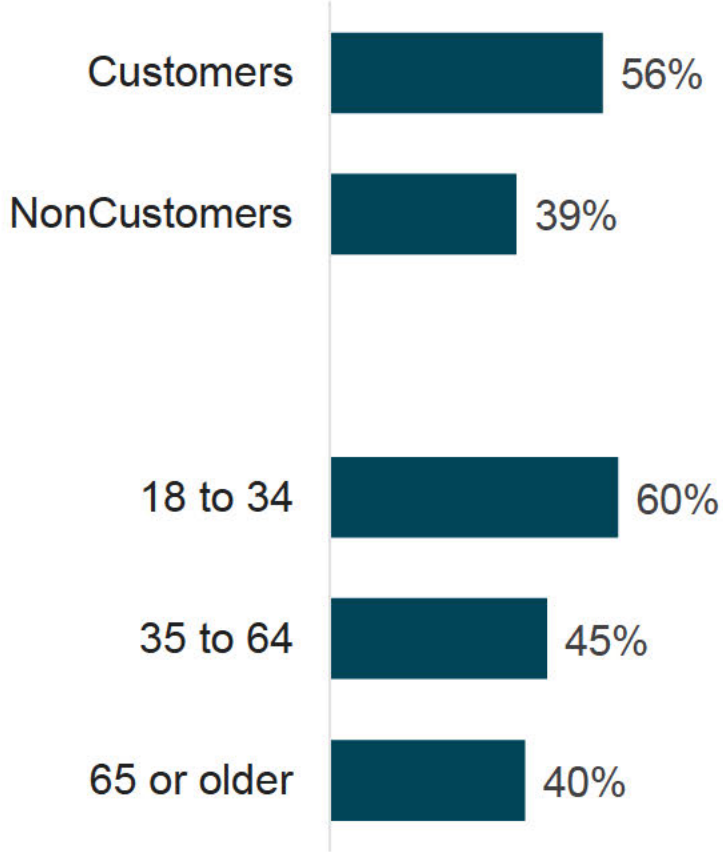
- A majority value either the affordability and reliability of natural gas (46%) or believe it can help achieve climate goals (38%).
- 16% believe natural gas is fossil fuel and should be ban (non-customers 20%, democrats 24% and renters 23%).
- About half do not have a position in whether natural gas should be banned in new buildings.
  - 30% oppose gas ban: 39% homeowners, 35% male, 54% republicans, 41% in Washington county, 39% in Clark county.
  - 23% support gas ban: 30% renters, 29% male, 30% democrats, 30% in Multnomah county.
- 60% of all said natural gas is important for their next home purchase: 81% customers, 66% homeowners, 71% male, 69% republicans.
- Three third agree that natural gas is reliable, efficient or affordable, about half said that natural gas is safe or environmentally friendly.
- About half view NW Natural's environmental efforts as adequate.

Advertising Awareness

NW Natural Advertising Awareness

During the past three months, how many advertisements do you recall seeing, reading, or hearing from your natural gas company - NW Natural?

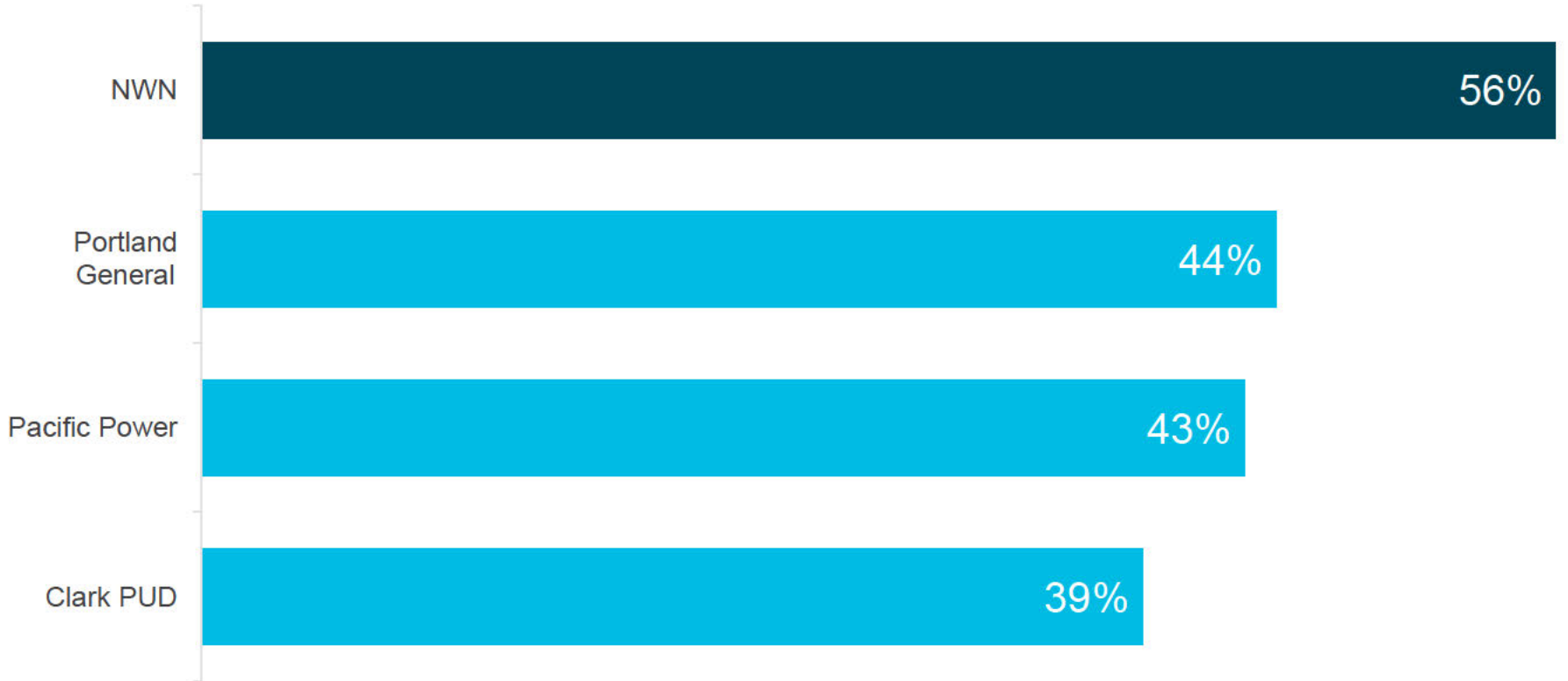




CUB/119
Jenks/10

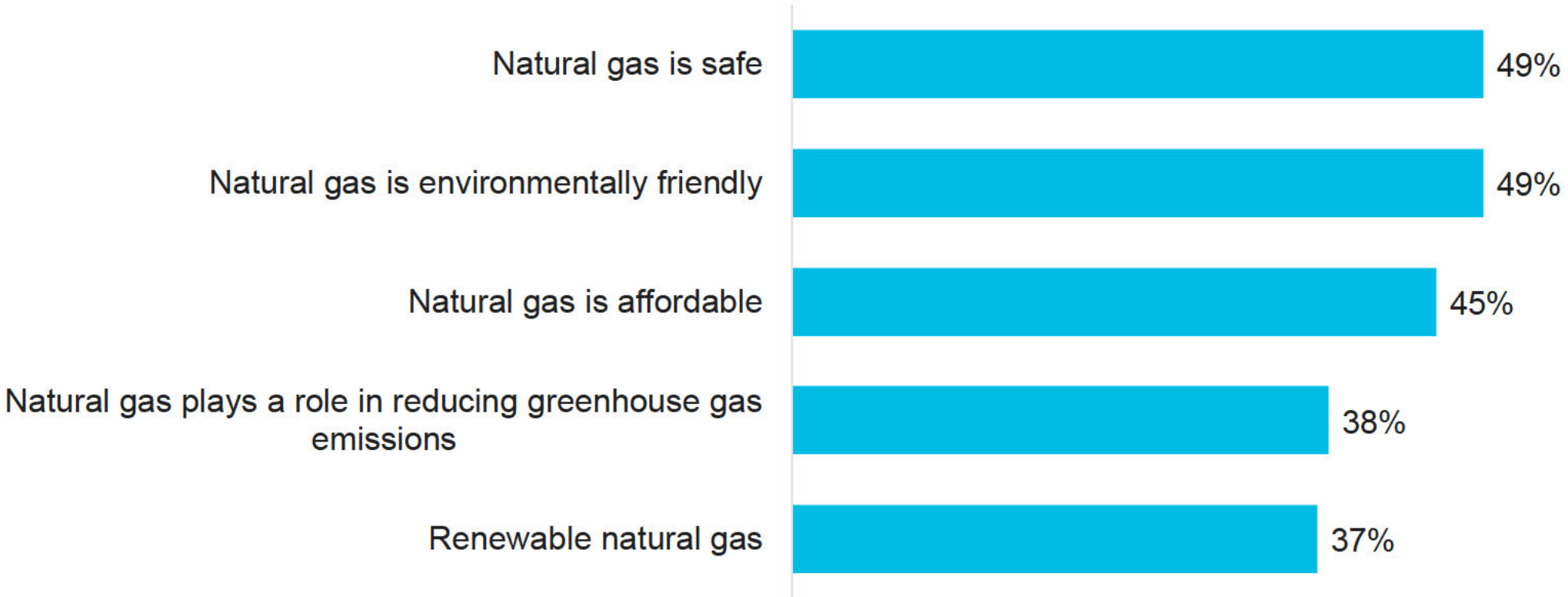
Utility Company Advertising Awareness among its own customers

During the past three months, how many advertisements do you recall seeing, reading, or hearing from your utility company?



NW Natural Ad Message Recall

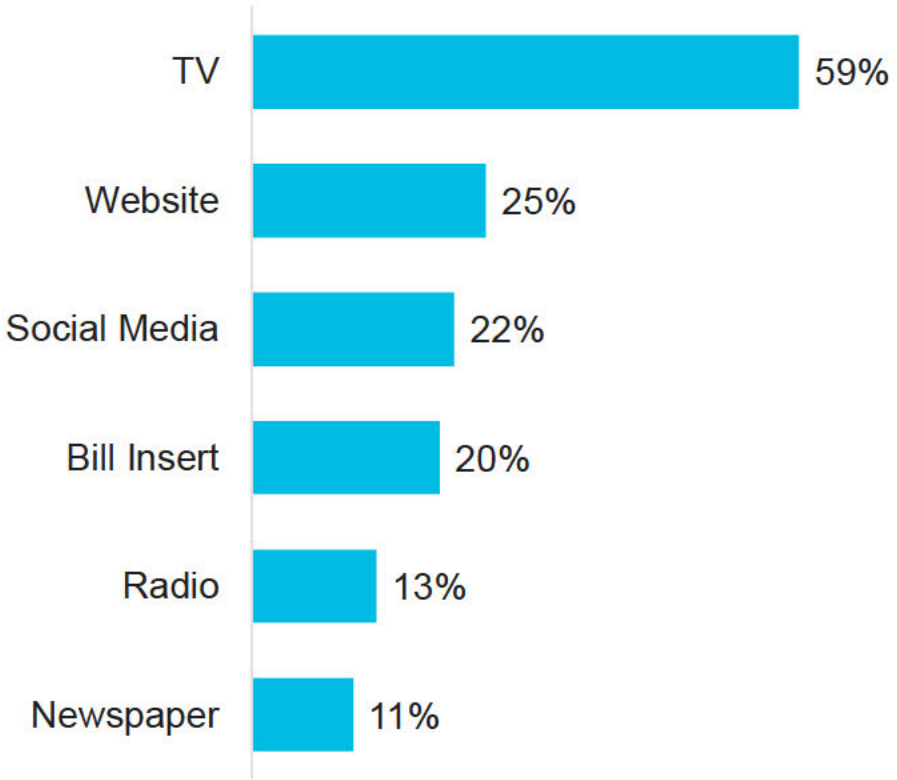
Think about the advertisement(s) you recall from NW Natural, what were the message(s) about? Mark all that apply.

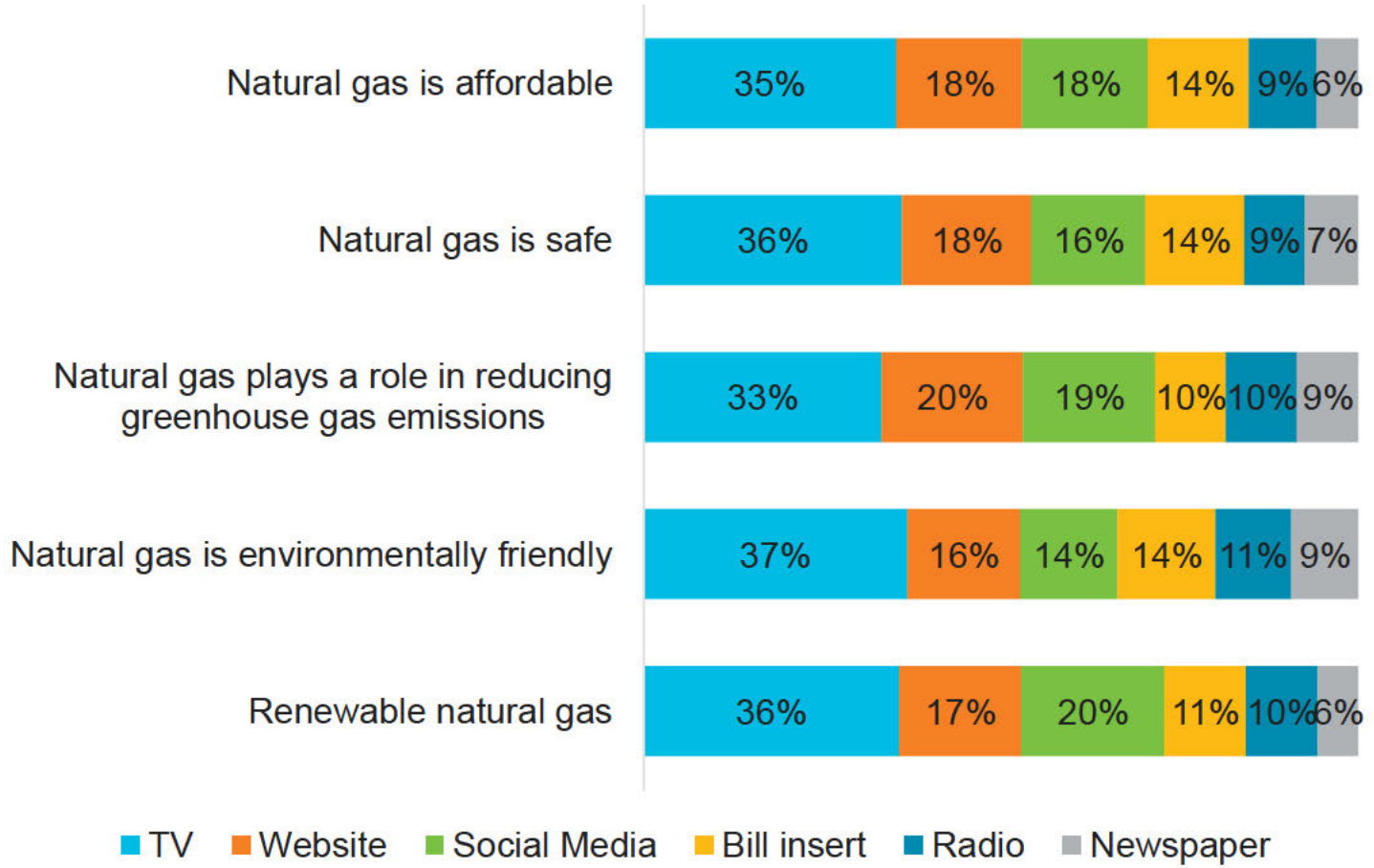


CUB/119
Jenks/12

NW Natural Ad Message Channel

Where did you see or hear this/these communication(s)? Mark all that apply.



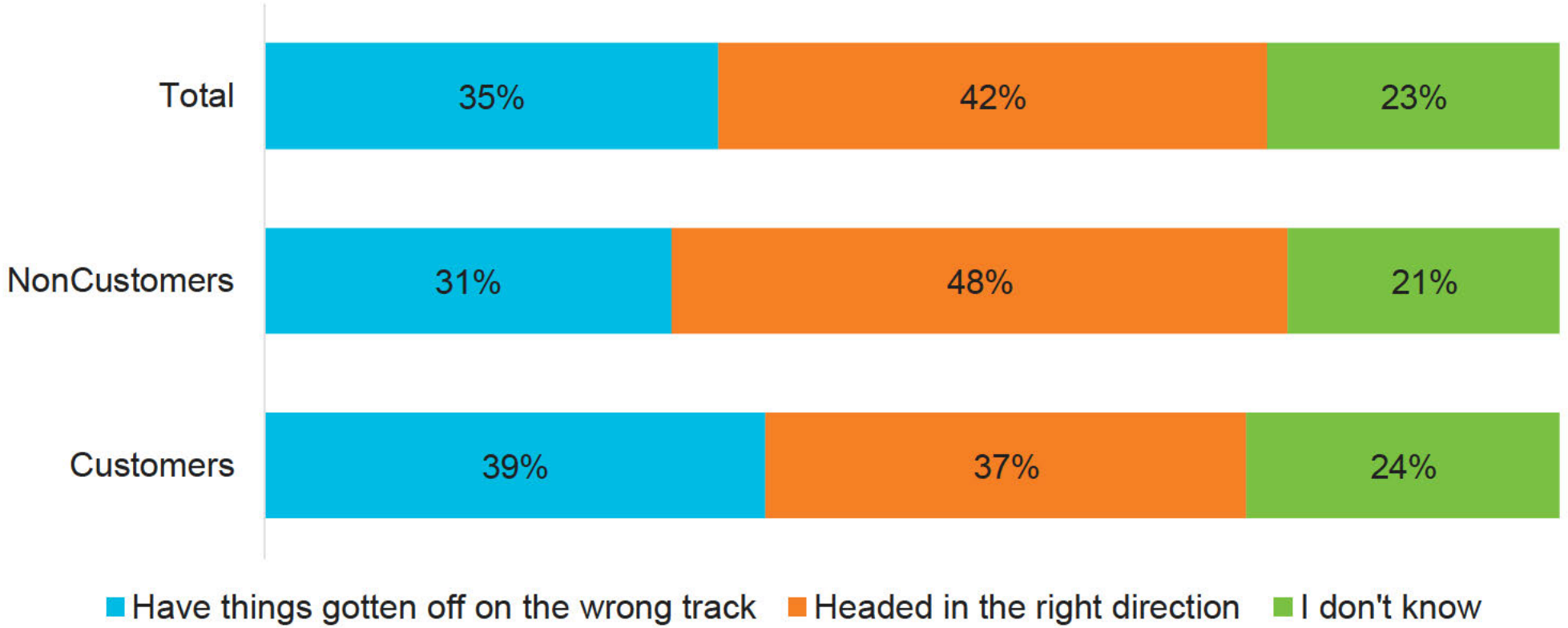


Public Sentiments

CUB/119
Jenks/14

General mood

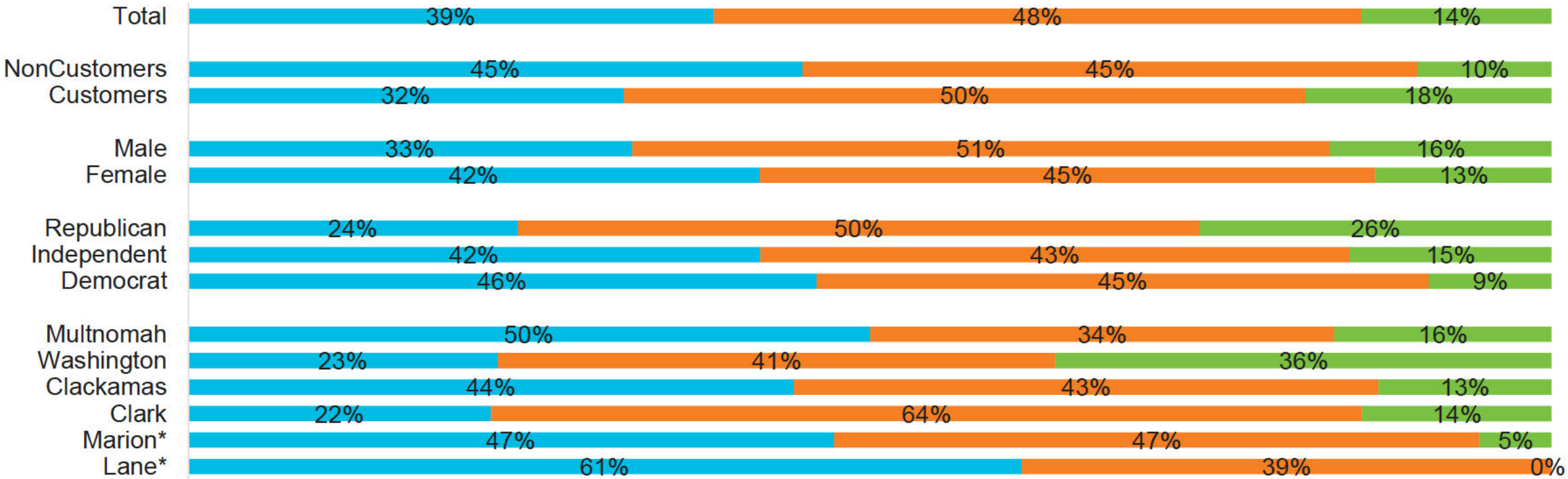
All things considered, would you say that your local community is headed in the right direction, or have things gotten off on the wrong track?



CUB/119
Jenks/15

Carbon Reduction Effort Statement

Which statement comes closest to your point of view?



** Small sample size*

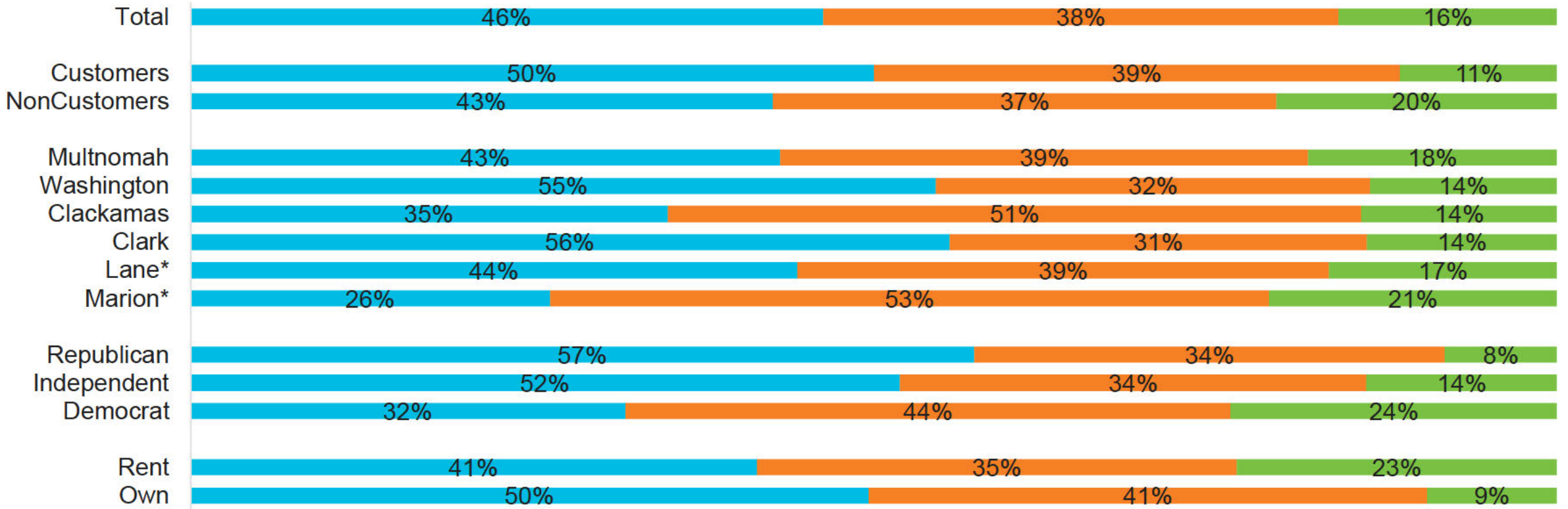
CUB/119
Jenks/16

Natural Gas Preference

CUB/119
Jenks/17

Natural Gas Statements

The following are statements that people sometimes make about natural gas. Please tell me which is closest to what you think.

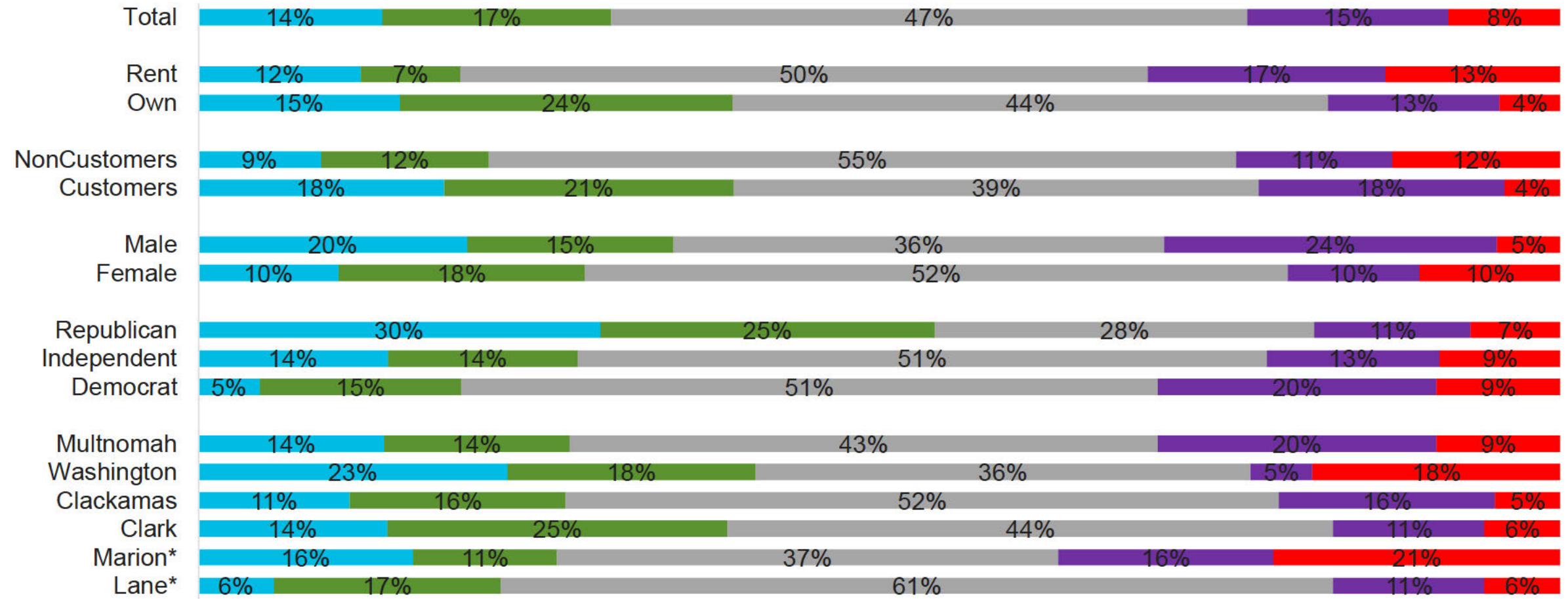


** Small sample size*

CUB/119
Jenks/18

Natural Gas Ban

Would you support or oppose your local government banning new natural gas hookups in homes and buildings?

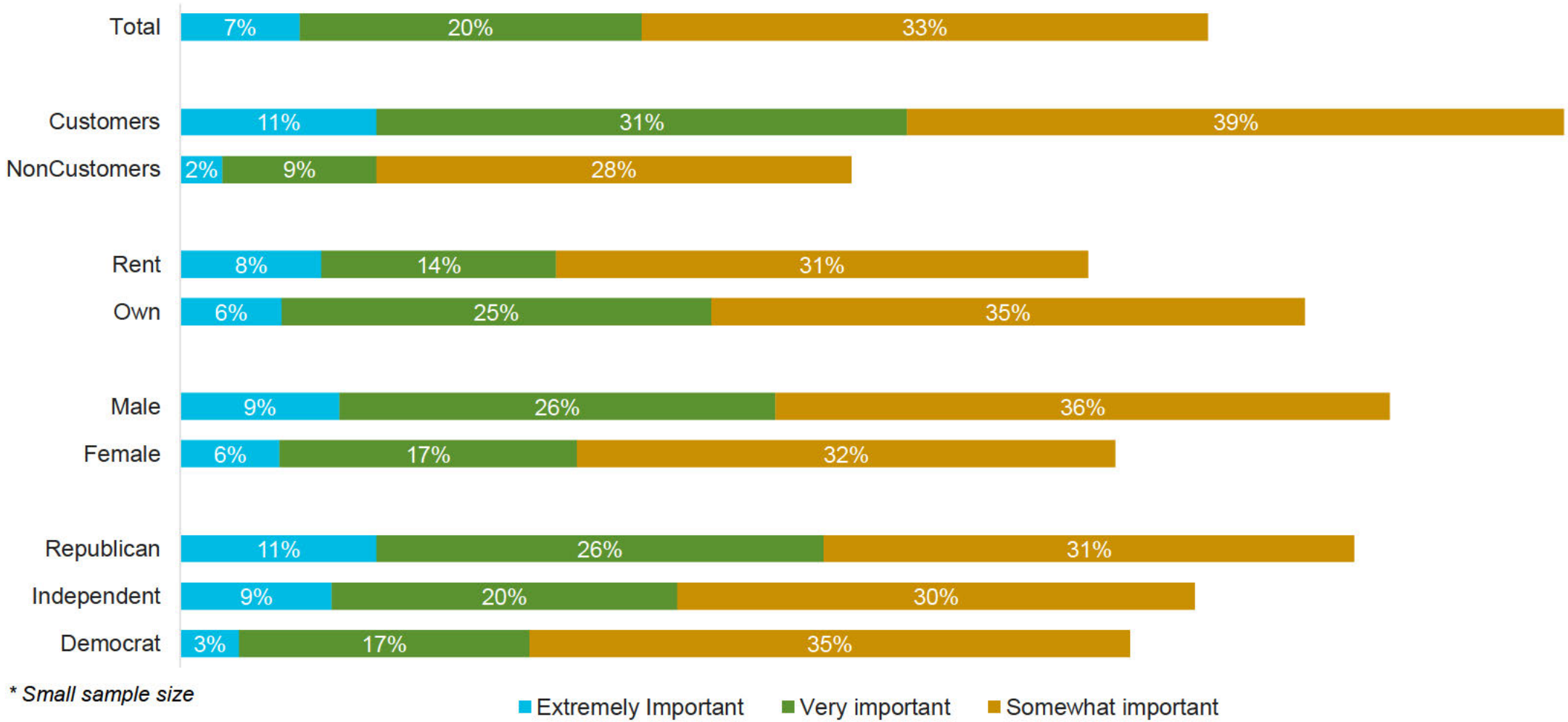


** Small sample size*

CUB/119
Jenks/19

Natural Gas Preference

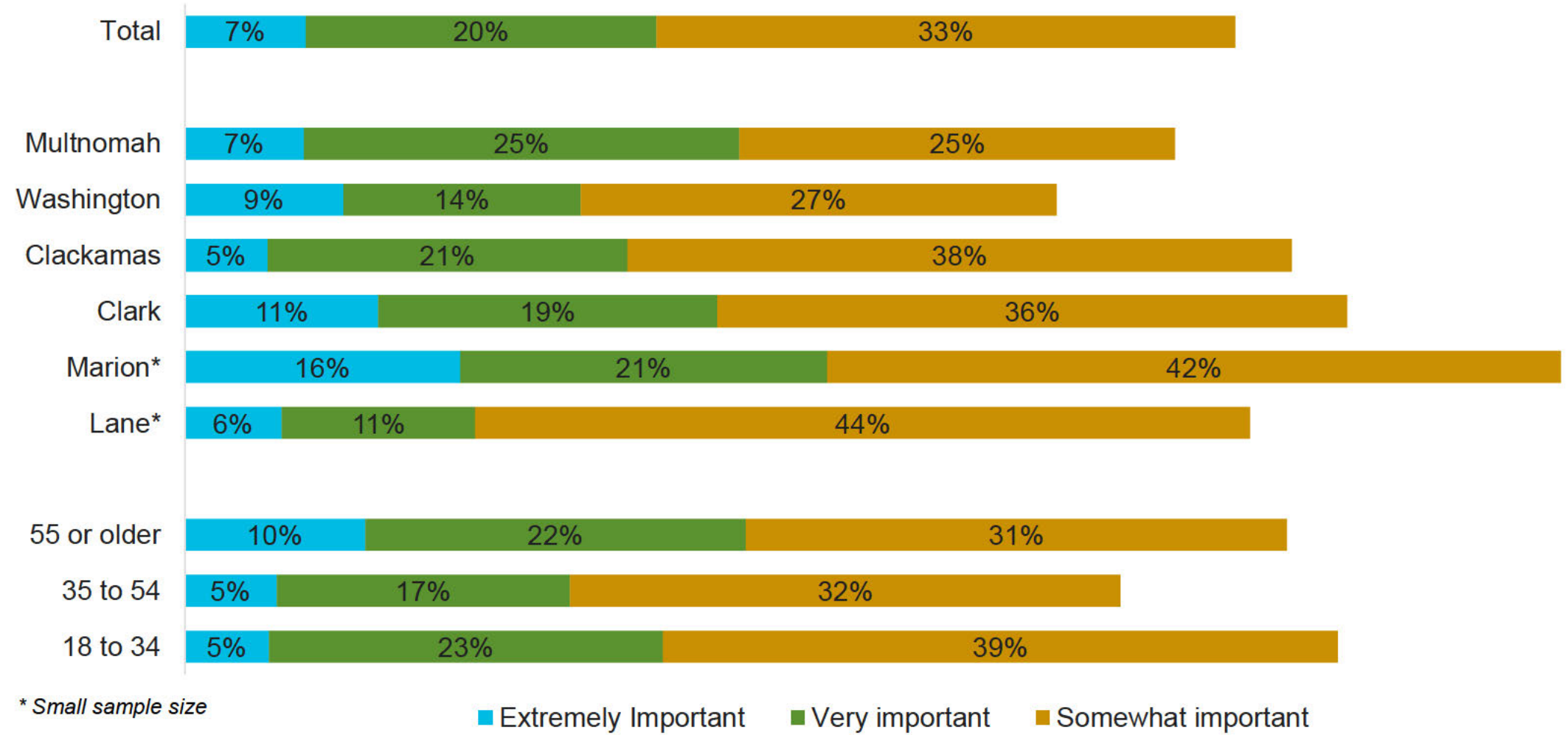
If you were looking for a new home, how important would it be to you that the new home have natural gas appliances?



** Small sample size*

Natural Gas Preference (continued)

If you were looking for a new home, how important would it be to you that the new home have natural gas appliances?

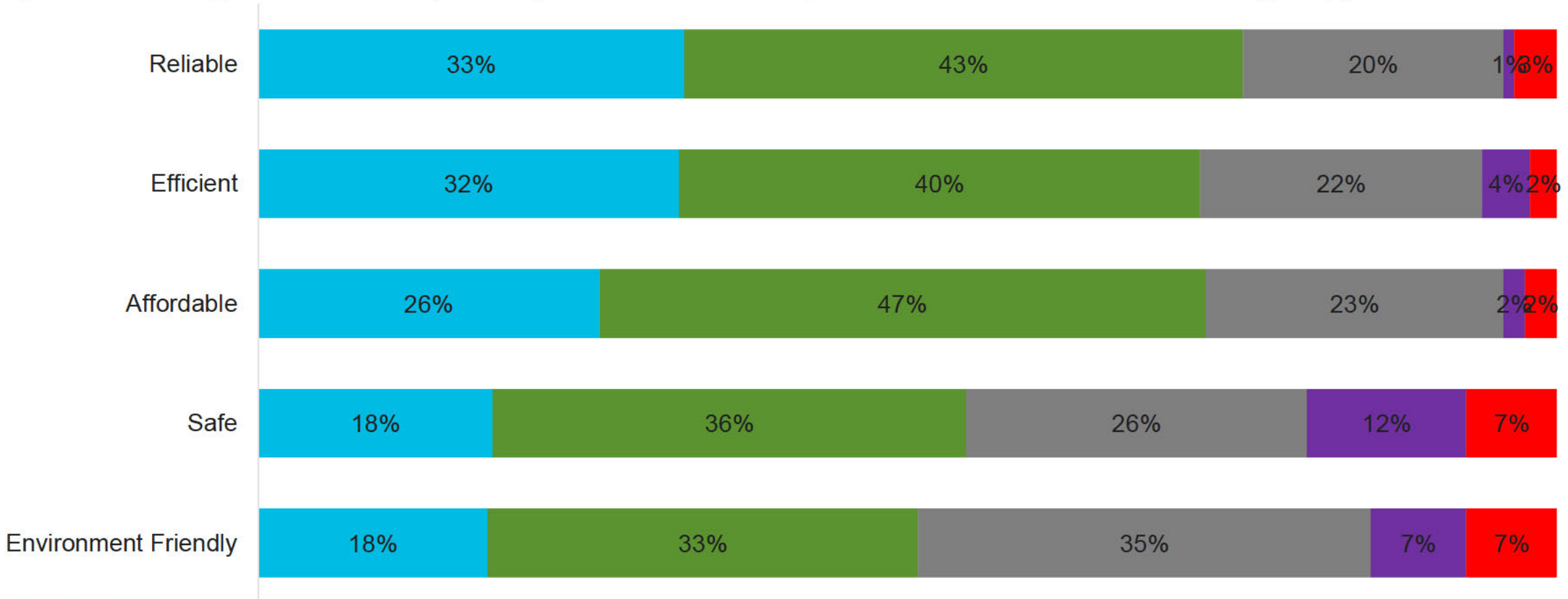


** Small sample size*

CUB/119
Jenks/21

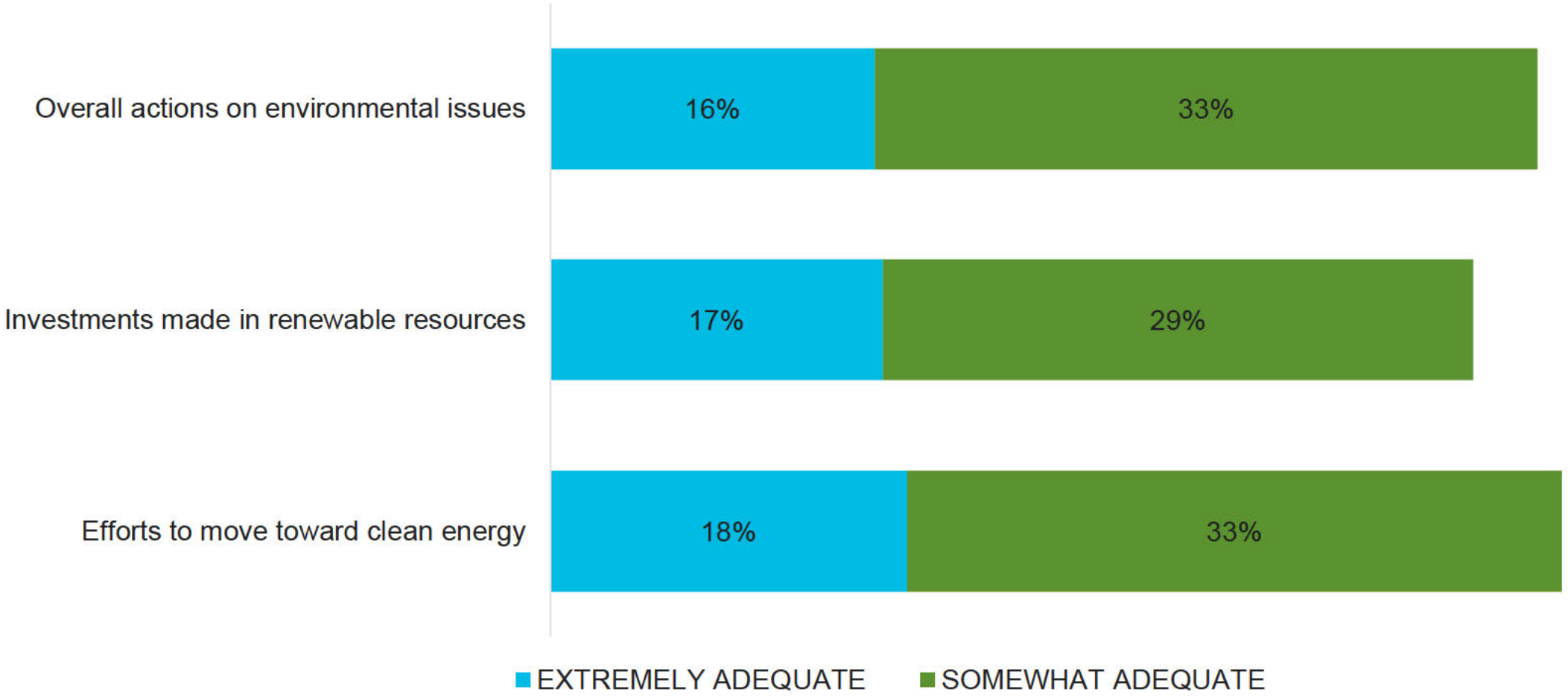
Natural Gas Attributes

If you were looking for a new home, how important would it be to you that the new home have natural gas appliances?



NW Natural Environmental Efforts

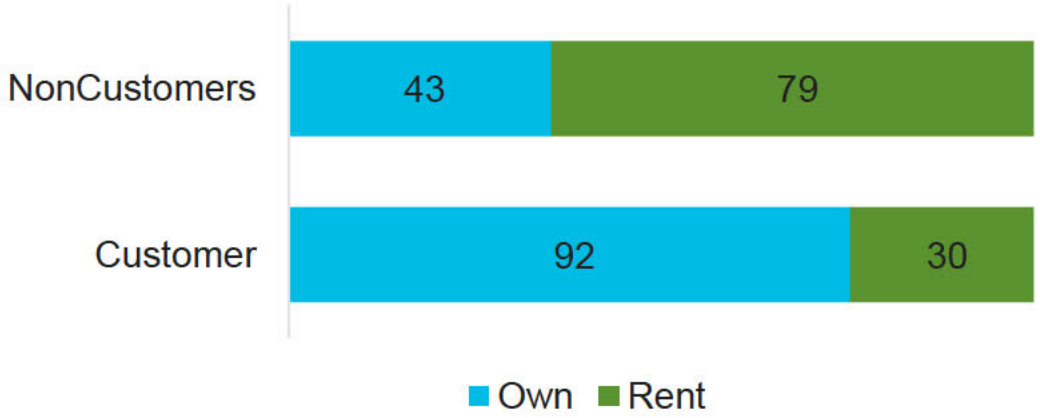
How would you rate NW Natural on the following:



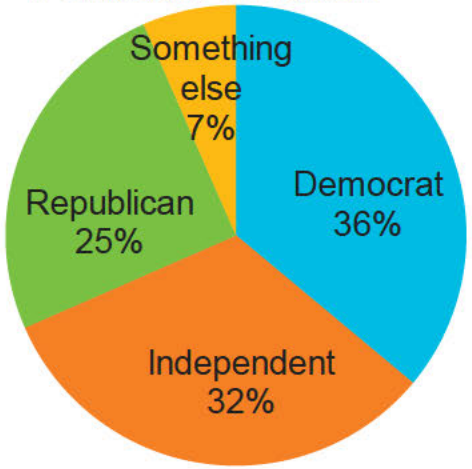
Demographics

Demographics

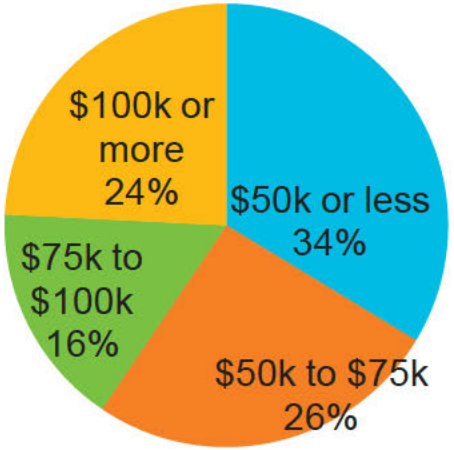
Homeownership



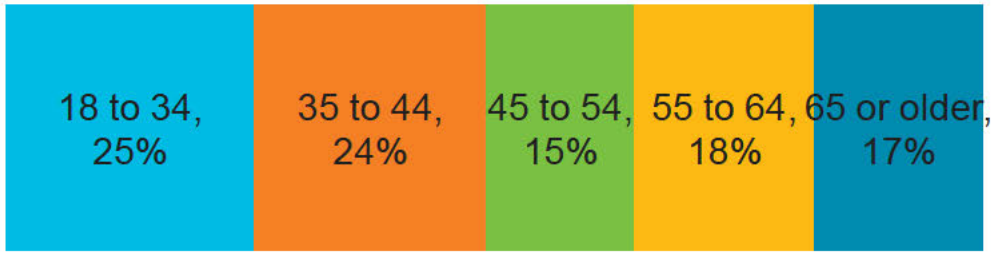
Political Affiliation



Income



Age



NW Natural Advertising Awareness Public Sentiment Tracking - Q3 2020

Methodology

- Online research panels
- Primary residence within NW Natural service territory
- 250 respondents each quarter
  - 125 gas customers
  - 125 non-gas customers
- Repeat every three months
  - June
  - September
  - December
  - March

Executive Summary – Ad Awareness

- 55% of all respondents recalled seeing NW Natural ads during that last quarter, an improvement of 7 percentage points from Q2.
  - The increase is largely due the age of 35 – 64, while other groups drops.
  - Other local utilities are also experiencing increases in their own advertising awareness: PGE 48%, Pacific Power 47%, and Clark PUD 45%.
- Among those recalled seeing NW Natural ads, about half of them saw Natural Gas is Safe or Natural Gas is environmental friendly.
- 62% of the recalls were from TV, followed by social media 29% and websites 22%.

Executive Summary –Public Sentiment

- 44% thought that our local community is gotten off the wrong track, close to half of NW Natural customers shared the same sentiment vs. 40% of non-customers.
- Possibly due to the wildfire occurring during the month of September, the percentage of people who said that not enough is being done to reduce carbon reduction jumped from last quarter's 39% to 53%. This trend is consistent across customers and non-customers, and different demographic groups.

Executive Summary – Natural Gas Preference

- A majority value either the affordability and reliability of natural gas (40%) or believe it can help achieve climate goals (38%). Though it dropped slightly from last quarter, possibly also due to the wildfire.
- 22% believe natural gas is fossil fuel and should be ban, comparing to 16% from last quarter.
- Those who oppose natural gas ban has remained stable this quarter at 30%, while those who support a ban has increased by 9 percentage points.
- 58% of all said natural gas is important for their next home purchase, it is down slightly from last quarter.
- About three quarters of all respondents agreed that natural gas is reliable, efficient or affordable, about half said that natural gas is safe.
- About half view NW Natural's environmental efforts as adequate.

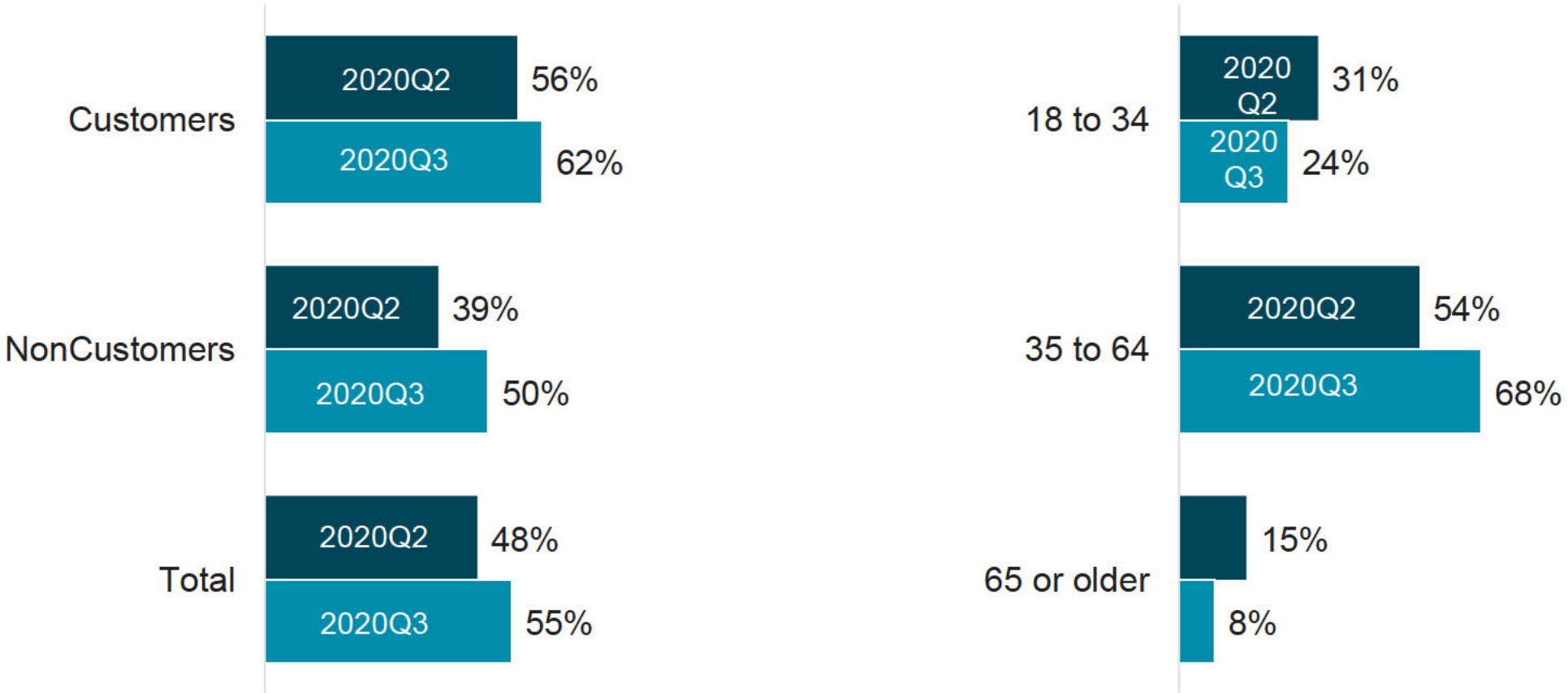
CUB/119
Jenks/30

Advertising Awareness

CUB/119
Jenks/31

NW Natural Advertising Awareness

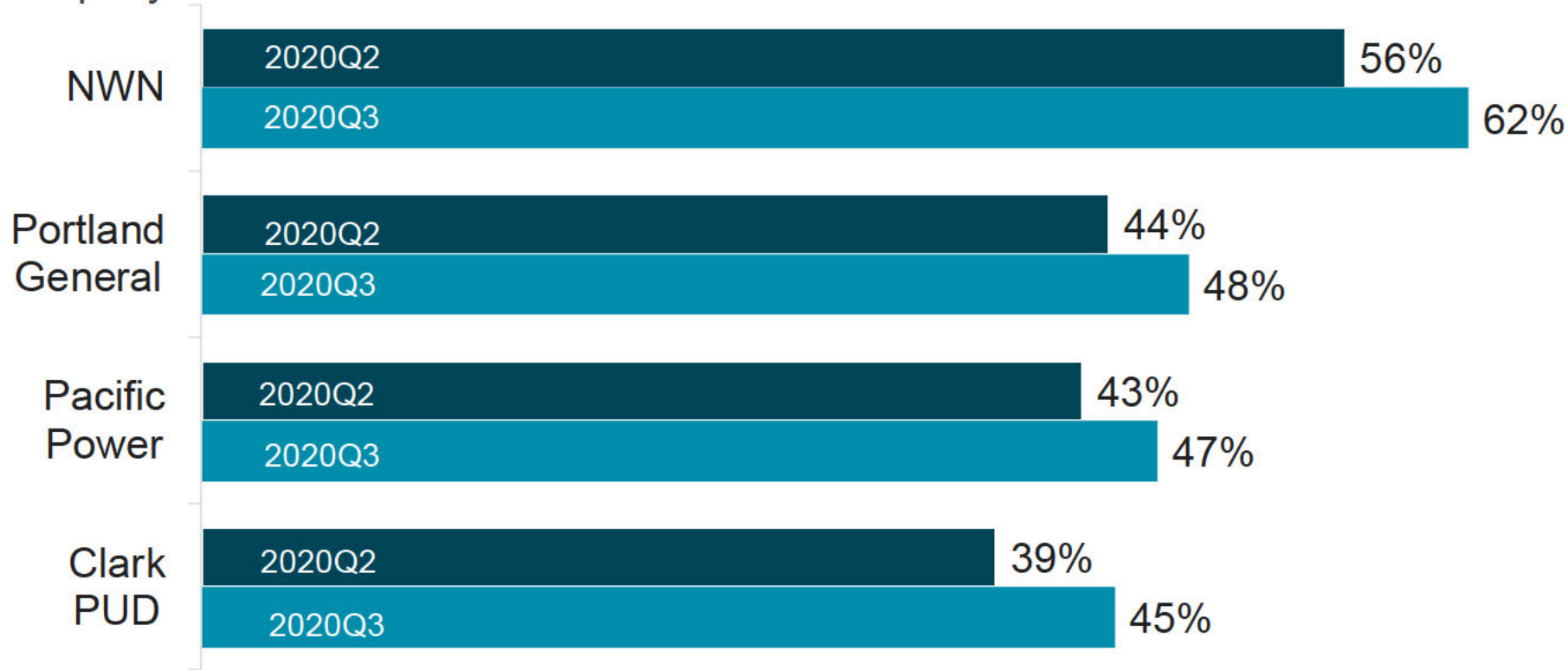
During the past three months, how many advertisements do you recall seeing, reading, or hearing from your natural gas company - NW Natural?



CUB/119
Jenks/32

Utility Company Advertising Awareness among its own customers

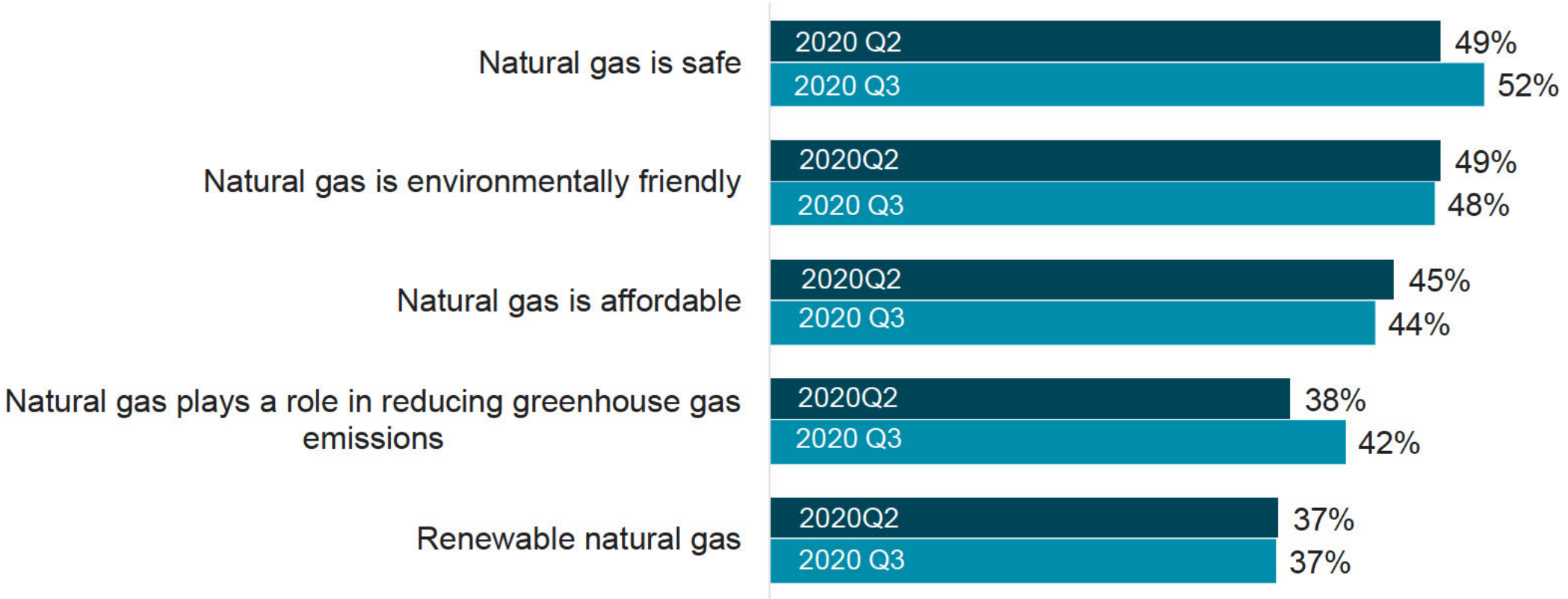
During the past three months, how many advertisements do you recall seeing, reading, or hearing from your utility company?



CUB/119
Jenks/33

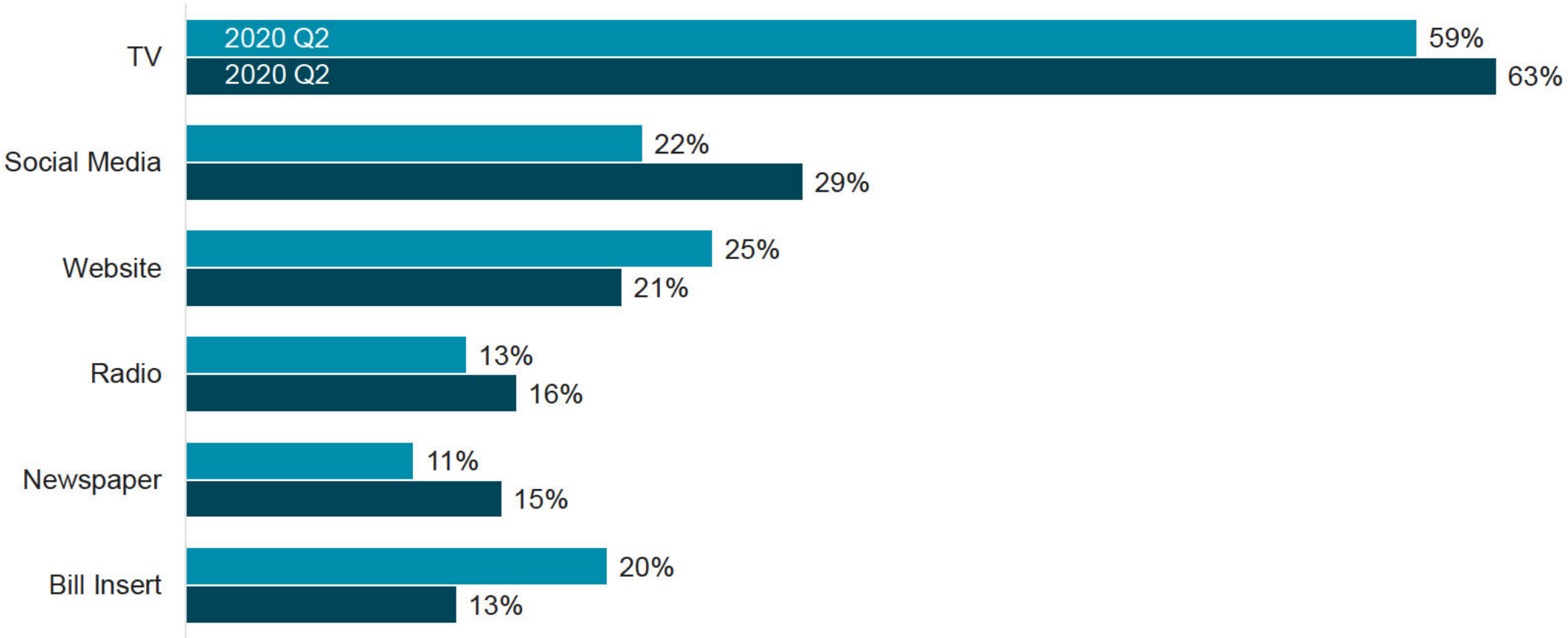
NW Natural Ad Message Recall

Think about the advertisement(s) you recall from NW Natural, what were the message(s) about? Mark all that apply.



NW Natural Ad Message Channel

Where did you see or hear this/these communication(s)? Mark all that apply.

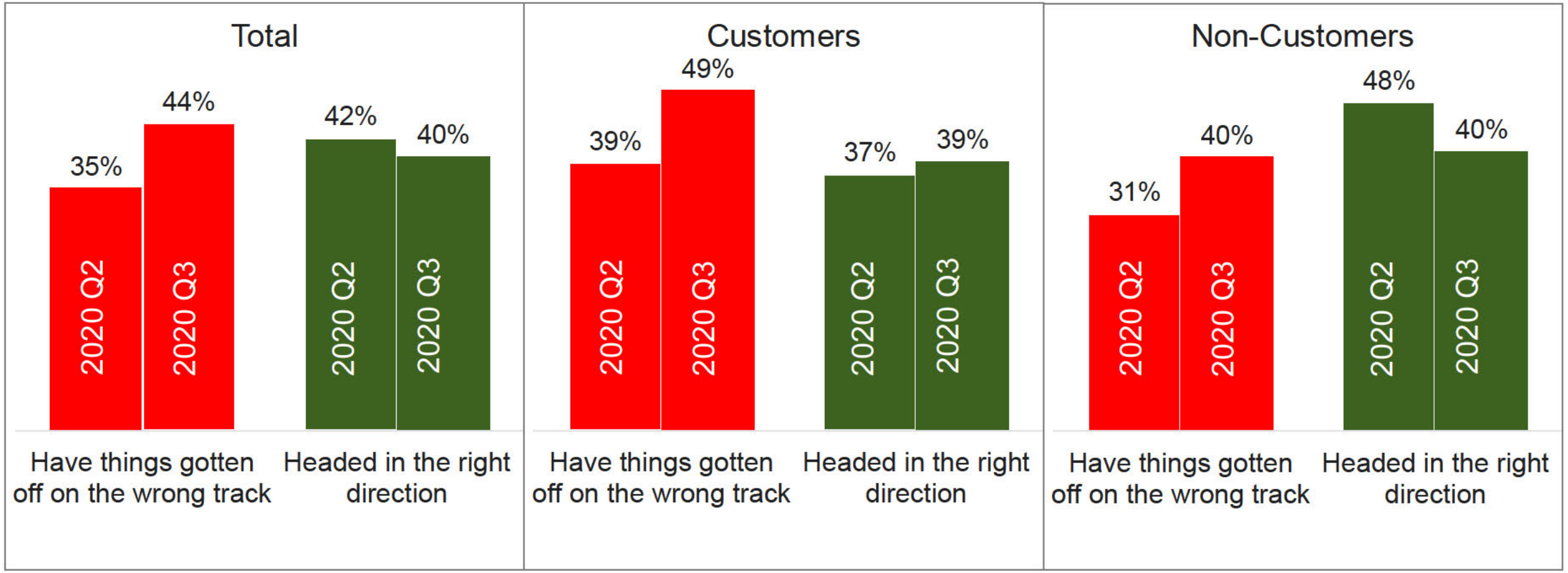


Public Sentiments

CUB/119
Jenks/36

General mood

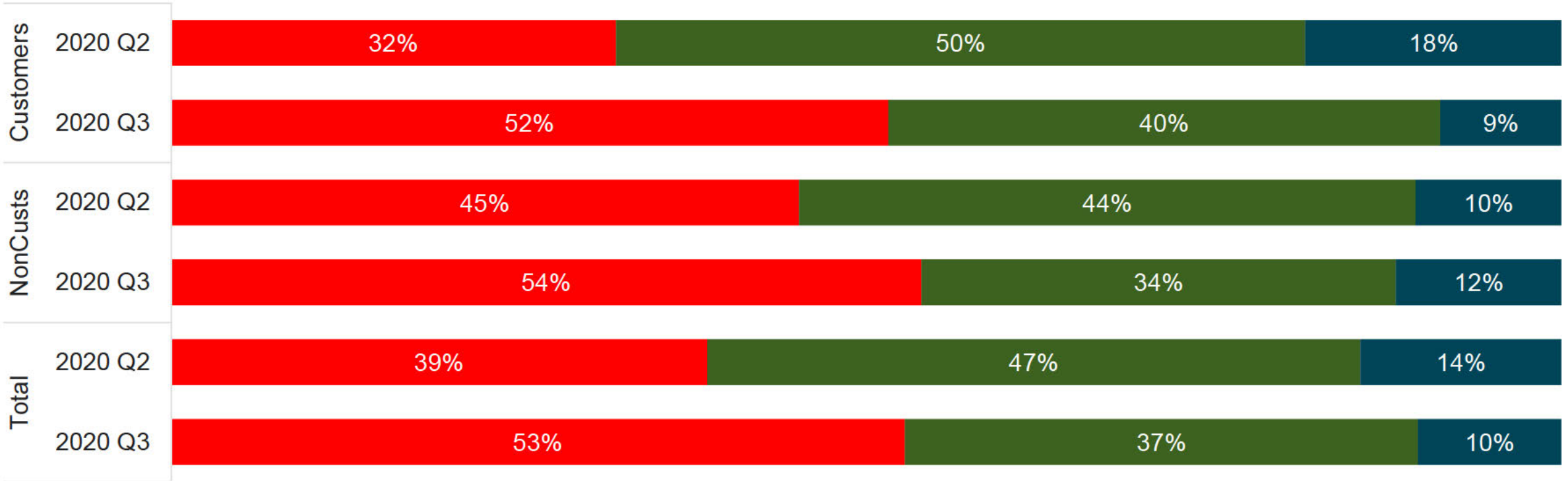
All things considered, would you say that your local community is headed in the right direction, or have things gotten off on the wrong track?



CUB/119
Jenks/37

Carbon Reduction Effort Statement

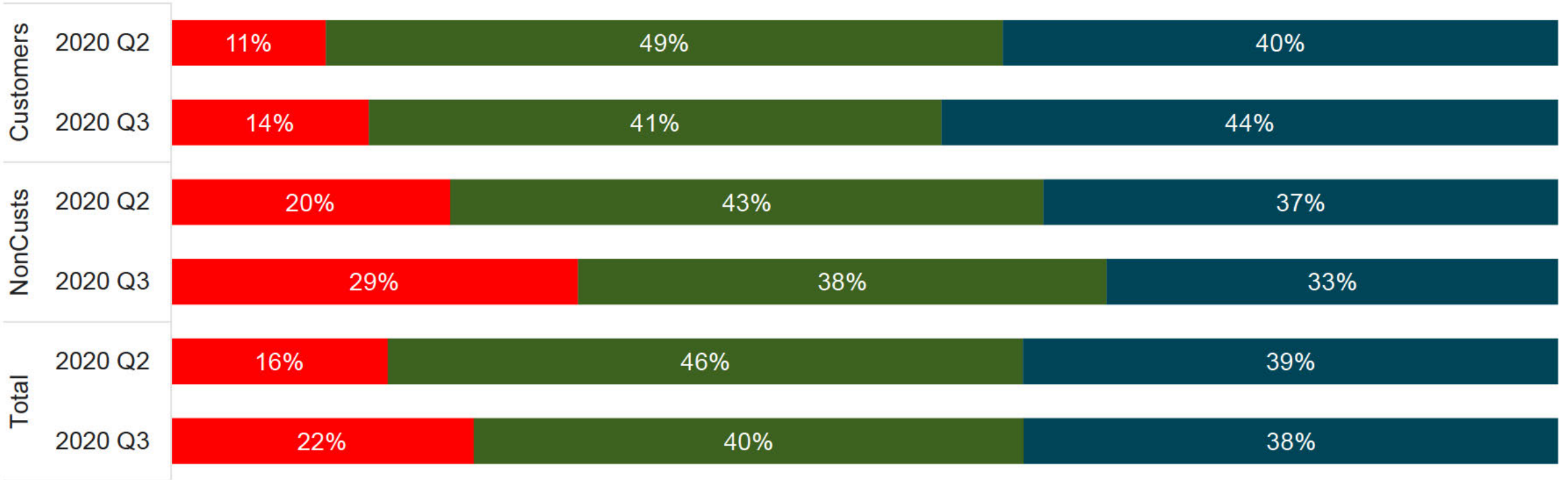
Which statement comes closest to your point of view?



Natural Gas Preference

Natural Gas Statements

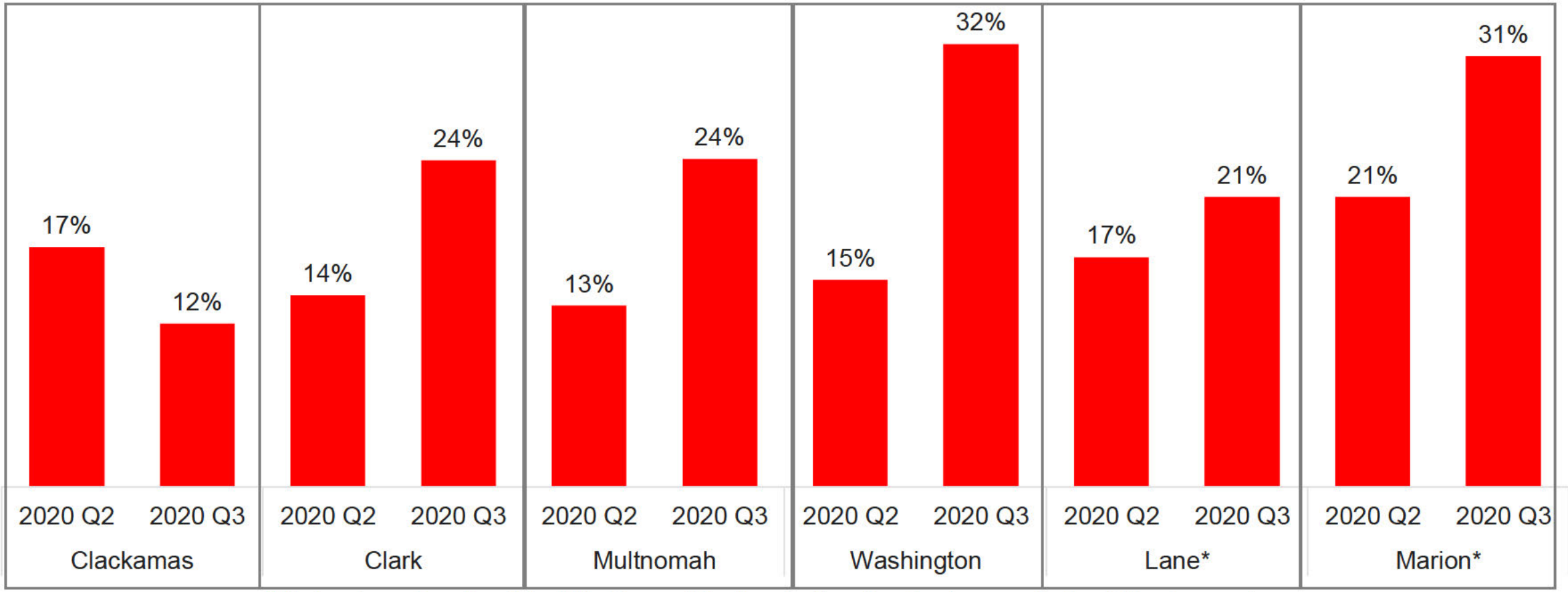
Which statement comes closest to your point of view?



CUB/119
Jenks/40

Natural Gas Statements by County

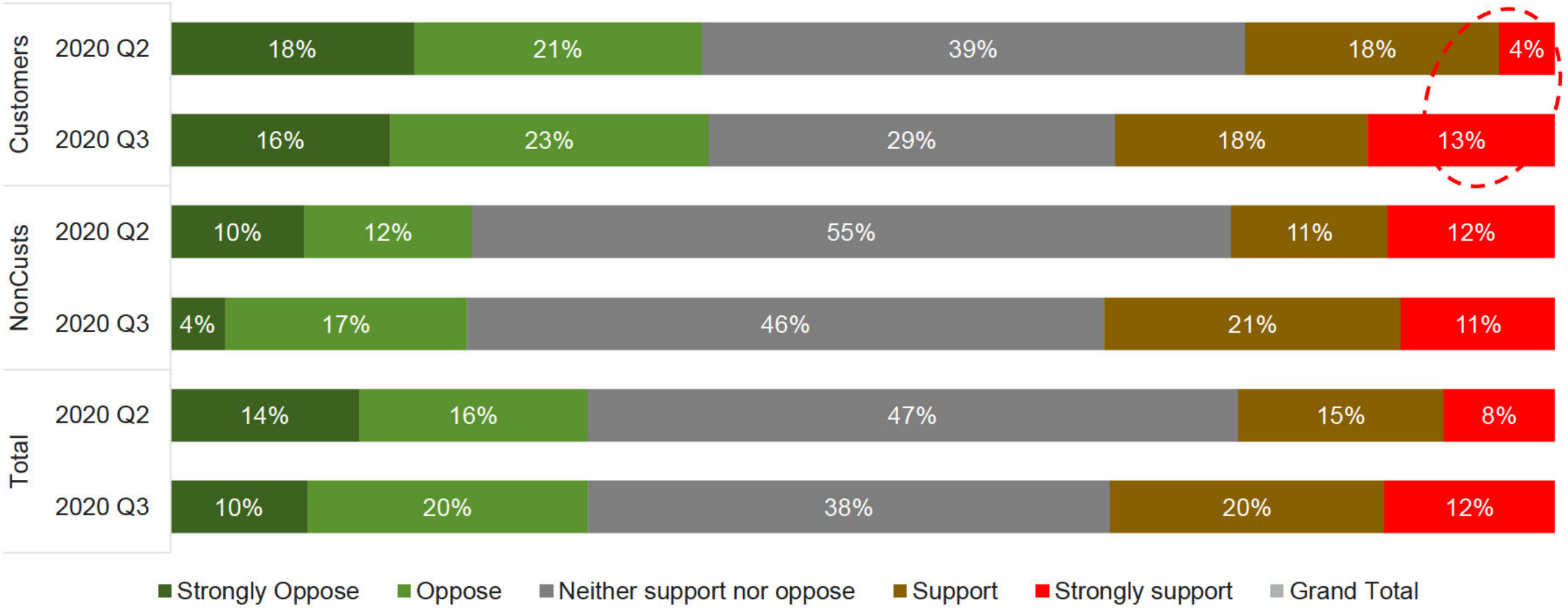
Statement: Natural gas is a fossil fuel that is contributing to the climate change. It should be banned now.



CUB/119
Jenks/41

Natural Gas Ban

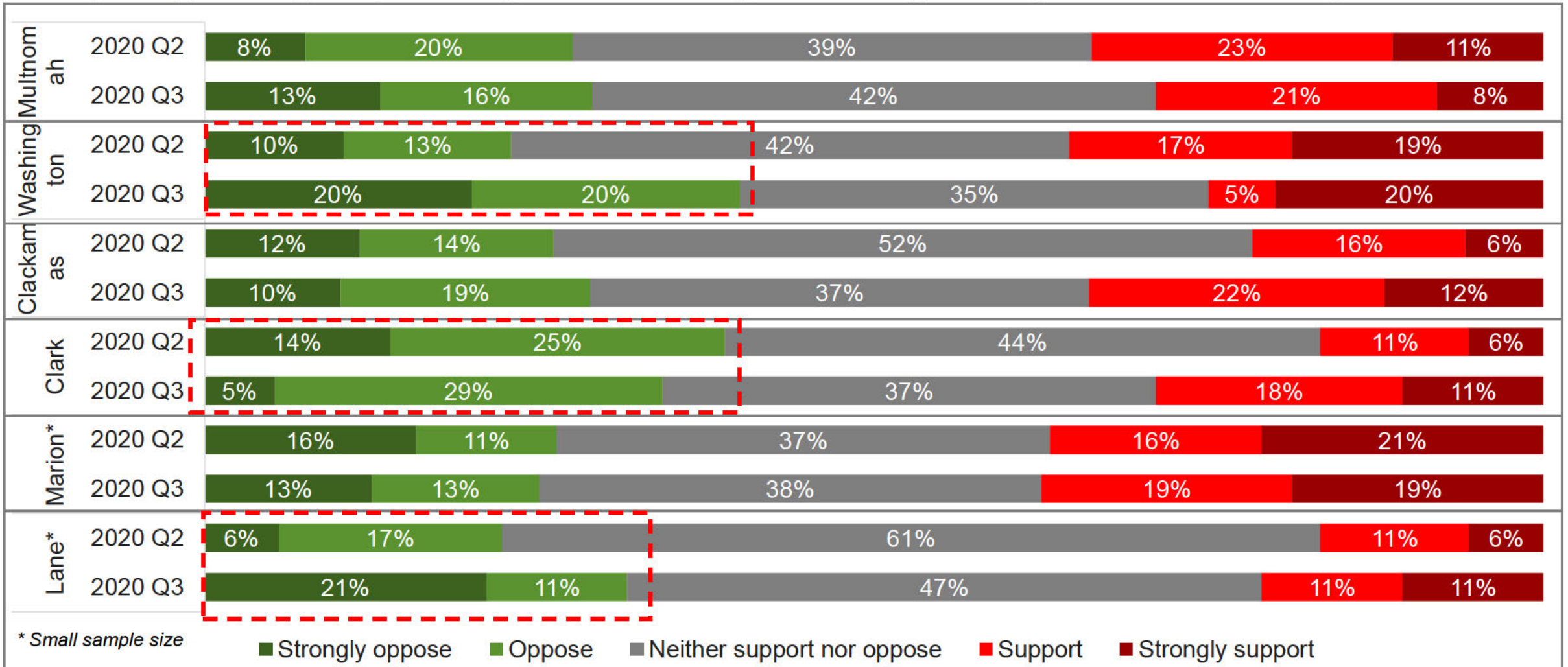
Which statement comes closest to your point of view?



CUB/119
Jenks/42

Natural Gas Ban by county

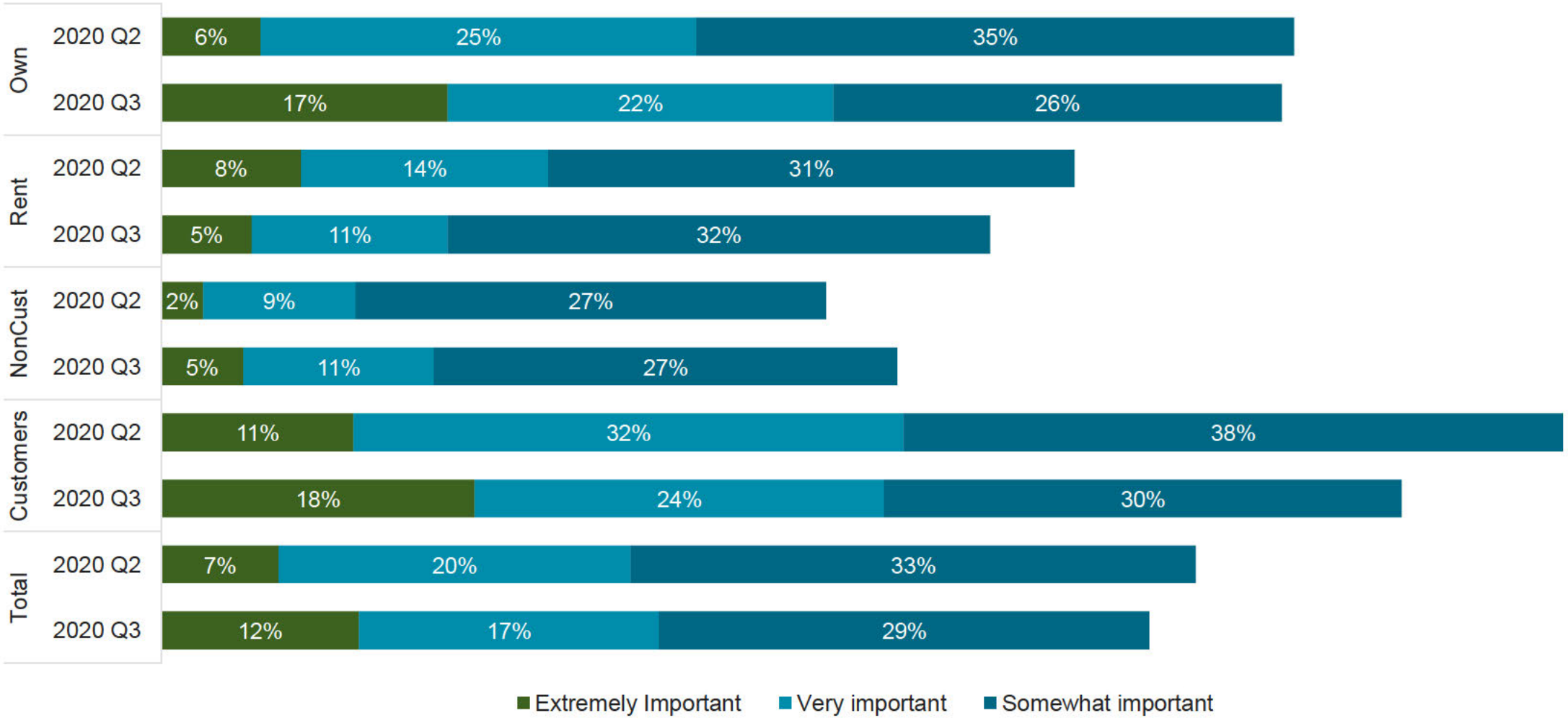
Would you support or oppose your local government banning new natural gas hookups in homes and buildings?



CUB/119
Jenks/43

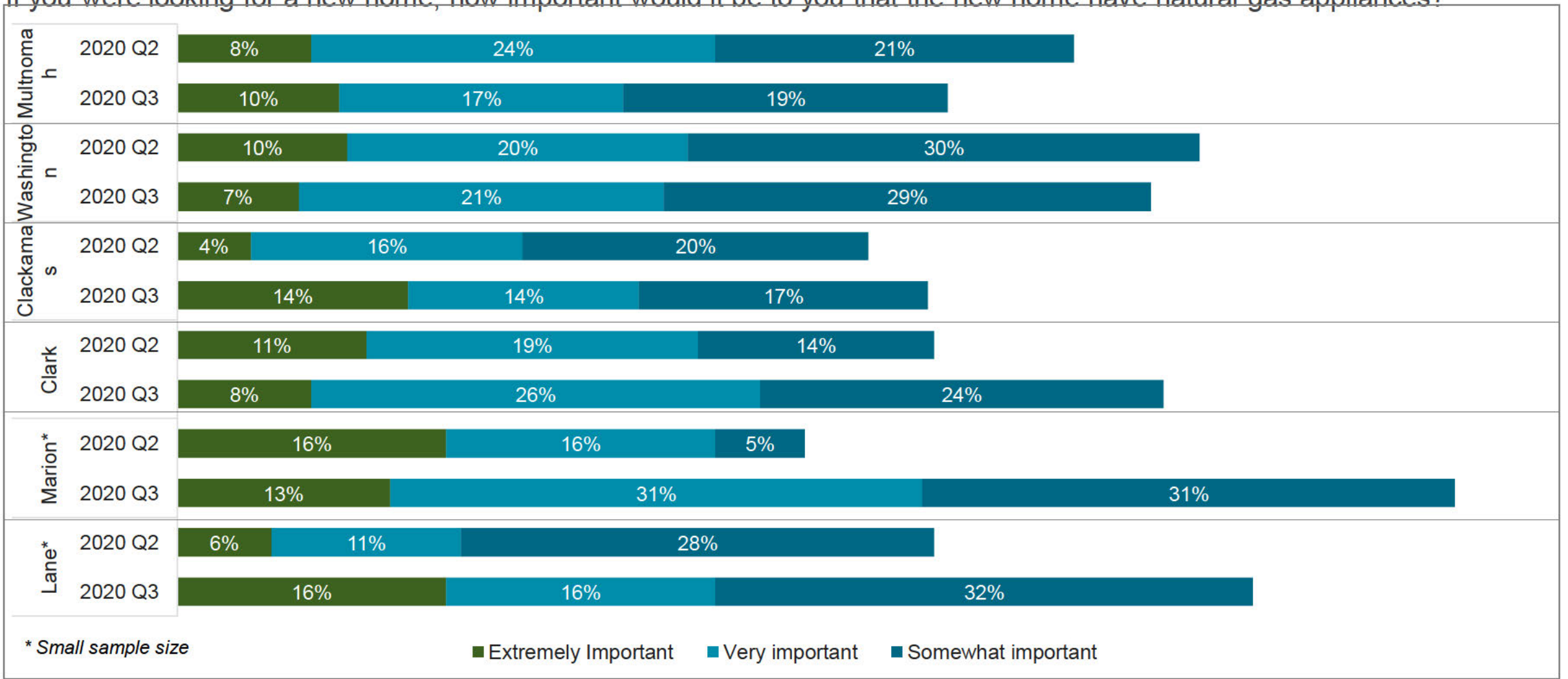
Natural Gas Preference

If you were looking for a new home, how important would it be to you that the new home have natural gas appliances?



Natural Gas Preference by county

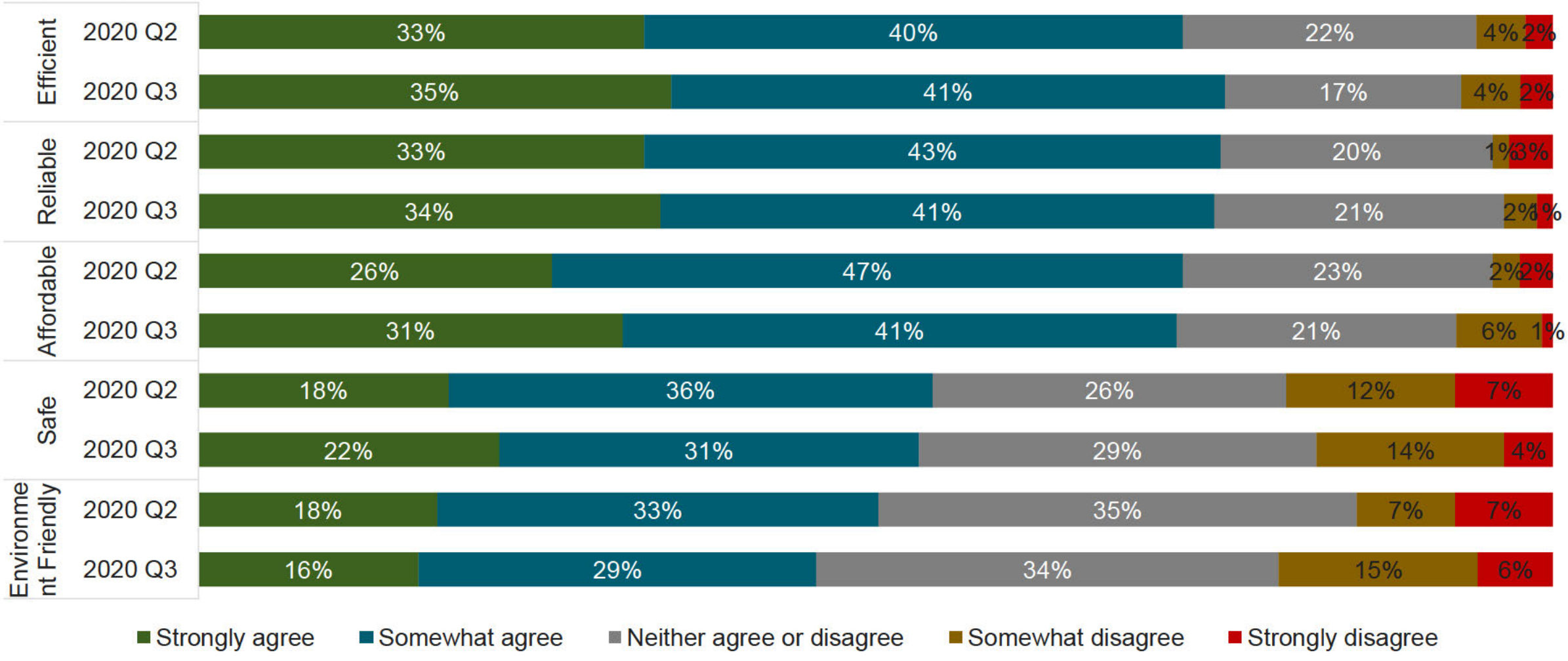
If you were looking for a new home, how important would it be to you that the new home have natural gas appliances?



CUB/119
Jenks/45

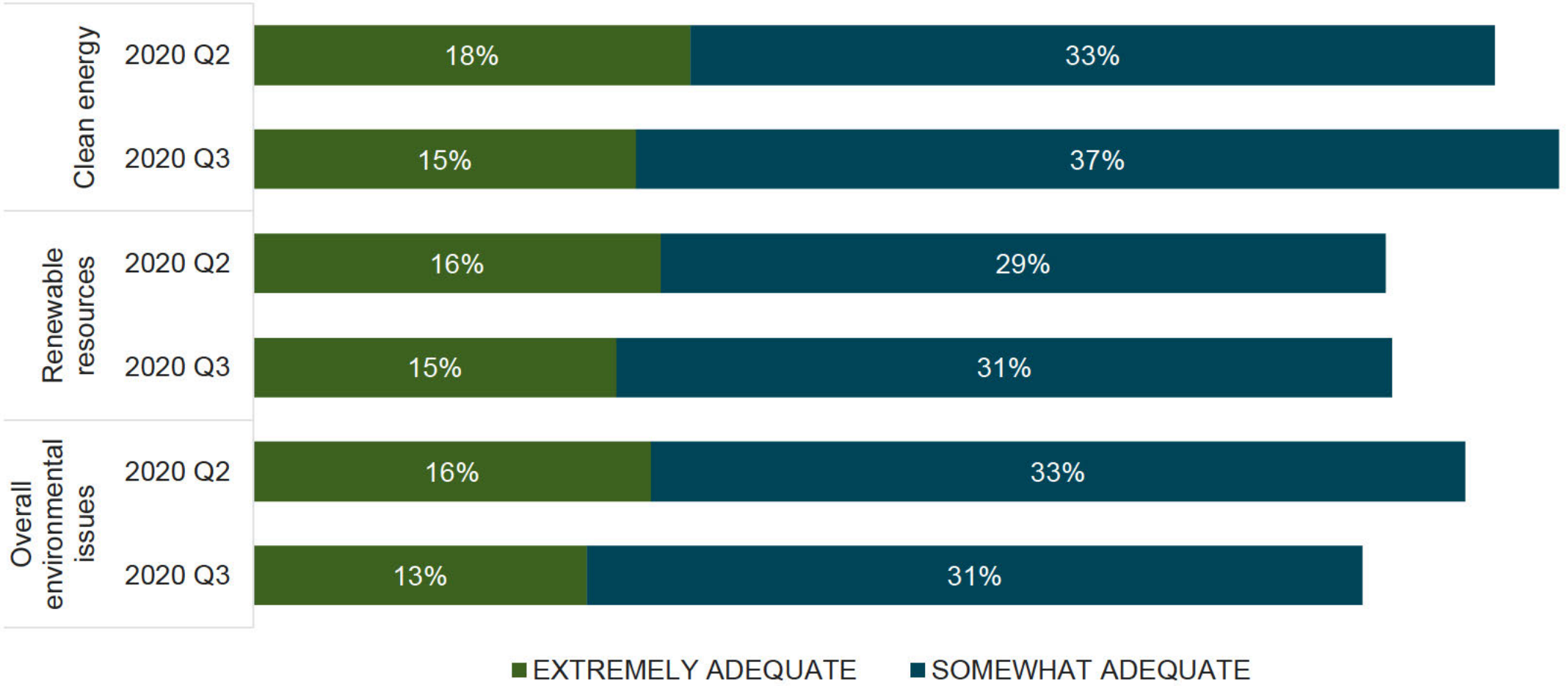
Natural Gas Attributes

Do you agree with the following statements about natural gas?



NW Natural Environmental Efforts

How would you rate NW Natural on the following:



NW Natural Advertising Awareness Public Sentiment Tracking - Q4 2020

Methodology

- Online research panels
- Primary residence within NW Natural service territory
- 250 respondents each quarter
  - 125 gas customers
  - 125 non-gas customers
- Repeat every three months
  - June
  - September
  - December
  - March

Executive Summary – Ad Awareness

- 55% of all respondents recalled seeing NW Natural ads during that last quarter, an improvement of 7 percentage points from Q2.
  - The increase is largely due the age of 35 – 64, while other groups drops.
  - Other local utilities are also experiencing increases in their own advertising awareness: PGE 48%, Pacific Power 47%, and Clark PUD 45%.
- Among those recalled seeing NW Natural ads, about half of them saw Natural Gas is Safe or Natural Gas is environmental friendly.
- 62% of the recalls were from TV, followed by social media 29% and websites 22%.

Executive Summary –Public Sentiment

- 44% thought that our local community is gotten off the wrong track, close to half of NW Natural customers shared the same sentiment vs. 40% of non-customers.
- Possibly due to the wildfire occurring during the month of September, the percentage of people who said that not enough is being done to reduce carbon reduction jumped from last quarter's 39% to 53%. This trend is consistent across customers and non-customers, and different demographic groups.

Executive Summary – Natural Gas Preference

- A majority value either the affordability and reliability of natural gas (40%) or believe it can help achieve climate goals (38%). Though it dropped slightly from last quarter, possibly also due to the wildfire.
- 22% believe natural gas is fossil fuel and should be ban, comparing to 16% from last quarter.
- Those who oppose natural gas ban has remained stable this quarter at 30%, while those who support a ban has increased by 9 percentage points.
- 58% of all said natural gas is important for their next home purchase, it is down slightly from last quarter.
- About three quarters of all respondents agreed that natural gas is reliable, efficient or affordable, about half said that natural gas is safe.
- About half view NW Natural's environmental efforts as adequate.

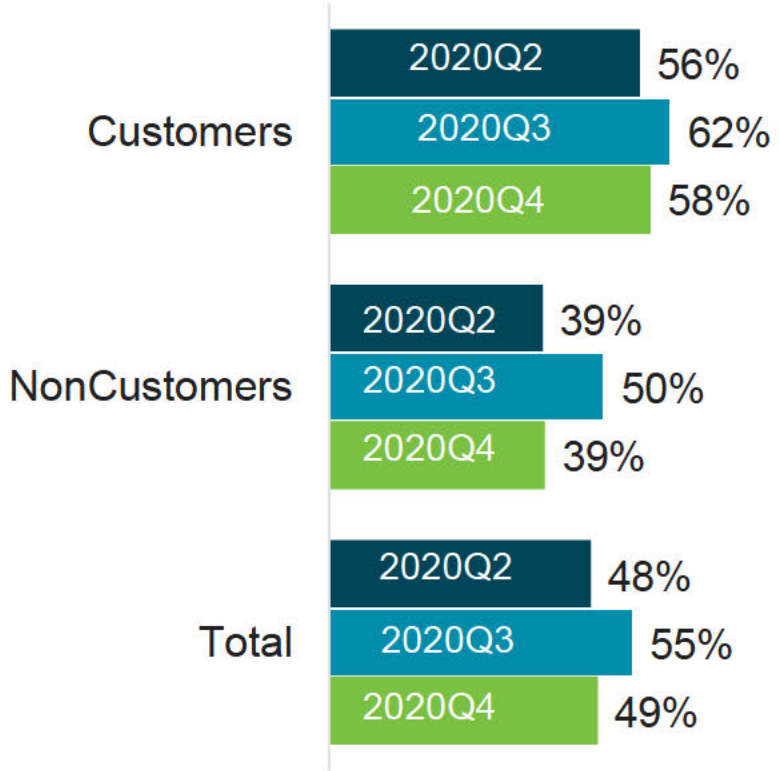
Advertising Awareness

CUB/119
Jenks/53

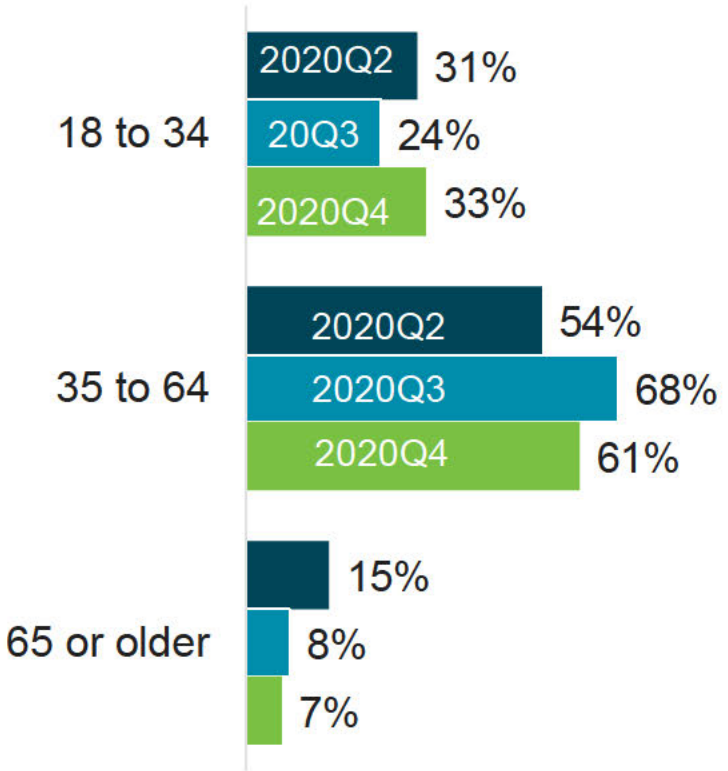
NW Natural Advertising Awareness

During the past three months, how many advertisements do you recall seeing, reading, or hearing from your natural gas company - NW Natural?

By Customers/Non-customers

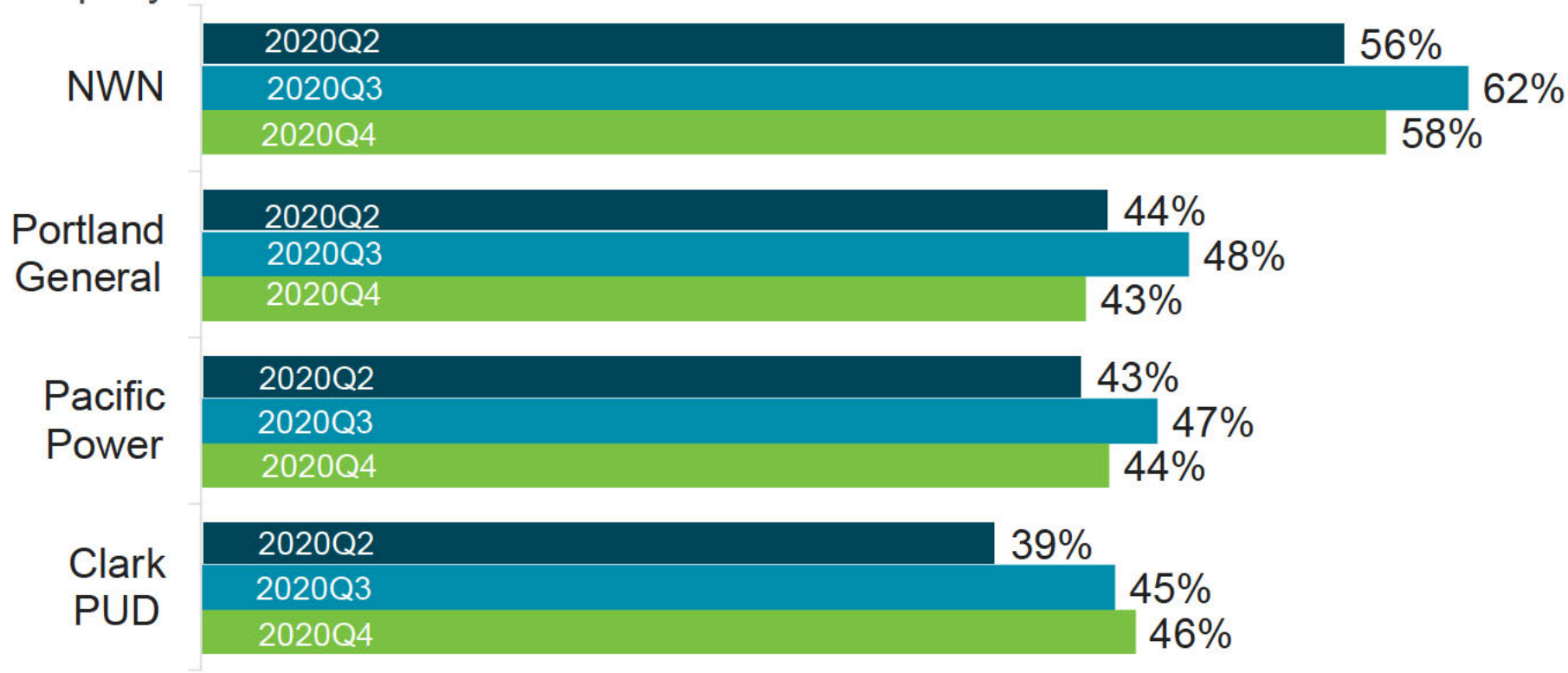


By Age Group



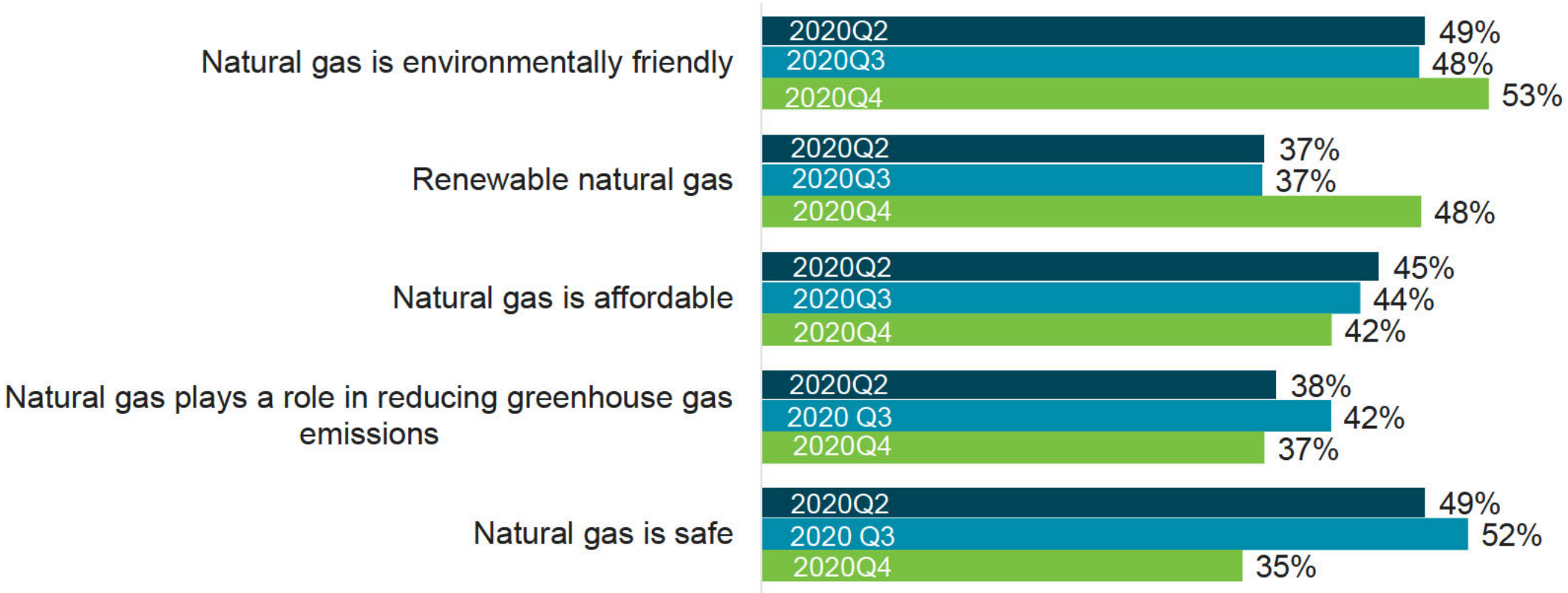
Utility Company Advertising Awareness among its own customers

During the past three months, how many advertisements do you recall seeing, reading, or hearing from your utility company?



NW Natural Ad Message Recall

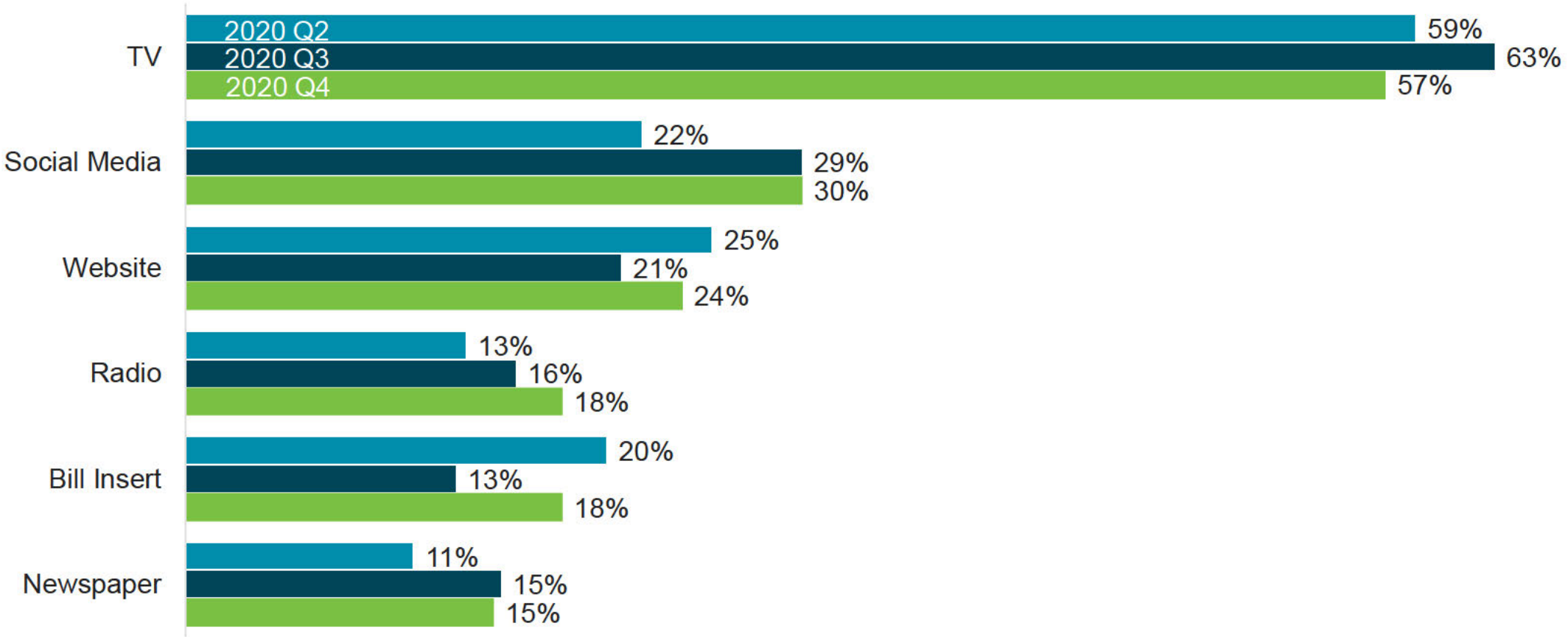
Think about the advertisement(s) you recall from NW Natural, what were the message(s) about? Mark all that apply.



CUB/119
Jenks/56

NW Natural Ad Message Channel

Where did you see or hear this/these communication(s)? Mark all that apply.

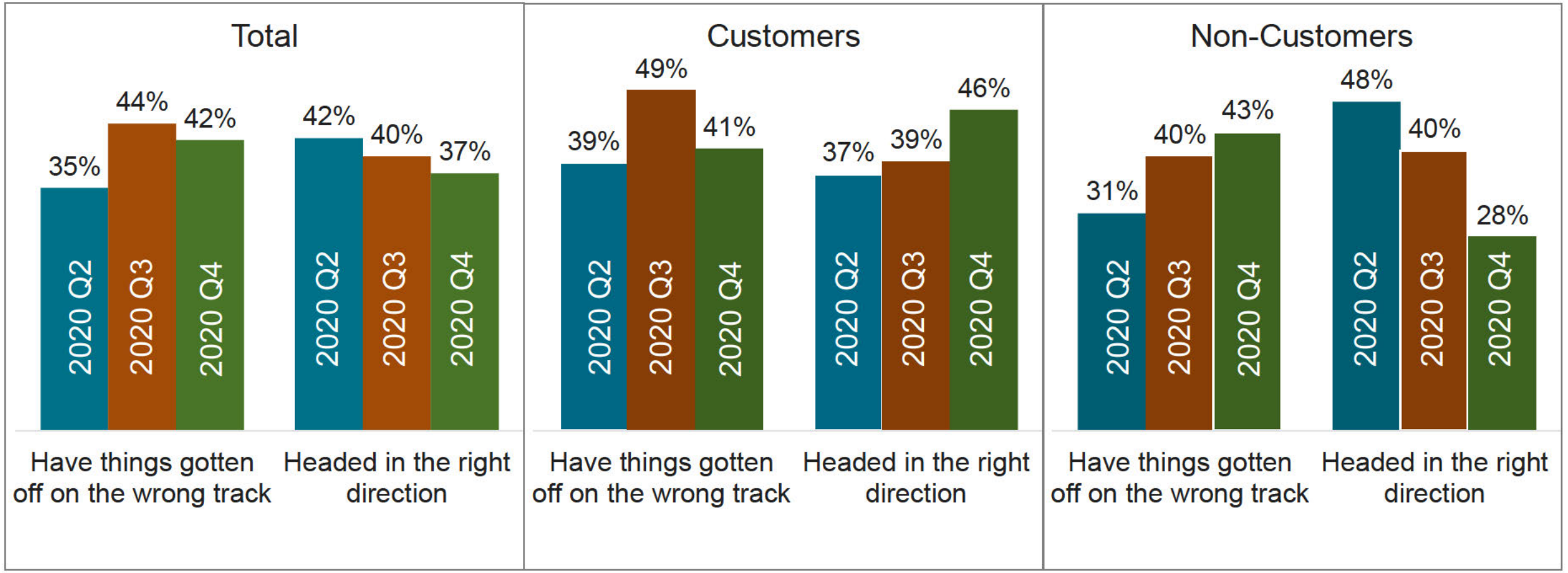


Public Sentiments

CUB/119
Jenks/58

General mood

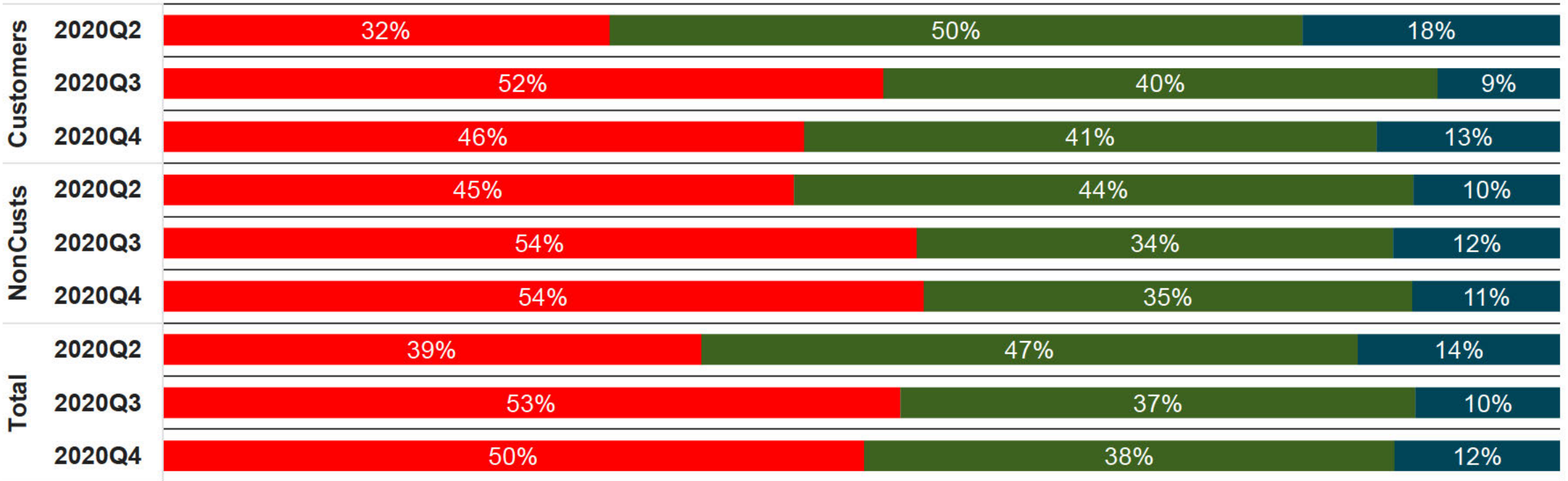
All things considered, would you say that your local community is headed in the right direction, or have things gotten off on the wrong track?



CUB/119
Jenks/59

Carbon Reduction Effort Statement

Which statement comes closest to your point of view?



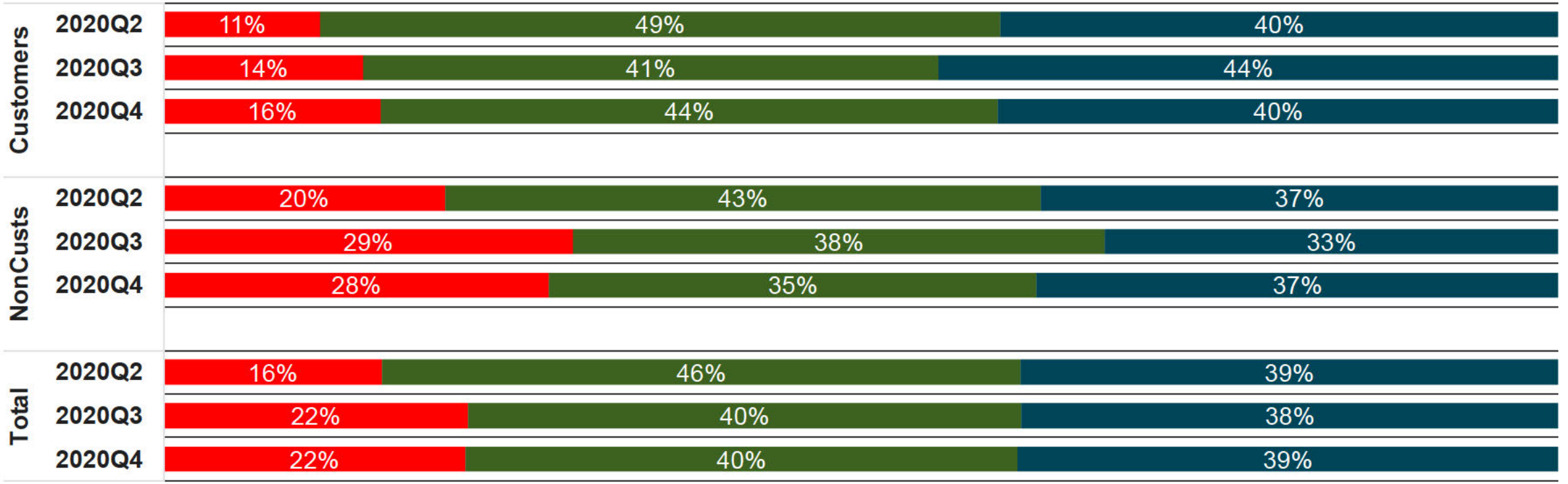
CUB/119
Jenks/60

Natural Gas Preference

CUB/119
Jenks/61

Natural Gas Statements

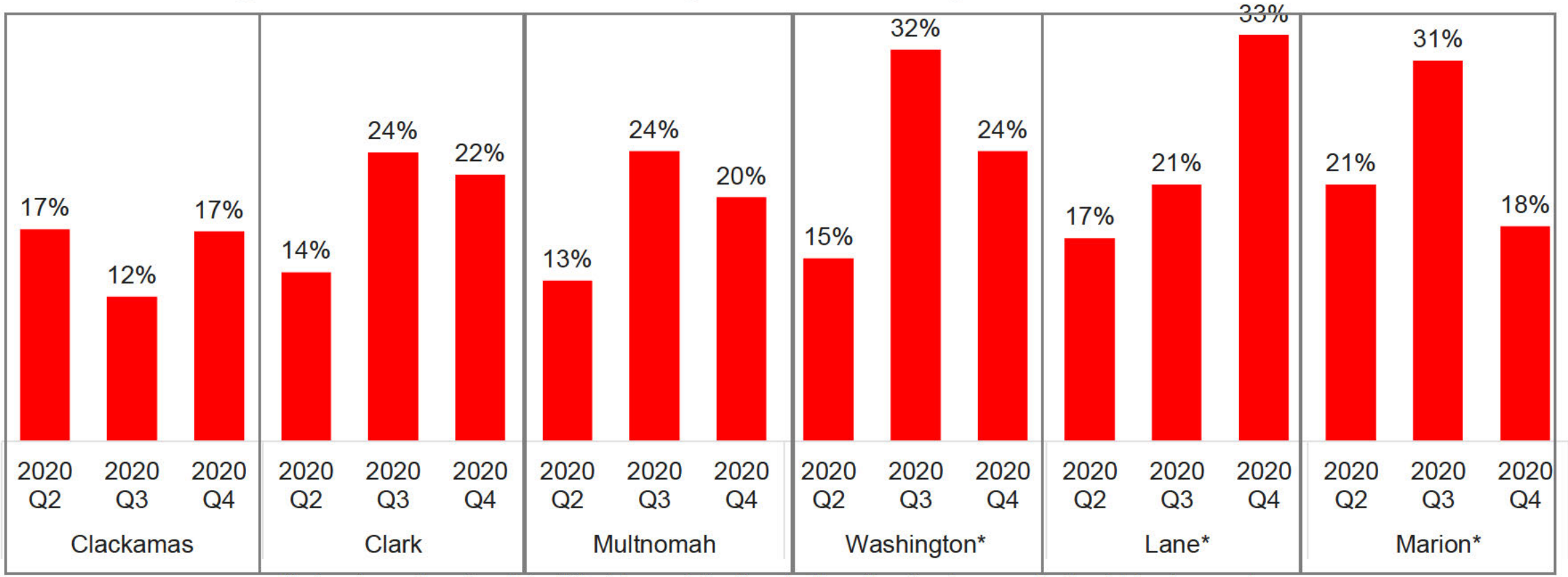
Which statement comes closest to your point of view?



CUB/119
Jenks/62

Natural Gas Statements by County

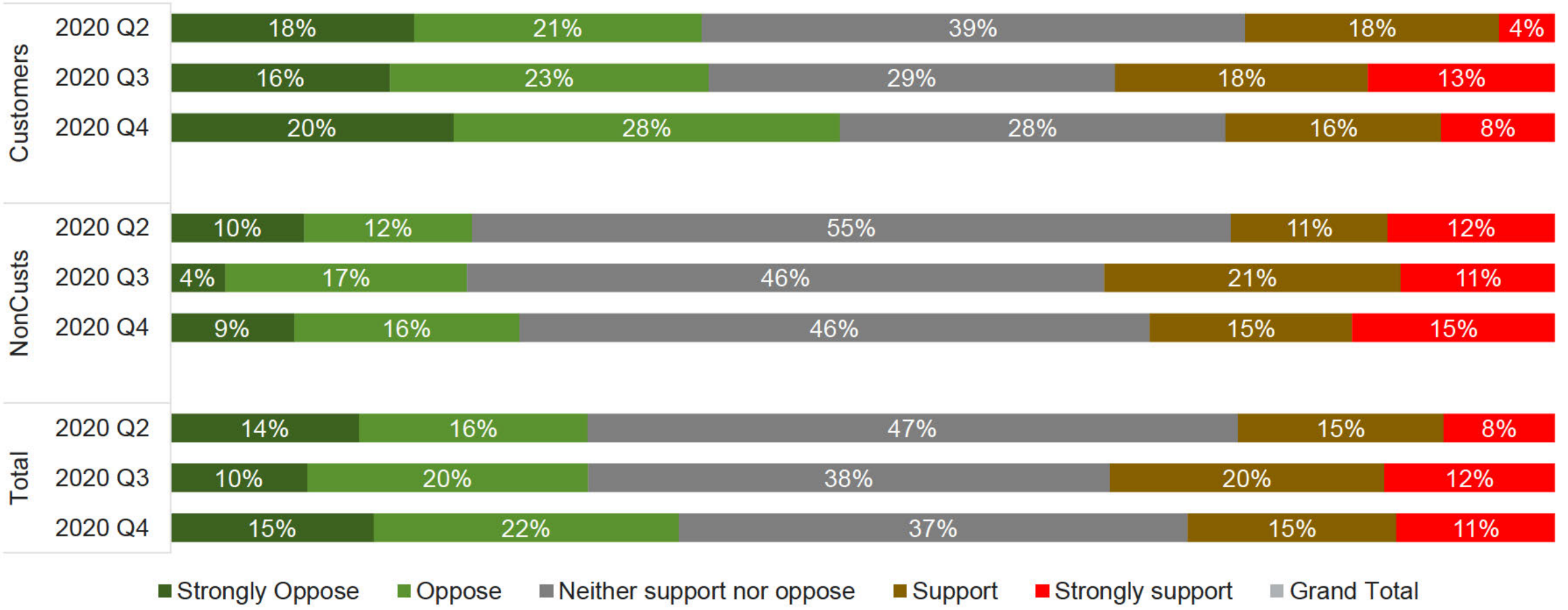
Statement: Natural gas is a fossil fuel that is contributing to the climate change. It should be banned now.



** Small sample size*

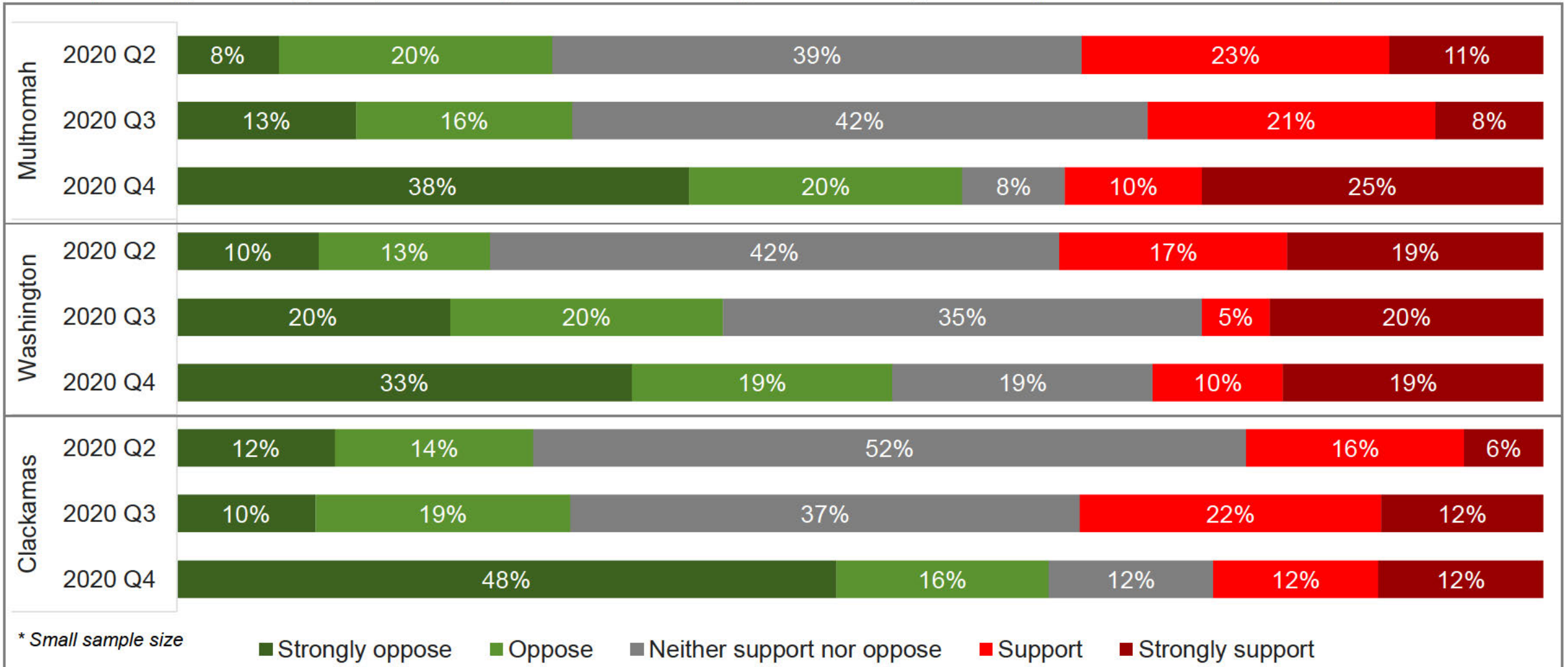
Natural Gas Ban Support

Would you support or oppose your local government banning new natural gas hookups in homes and buildings??



Natural Gas Ban by county

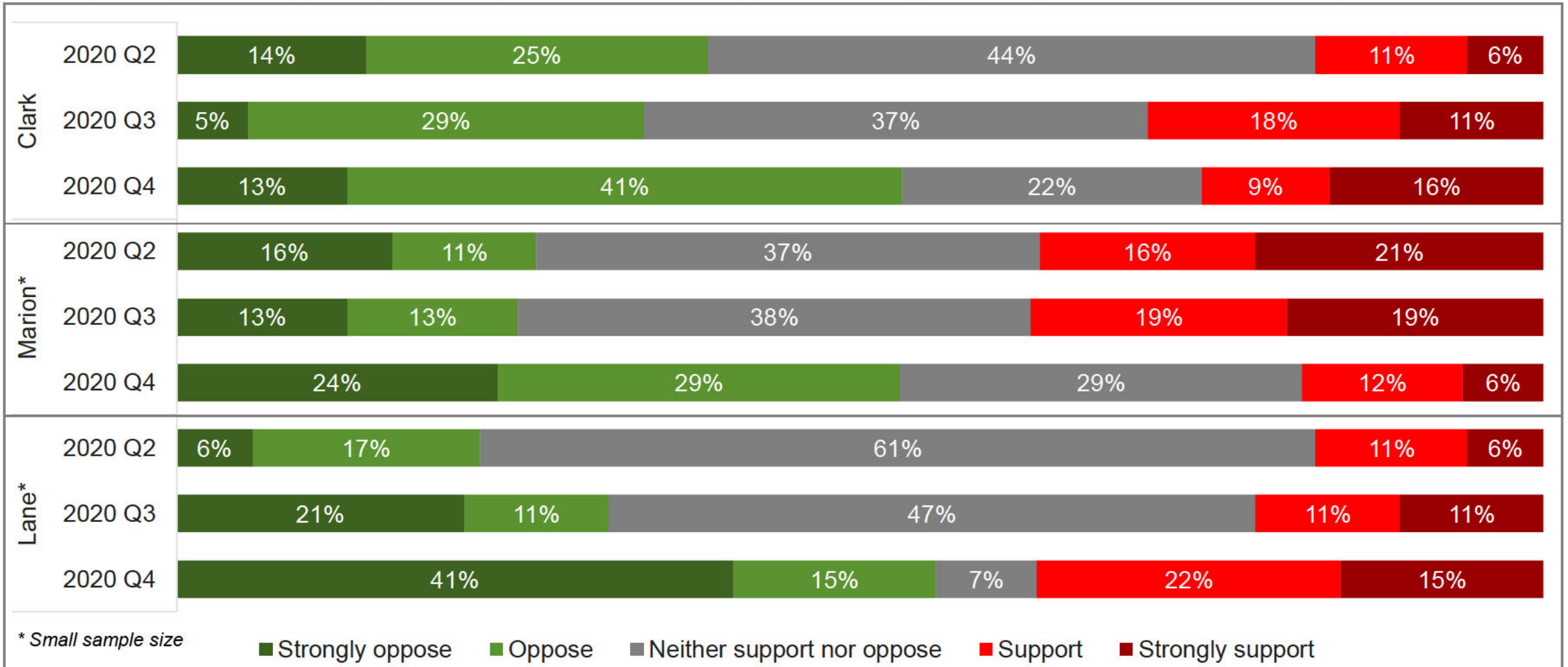
Would you support or oppose your local government banning new natural gas hookups in homes and buildings?



CUB/119
Jenks/65

Natural Gas Ban by county (continued)

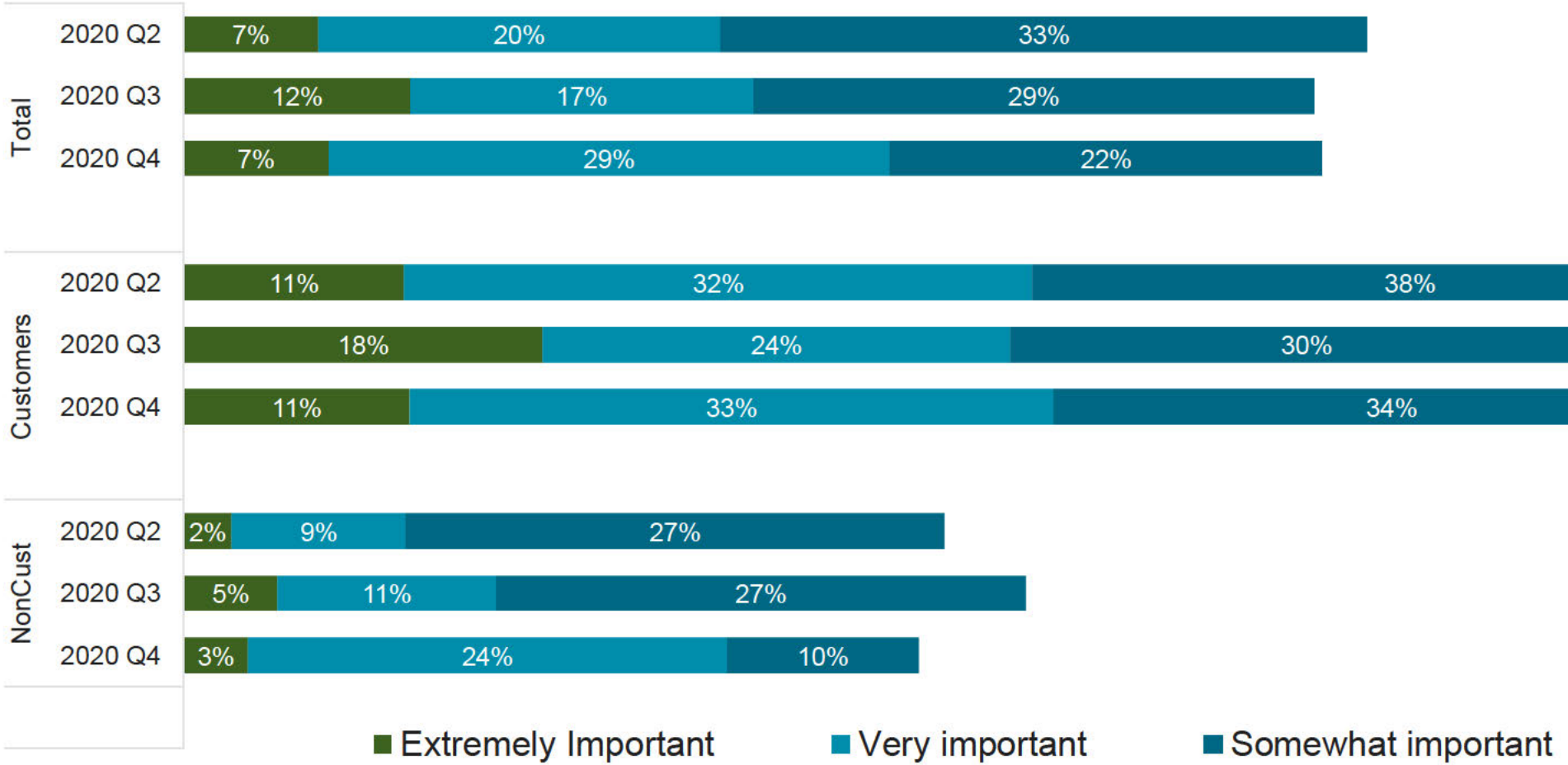
Would you support or oppose your local government banning new natural gas hookups in homes and buildings?



CUB/119
Jenks/66

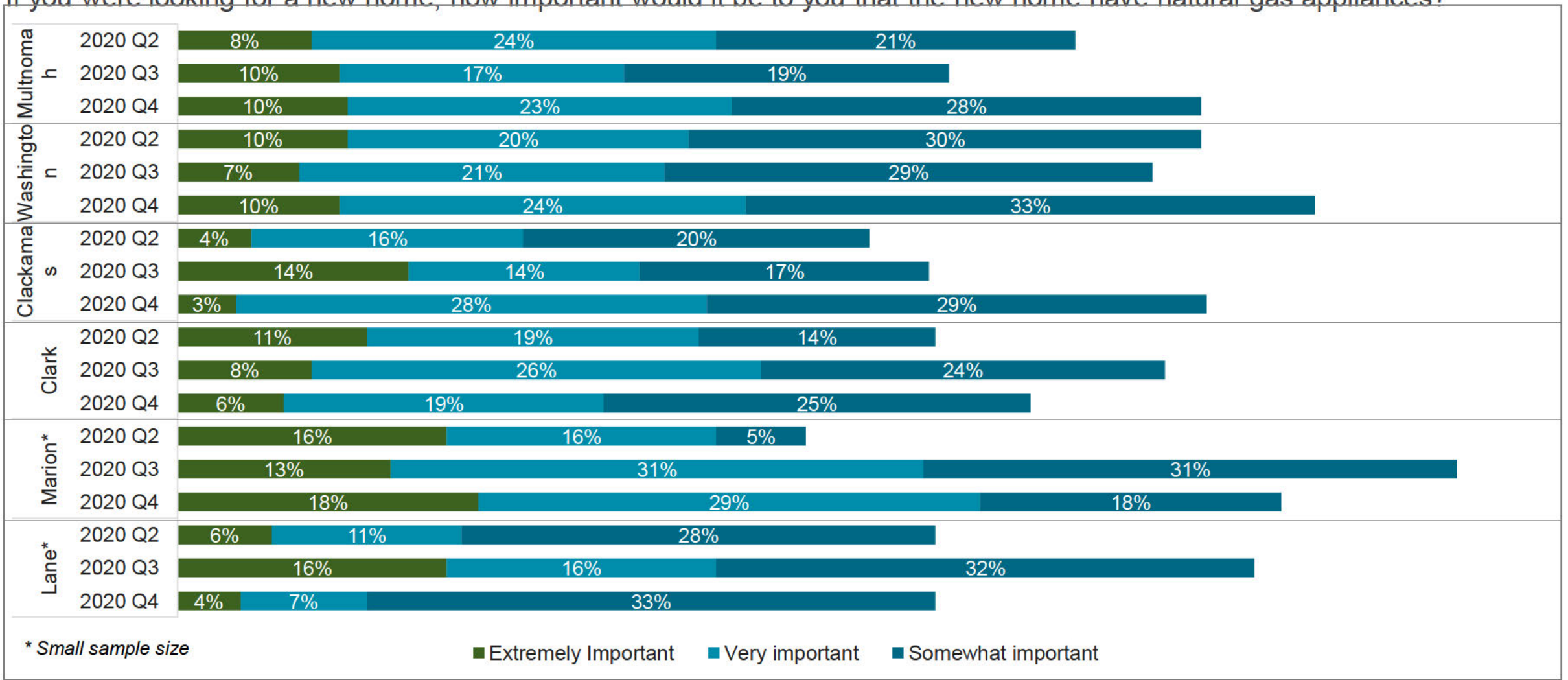
Natural Gas Preference

If you were looking for a new home, how important would it be to you that the new home have natural gas appliances?



Natural Gas Preference by county

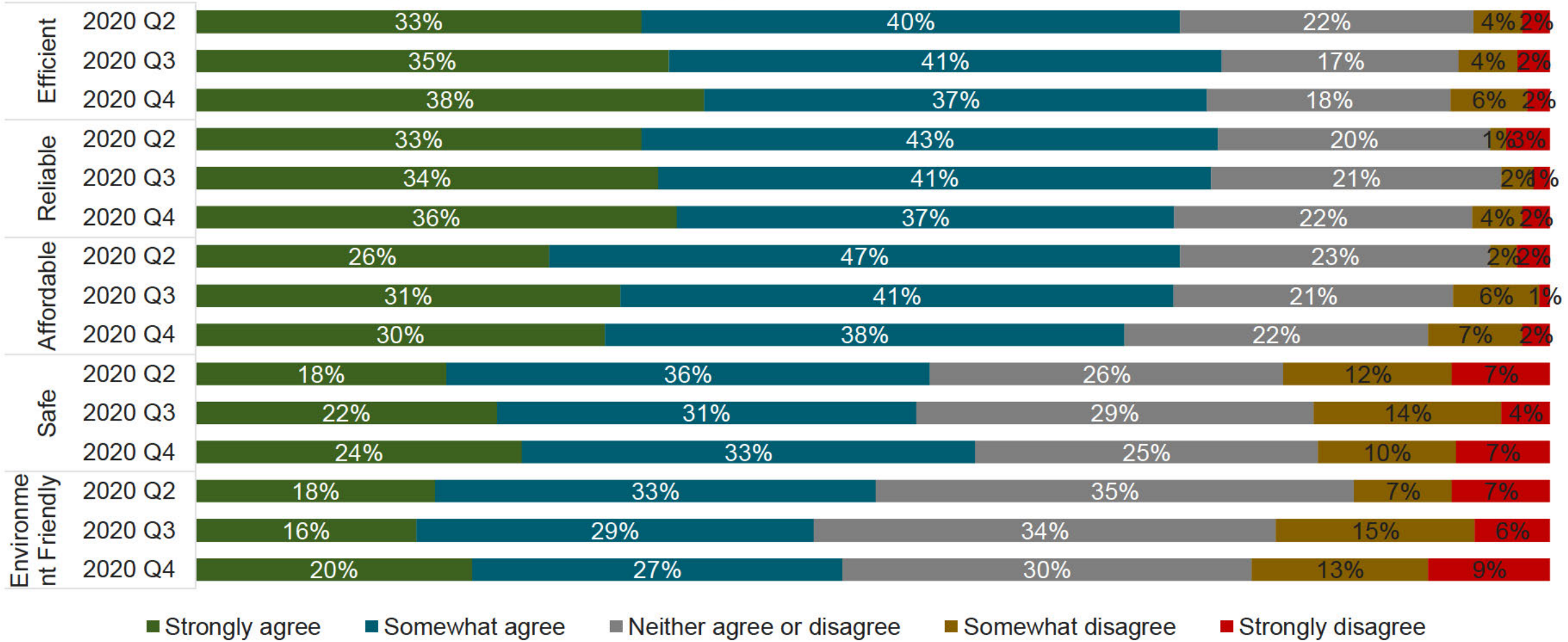
If you were looking for a new home, how important would it be to you that the new home have natural gas appliances?



CUB/119
Jenks/68

Natural Gas Attributes

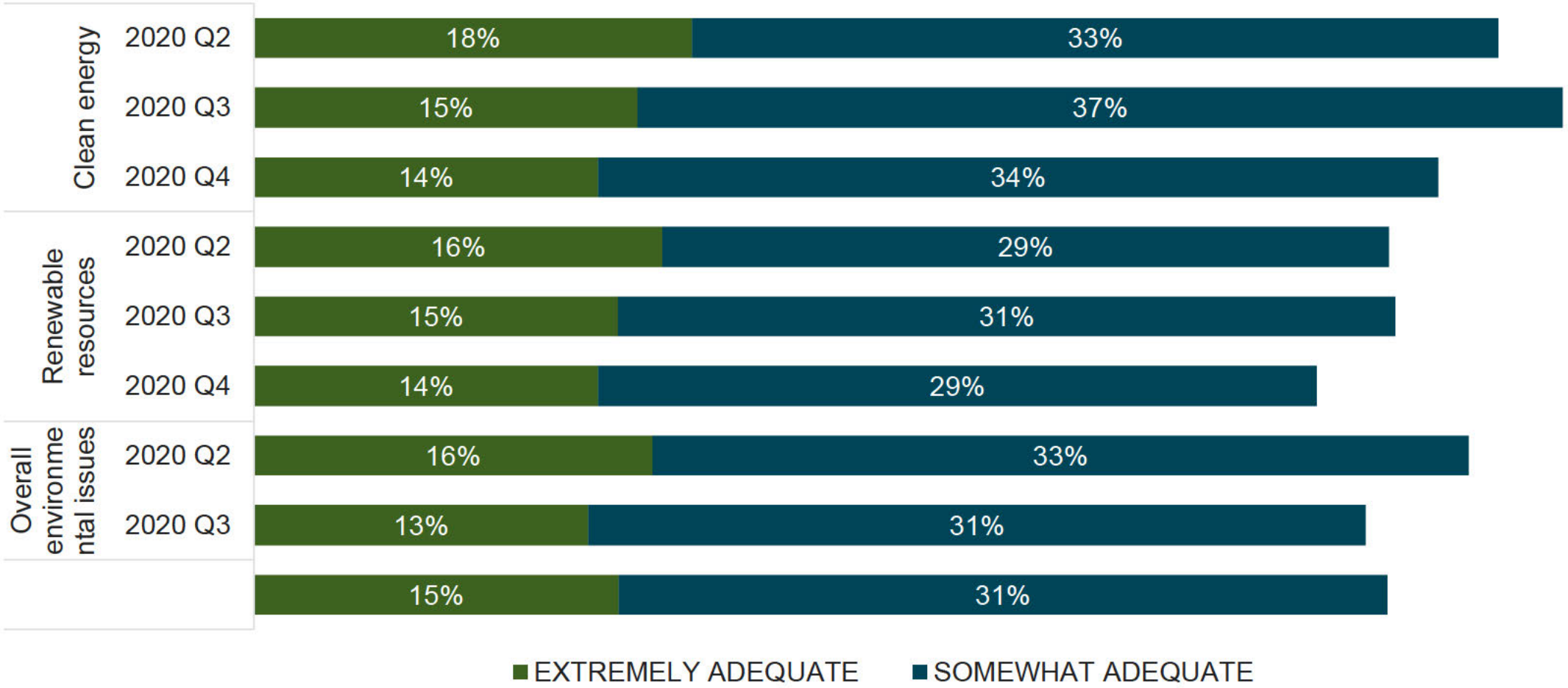
Do you agree with the following statements about natural gas?



CUB/119
Jenks/69

NW Natural Environmental Efforts

How would you rate NW Natural on the following:



CUB/119
Jenks/70

NW Natural Advertising Awareness Public Sentiment Tracking - Q1 2021

Methodology

- Online research panels
- Primary residence within NW Natural service territory
- 250 respondents each quarter
  - 125 gas customers
  - 125 non-gas customers
- Repeat every three months
  - March
  - June
  - September
  - December

Executive Summary – Ad Awareness

- 57% of all respondents recalled seeing NW Natural ads during the last quarter, unchanged from Q4 last year.
  - By age group: only 65+ group increased while the other two decline slightly.
  - PGE's ad awareness jumped almost 10 percentage points to 54%, but it is still 7 points less the NW Natural recalls among customers.
- Among those recalled seeing NW Natural ads, about half of them saw Natural Gas is Safe or Natural Gas is environmental friendly.
- 60% of the recalls were from TV, followed by social media 28% and websites 18%.

Executive Summary –Public Sentiment

- 49% of all who surveyed agreed that our local community is headed in the right direction - a jump of 12 percentage points. The increase was all coming from non-customers – an increase of 21 percentage points.
- After a 2 points drop during Q4 last year, the percentage of people claiming not enough is being done to reduce carbon emissions increased slightly to 55%. At the same time, the percentage of people who said too much effort is being spent to reduce carbon emissions also steadily increases to 15%.

Executive Summary – Natural Gas Preference

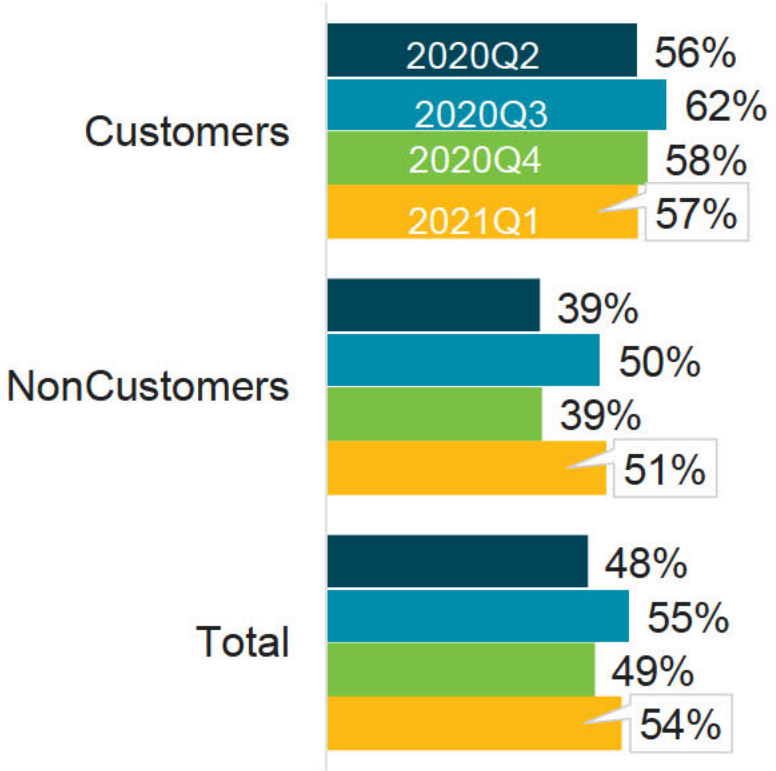
- A majority value either the affordability and reliability of natural gas (42%) or believe it can help achieve climate goals (38%).
- 20% believe natural gas is fossil fuel and should be ban, a drop of 2 points from last quarter. But the sentiment remained high in both Multnomah and Lane county (27%), all other major counties were in the tens.
- Those who oppose natural gas ban has remained stable this quarter at 35%, while those who support a ban has dropped slightly by 2 percentage points.
- 66% of all said natural gas is important for their next home purchase – an increase of 8 percentage points from last quarter.
- About three quarters of all respondents agreed that natural gas is reliable, efficient or affordable.
- About half view NW Natural's environmental efforts as adequate.

Advertising Awareness

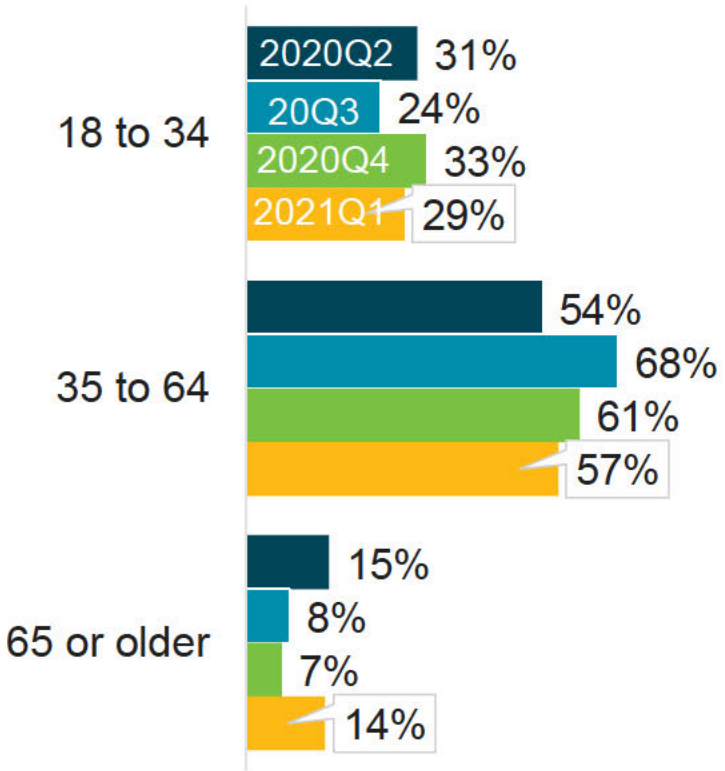
NW Natural Advertising Awareness

During the past three months, how many advertisements do you recall seeing, reading, or hearing from your natural gas company - NW Natural?

By Customers/Non-customers



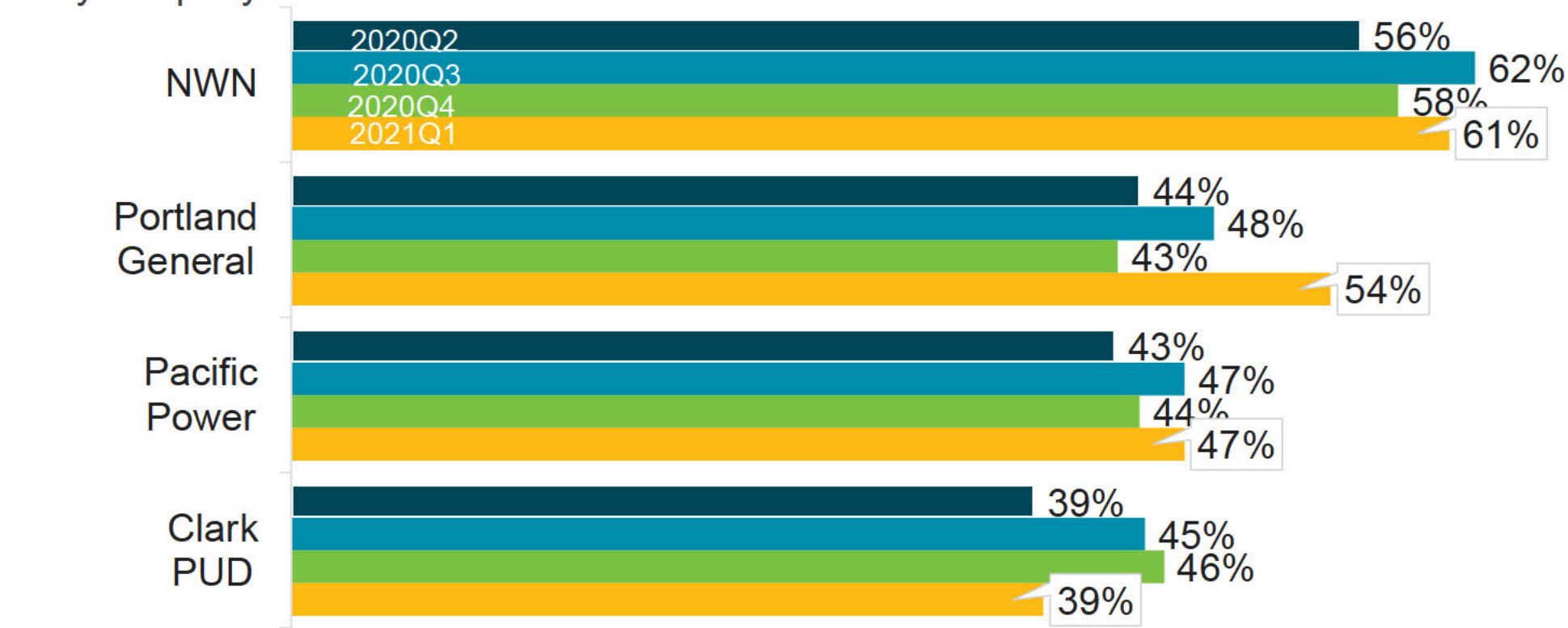
By Age Group



CUB/119
Jenks/77

Utility Company Advertising Awareness among its own customers

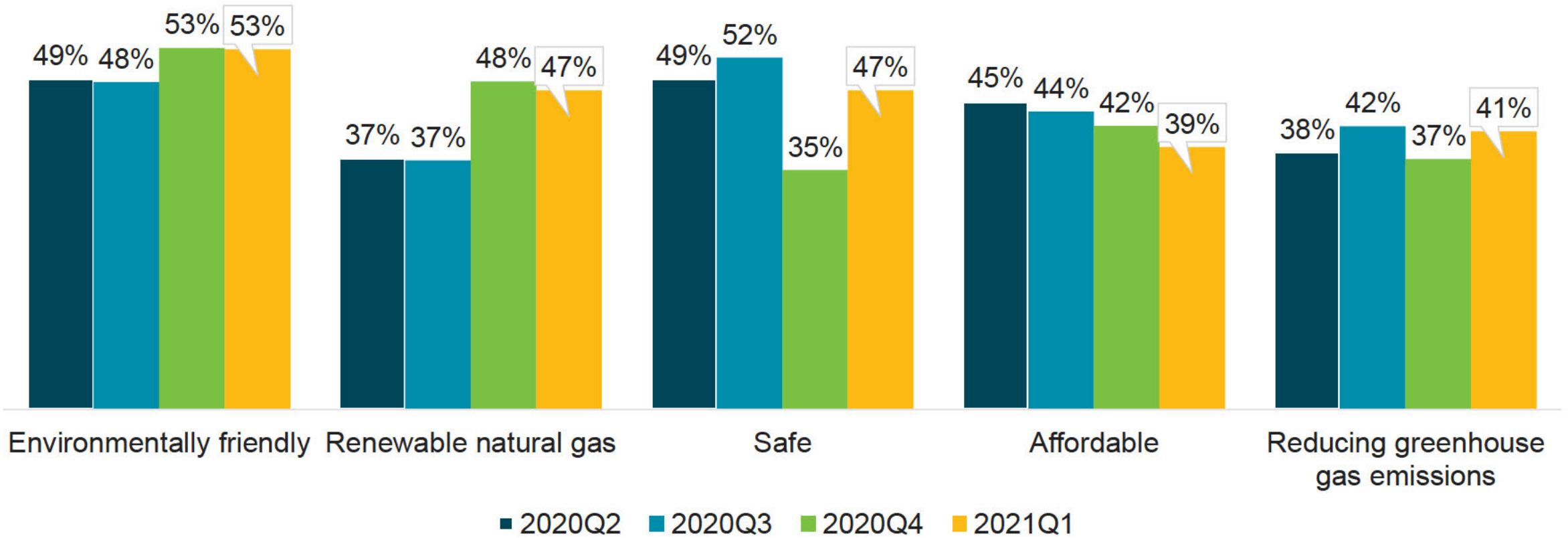
During the past three months, how many advertisements do you recall seeing, reading, or hearing from your utility company?



CUB/119
Jenks/78

NW Natural Ad Message Recall

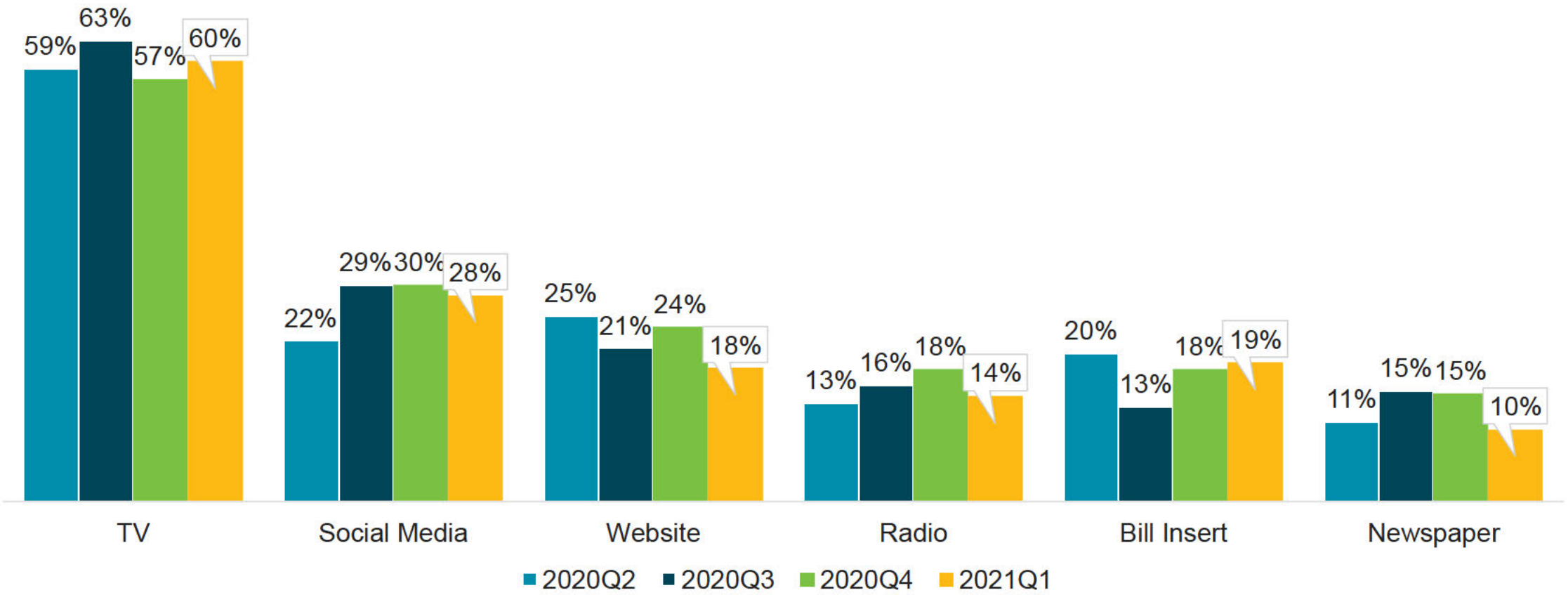
Think about the advertisement(s) you recall from NW Natural, what were the message(s) about? Mark all that apply.



CUB/119
Jenks/79

NW Natural Ad Message Channel

Where did you see or hear this/these communication(s)? Mark all that apply.

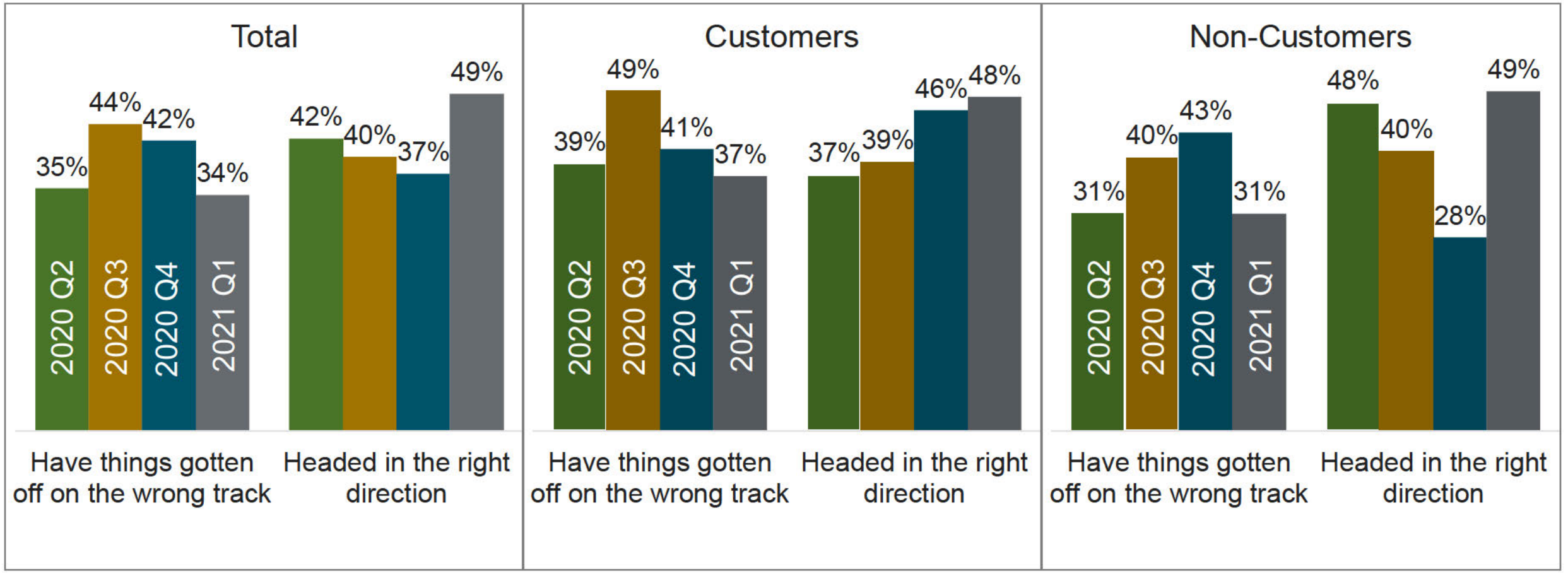


Public Sentiments

CUB/119
Jenks/81

General mood

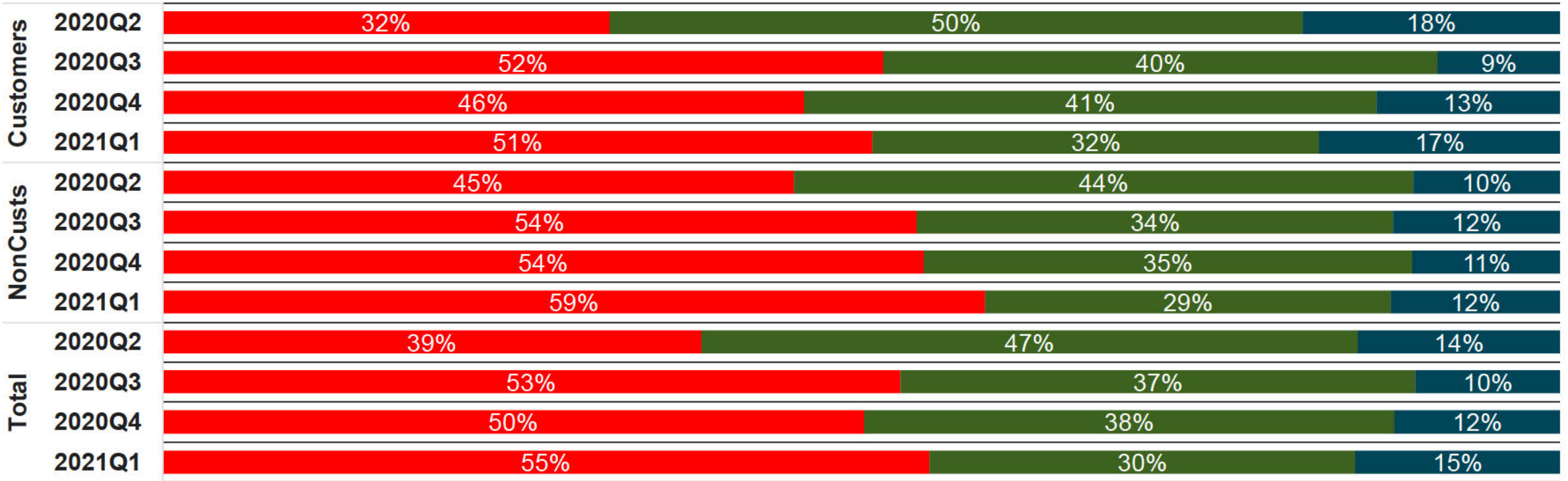
All things considered, would you say that your local community is headed in the right direction, or have things gotten off on the wrong track?



CUB/119
Jenks/82

Carbon Reduction Effort Statement

Which statement comes closest to your point of view?



- Not enough is being done to reduce carbon emissions in my city. This needs to be a higher priority.
- The right amount of effort is being spent to reduce carbon emissions in my city.
- Too much effort is being spent to reduce carbon emissions in my city. There are other higher priorities.

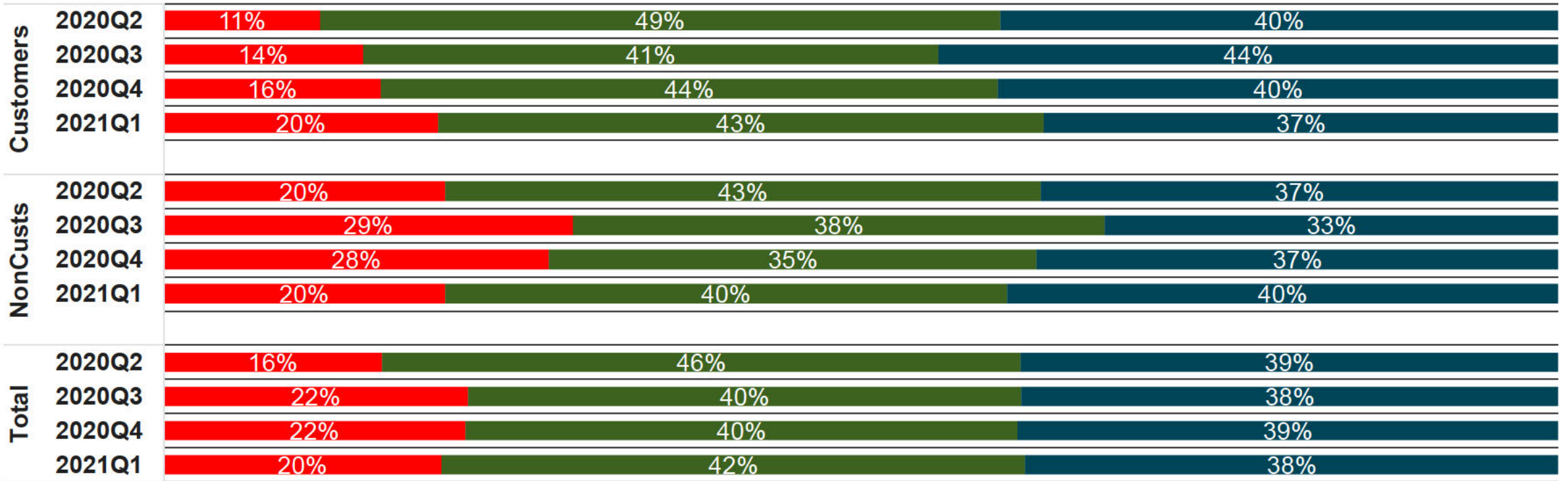
CUB/119
Jenks/83

Natural Gas Preference

CUB/119
Jenks/84

Natural Gas Statements

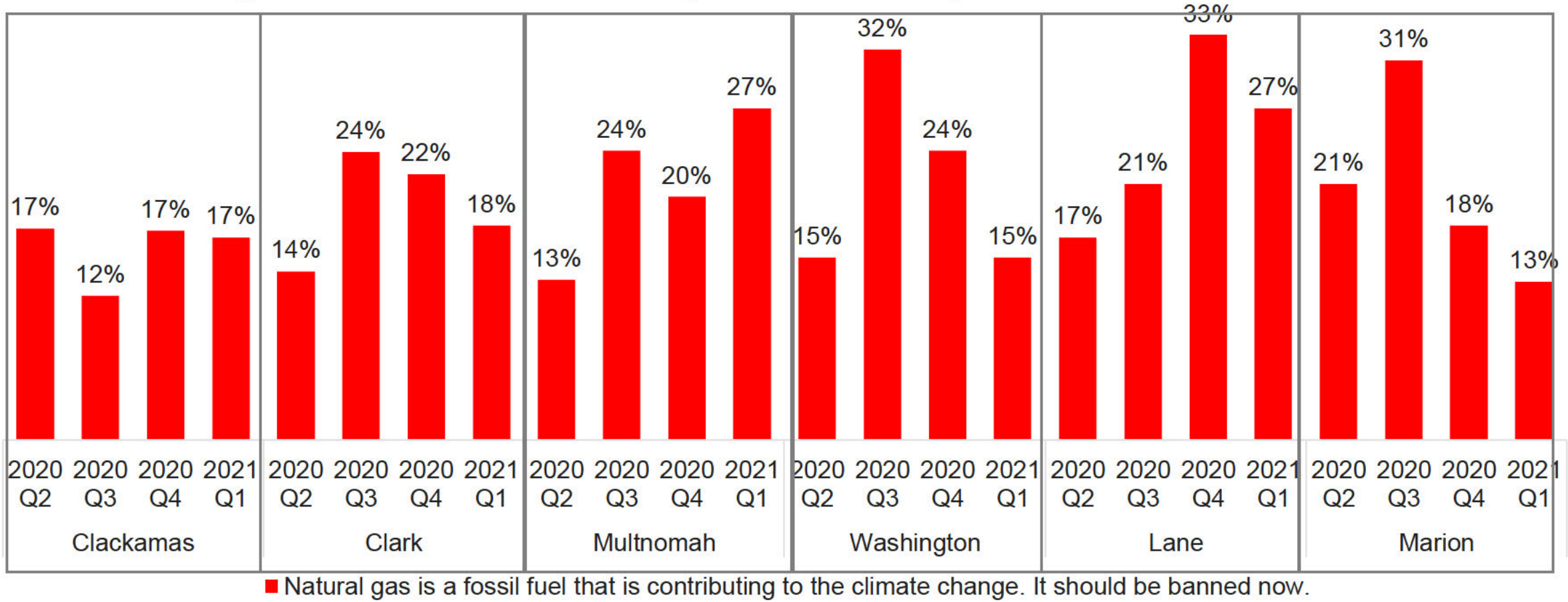
Which statement comes closest to your point of view?



CUB/119
Jenks/85

Natural Gas Statements by County

Statement: Natural gas is a fossil fuel that is contributing to the climate change. It should be banned now.

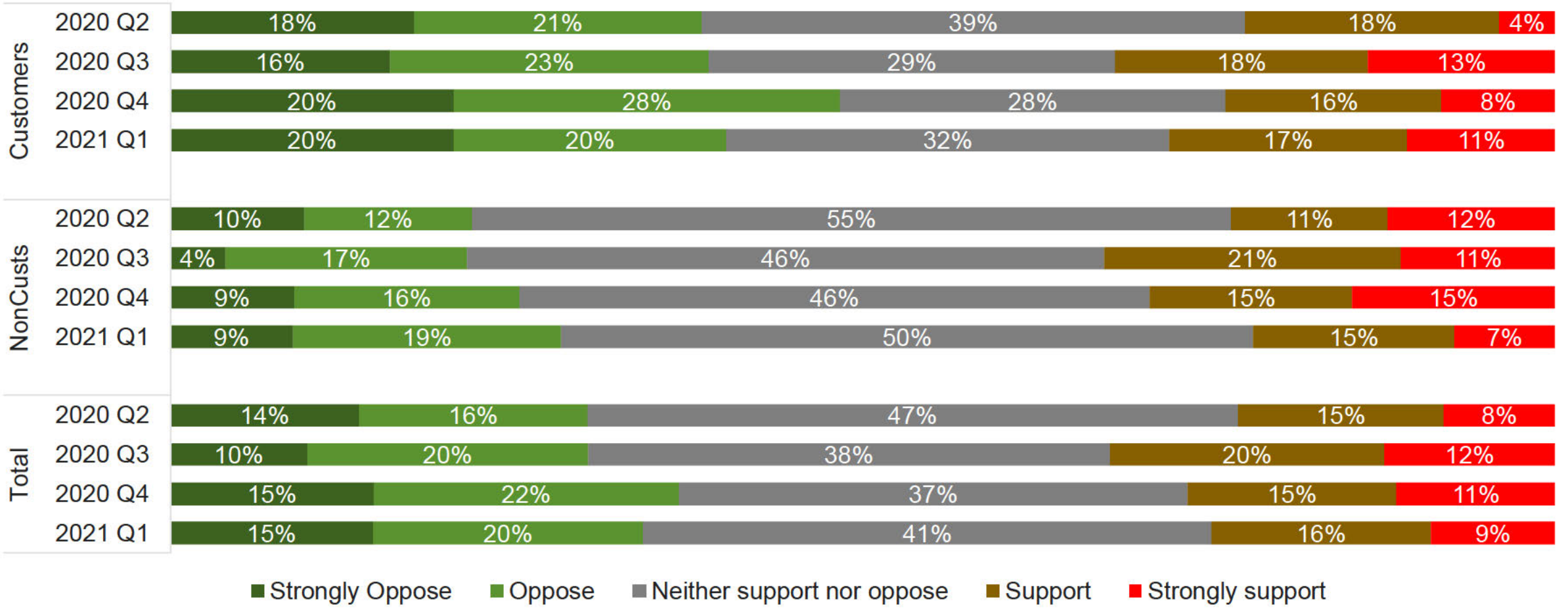


** Small sample size*

CUB/119
Jenks/86

Natural Gas Ban Support

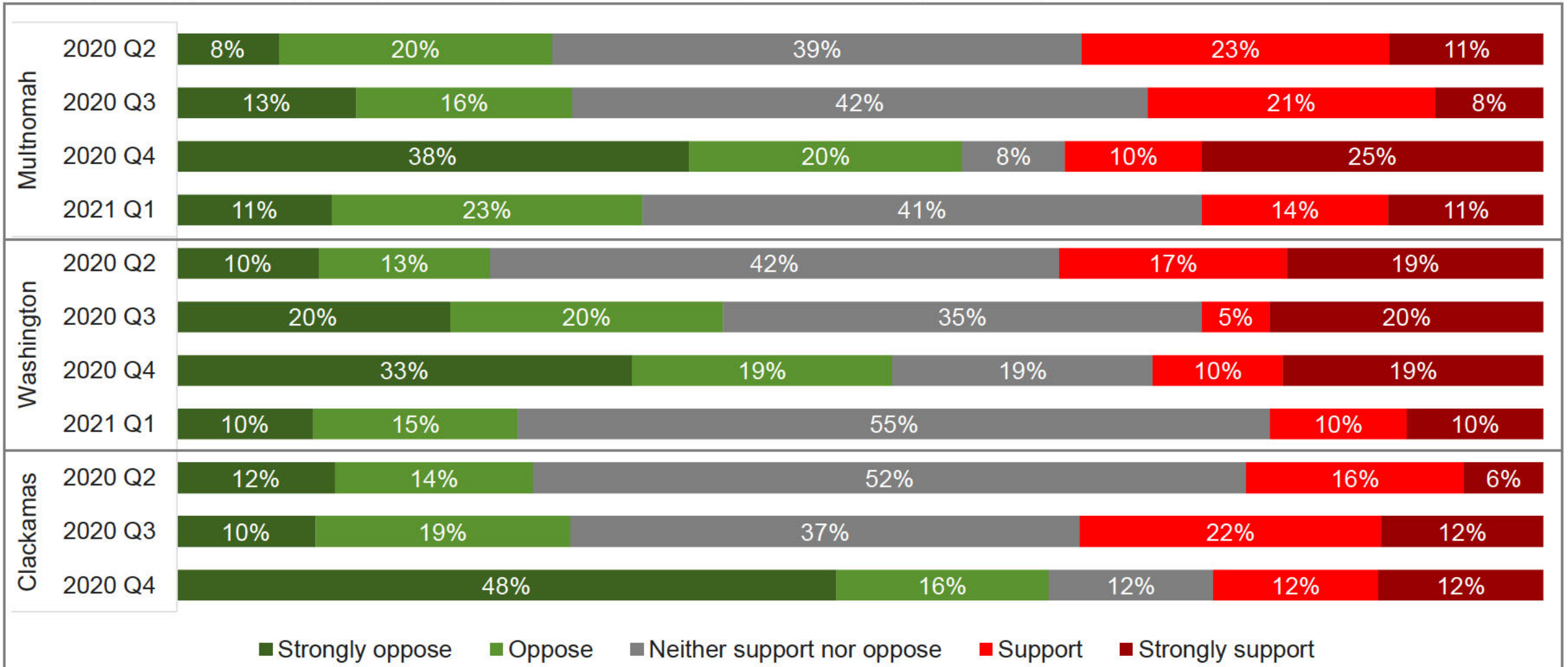
Would you support or oppose your local government banning new natural gas hookups in homes and buildings??



CUB/119
Jenks/87

Natural Gas Ban by county

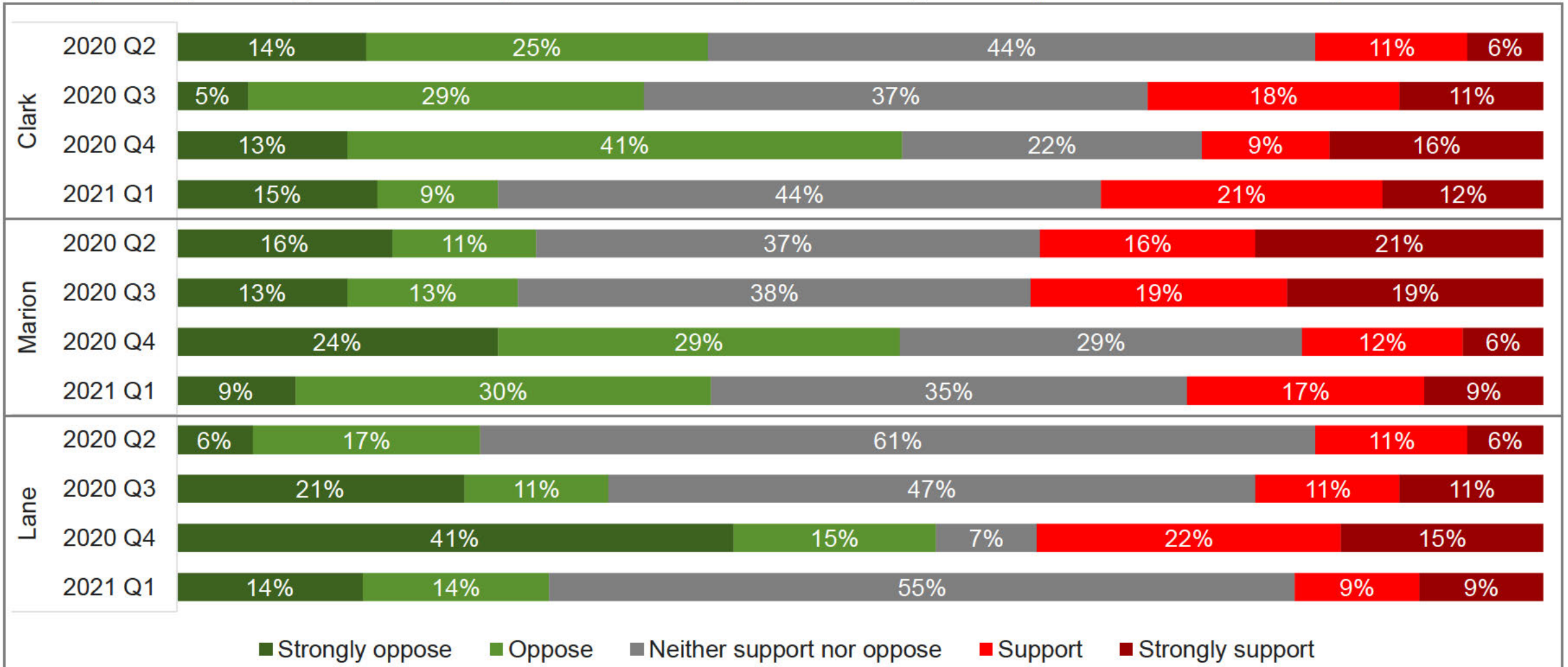
Would you support or oppose your local government banning new natural gas hookups in homes and buildings?



CUB/119
Jenks/88

Natural Gas Ban by county (continued)

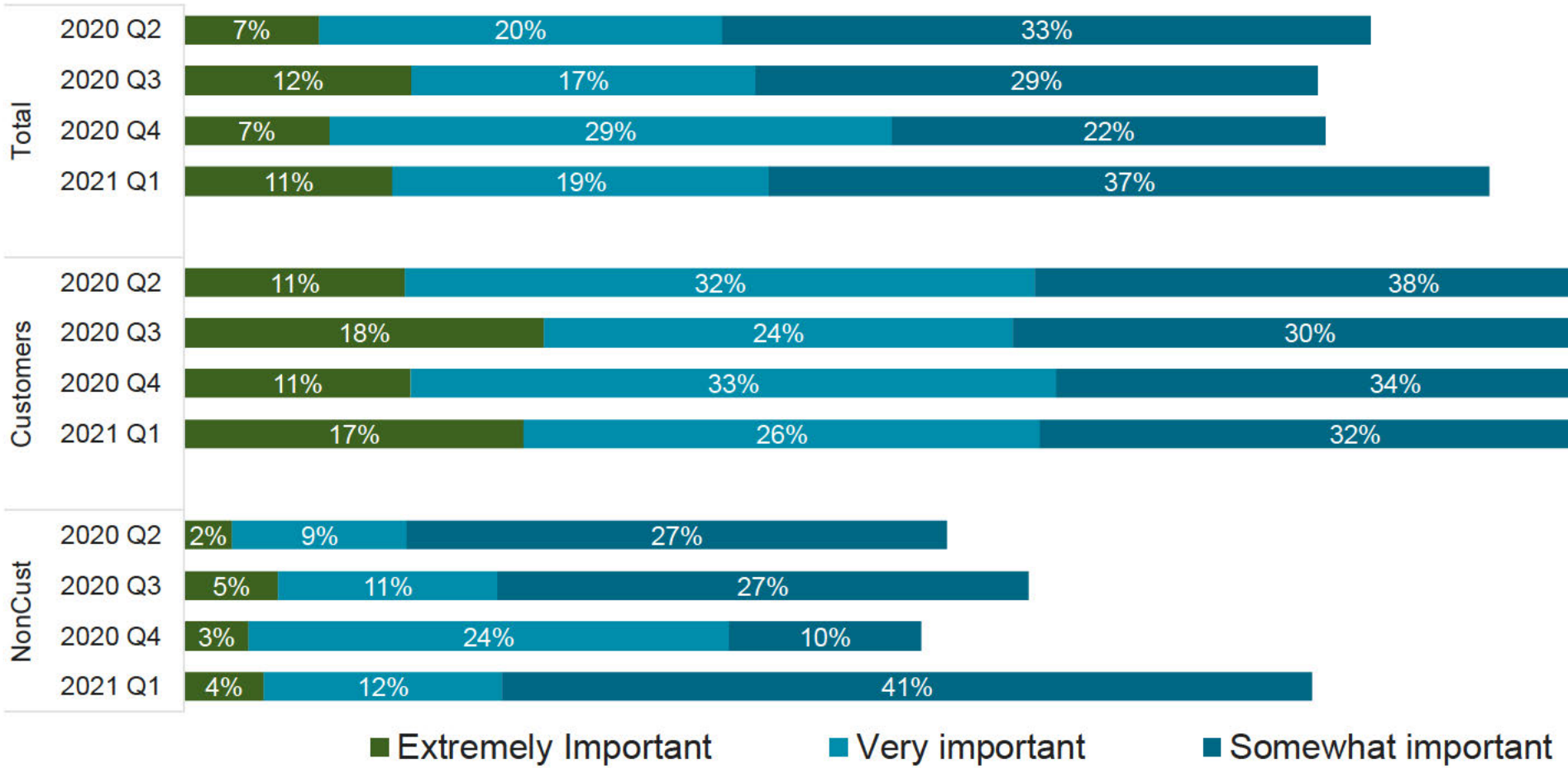
Would you support or oppose your local government banning new natural gas hookups in homes and buildings?



CUB/119
Jenks/89

Natural Gas Preference

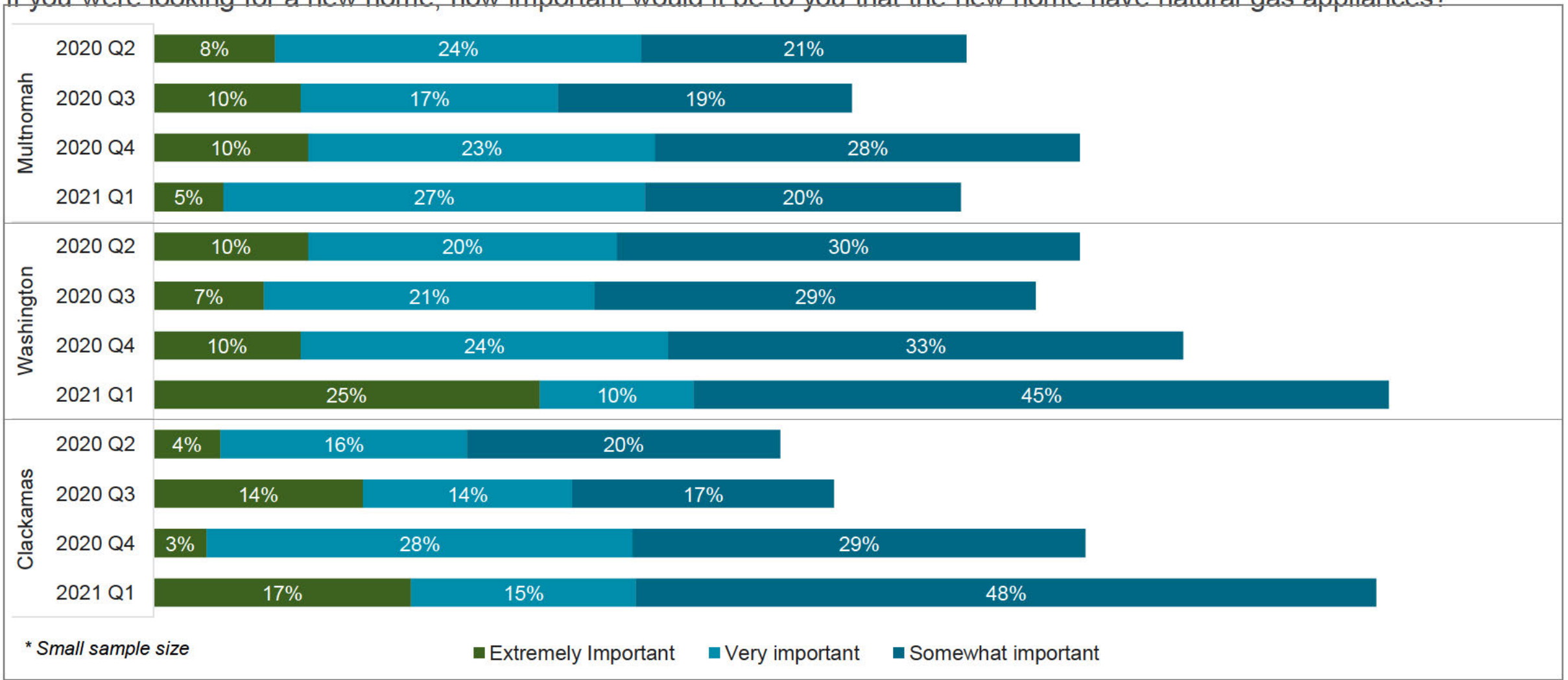
If you were looking for a new home, how important would it be to you that the new home have natural gas appliances?



CUB/119
Jenks/90

Natural Gas Preference by county

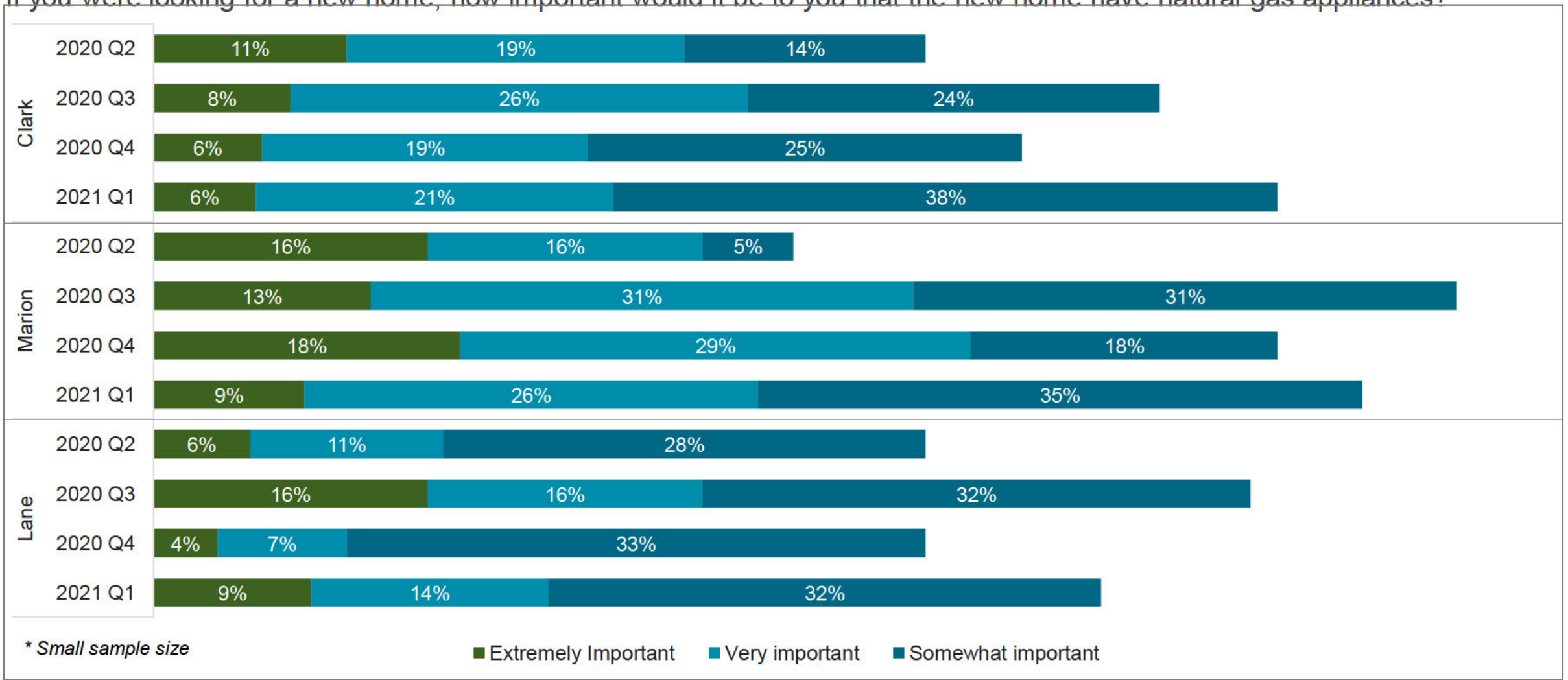
If you were looking for a new home, how important would it be to you that the new home have natural gas appliances?



CUB/119
Jenks/91

Natural Gas Preference by county (continued)

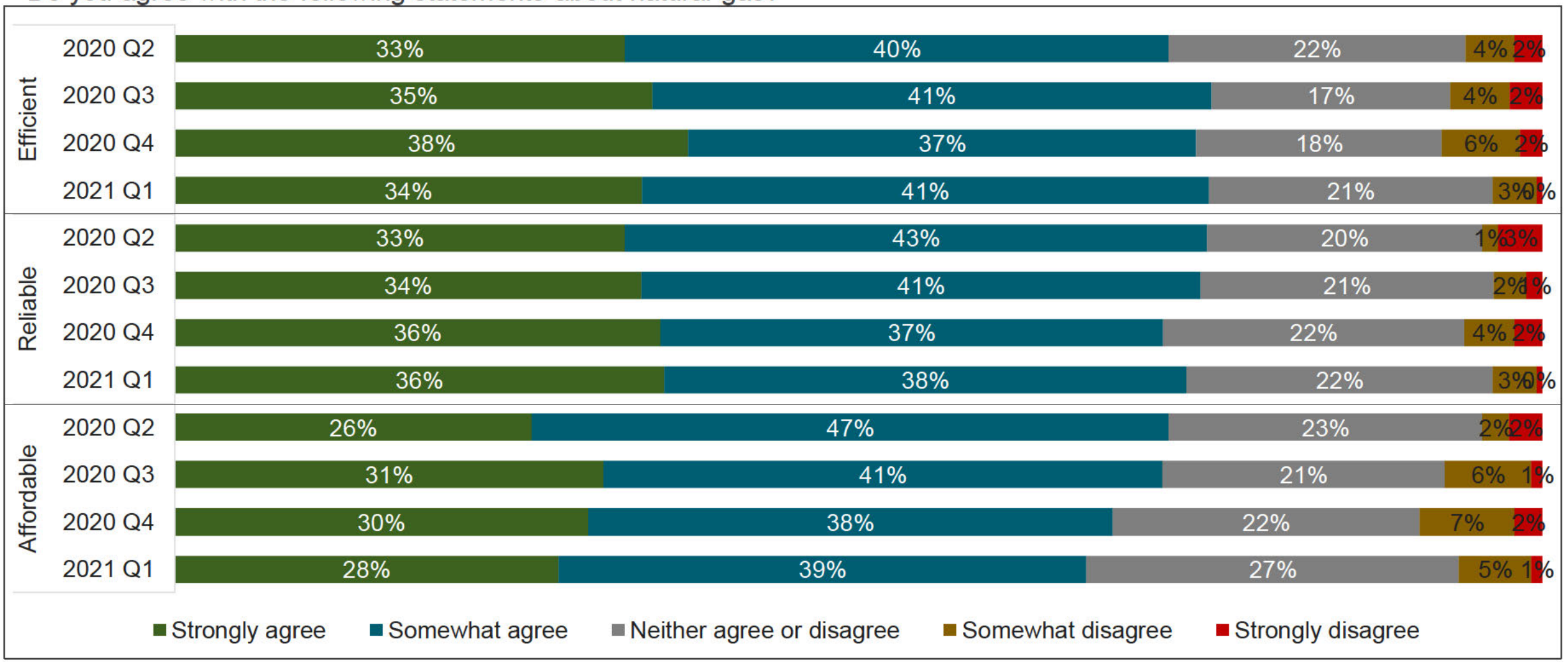
If you were looking for a new home, how important would it be to you that the new home have natural gas appliances?



CUB/119
Jenks/92

Natural Gas Attributes

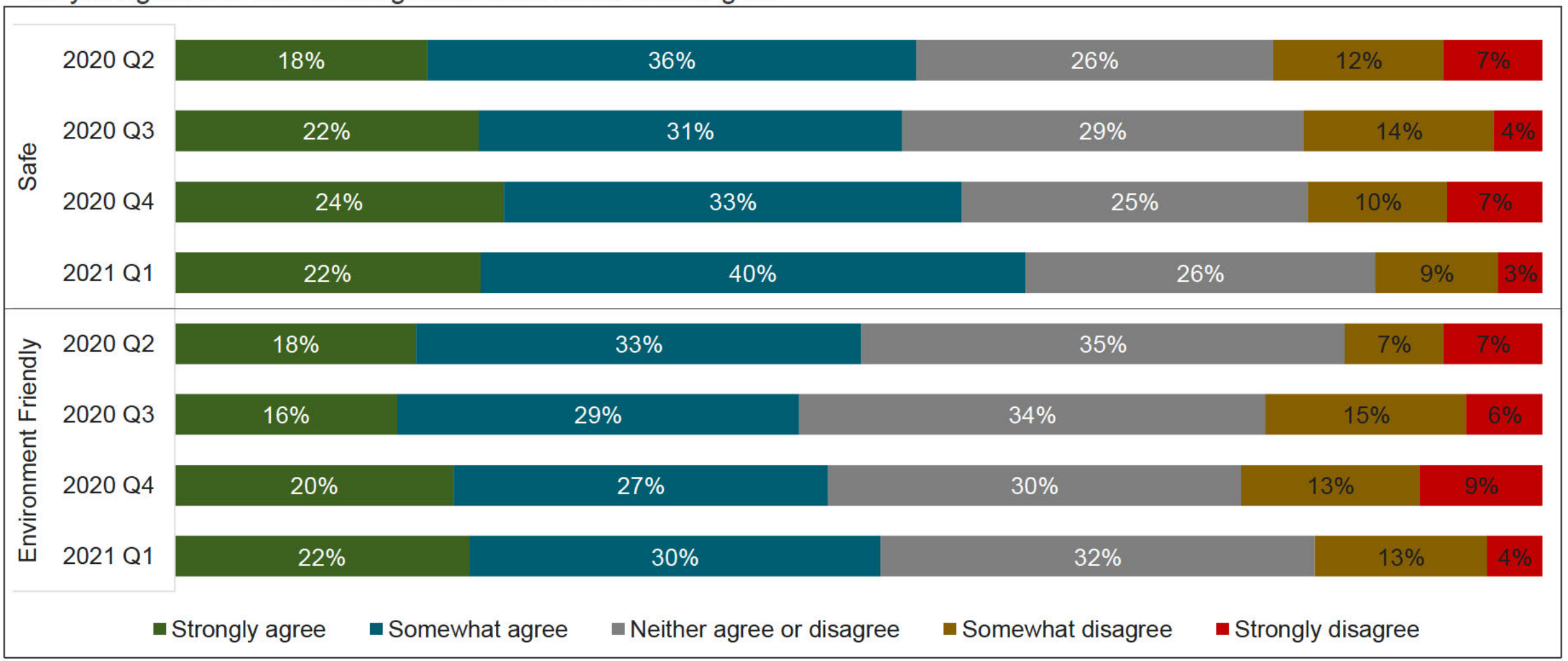
Do you agree with the following statements about natural gas?



CUB/119
Jenks/93

Natural Gas Attributes (continued)

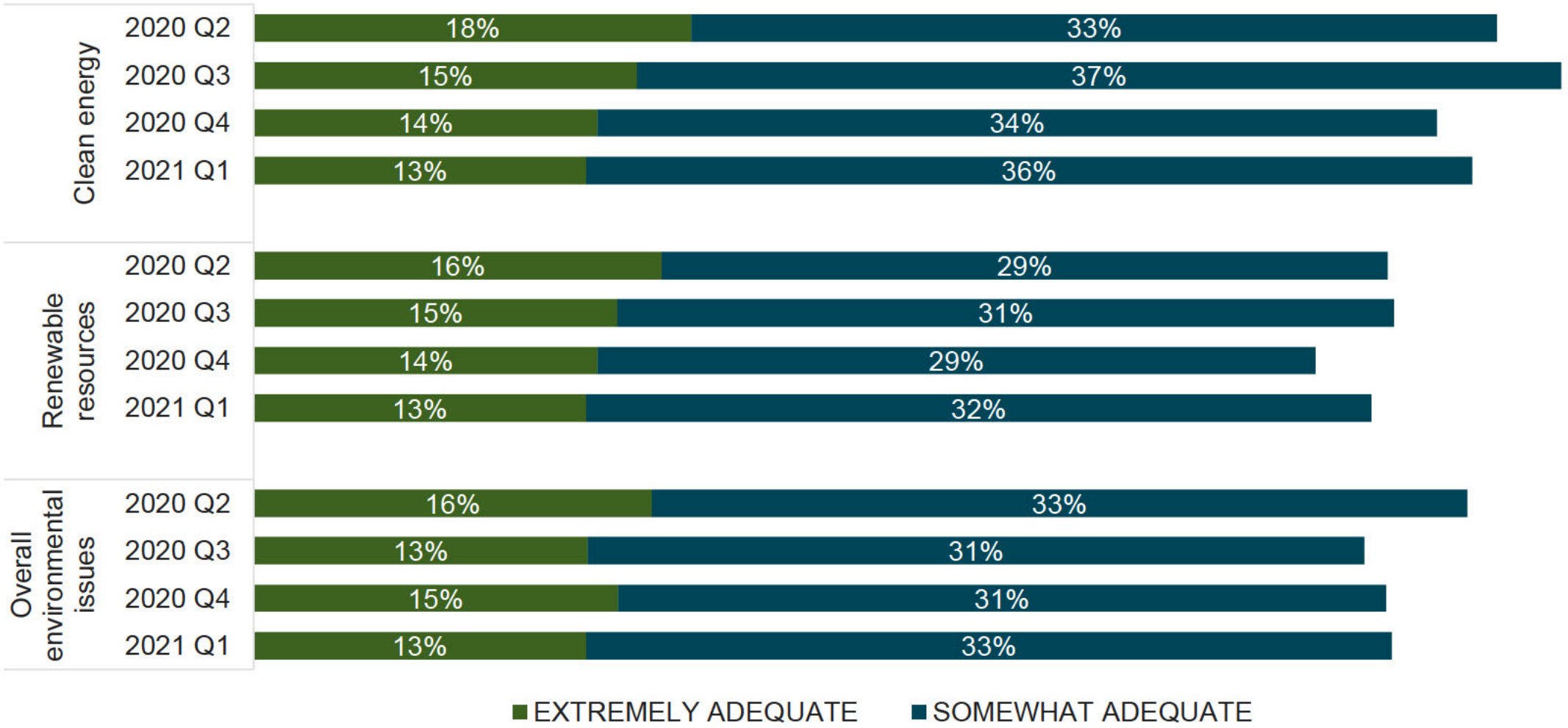
Do you agree with the following statements about natural gas?



CUB/119
Jenks/94

NW Natural Environmental Efforts

How would you rate NW Natural on the following:



CUB/119
Jenks/95

NW Natural Advertising Awareness Public Sentiment Tracking - Q2 2021

Methodology

- Online research panels
- Primary residence within NW Natural service territory
- 250 respondents each quarter
  - 125 gas customers
  - 125 non-gas customers
- Repeat every three months
  - June
  - September
  - December
  - March

Executive Summary – Ad Awareness

- 52% of all respondents recalled seeing NW Natural ads during the last quarter, down slightly comparing to last quarter.
  - By age group: the younger group under 34 registered a small increase while the other two groups decline slightly.
  - Around 50% of three other larger utilities' customers in our region recalled seeing their advertisings.
- Among those recalled seeing NW Natural ads, about half of them saw RNG or Natural Gas is environmental friendly piece, while Safe, Affordable and Reducing greenhouse gas emissions ads registered around 40% recall.
- 55% (- 5 pts) of the recalls were from TV, followed by social media 33% (+5 pts) and radio 20% (+6 pts).

Executive Summary –Public Sentiment

- 50% of all who surveyed agreed that our local community is headed in the right direction - unchanged from last quarter. While those said we are getting off the wrong track dropped from 34% to 31%.
- The percentage of people claiming not enough is being done to reduce carbon emissions dropped 7 points to 47%, while those who said too much effort is being spent to reduce carbon emissions also decreased 3 points to 12%. 40% said the right amount is being spent.

Executive Summary – Natural Gas Preference

- 42% of respondents believed that natural gas should be used, 36% natural is critical to reach climate goals, and only 19% natural gas should be ban. All these three measures have been unchanged from last quarter.
- Natural gas preference remains stable among gas customers, but experienced a slight drop among non-customers, especially in the somewhat important category.
- About three quarters of all respondents agreed that natural gas is reliable, efficient or affordable, about half safe or environmental friendly.
- Slightly less than half of all respondents viewed NW Natural's environmental efforts as adequate.

CUB/119
Jenks/100

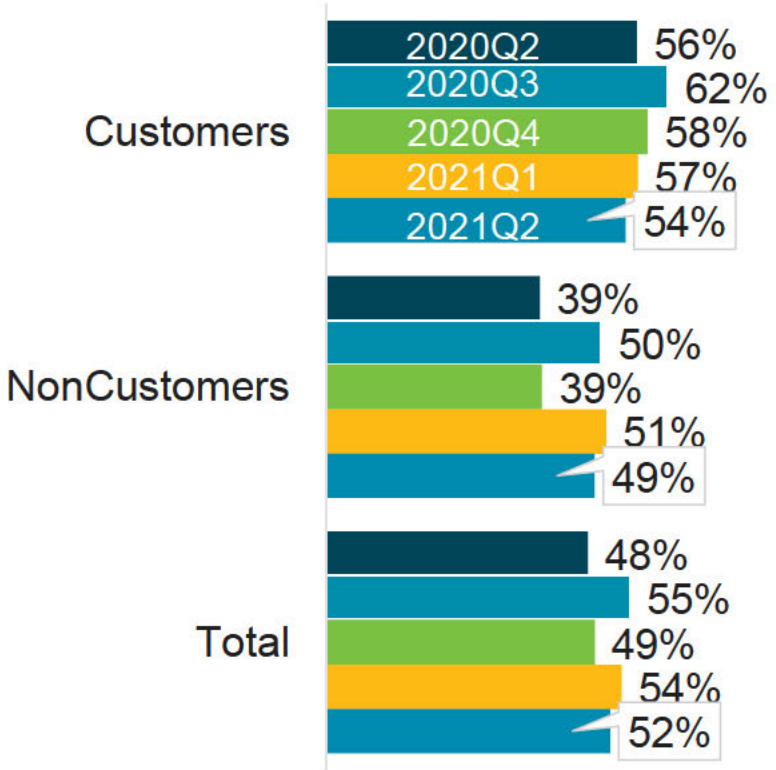
Advertising Awareness

CUB/119
Jenks/101

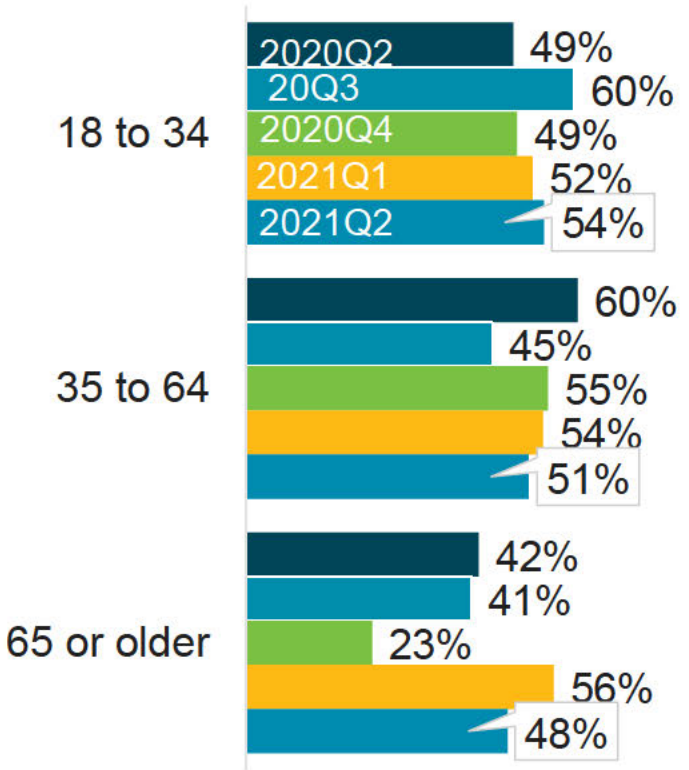
NW Natural Advertising Awareness

During the past three months, how many advertisements do you recall seeing, reading, or hearing from your natural gas company - NW Natural?

By Customers/Non-customers



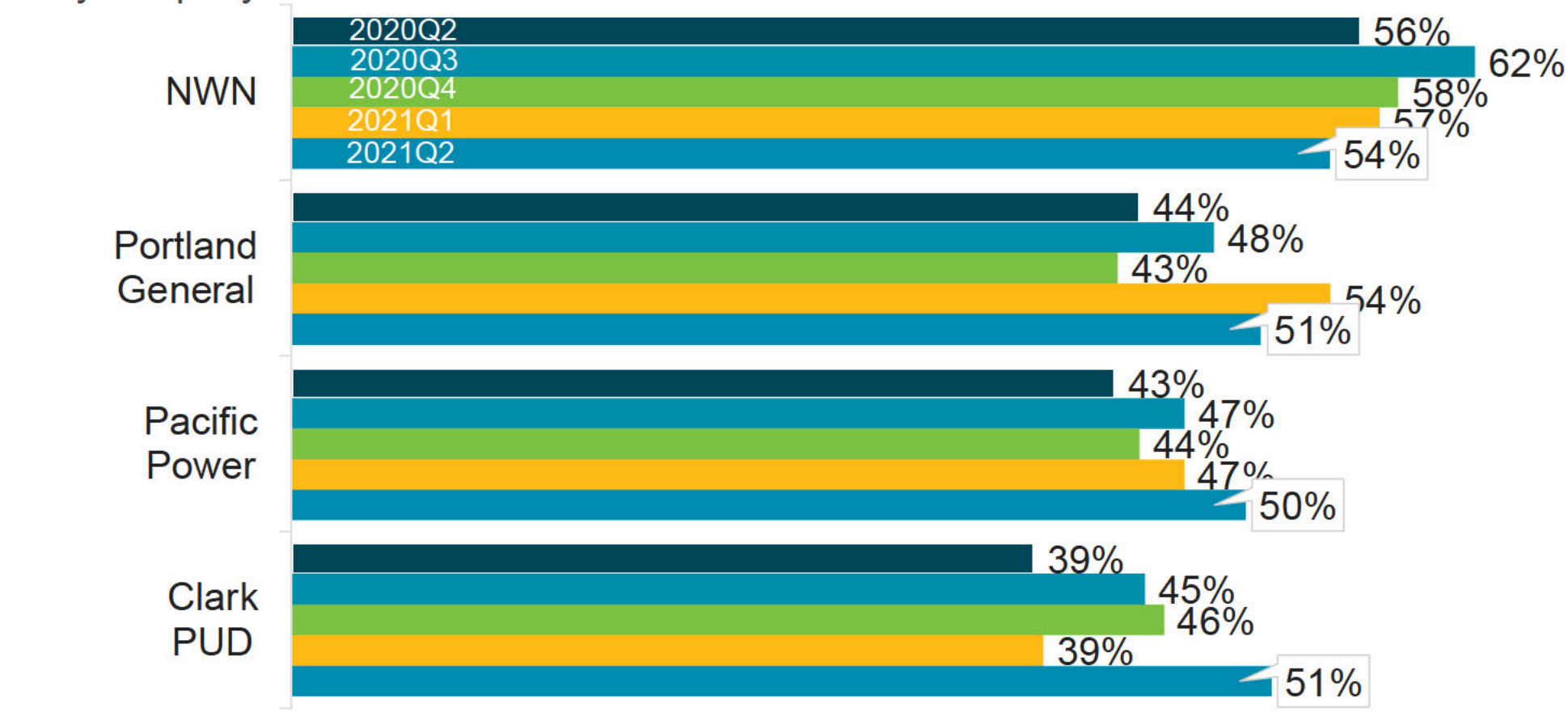
By Age Group



CUB/119
Jenks/102

Utility Company Advertising Awareness among its own customers

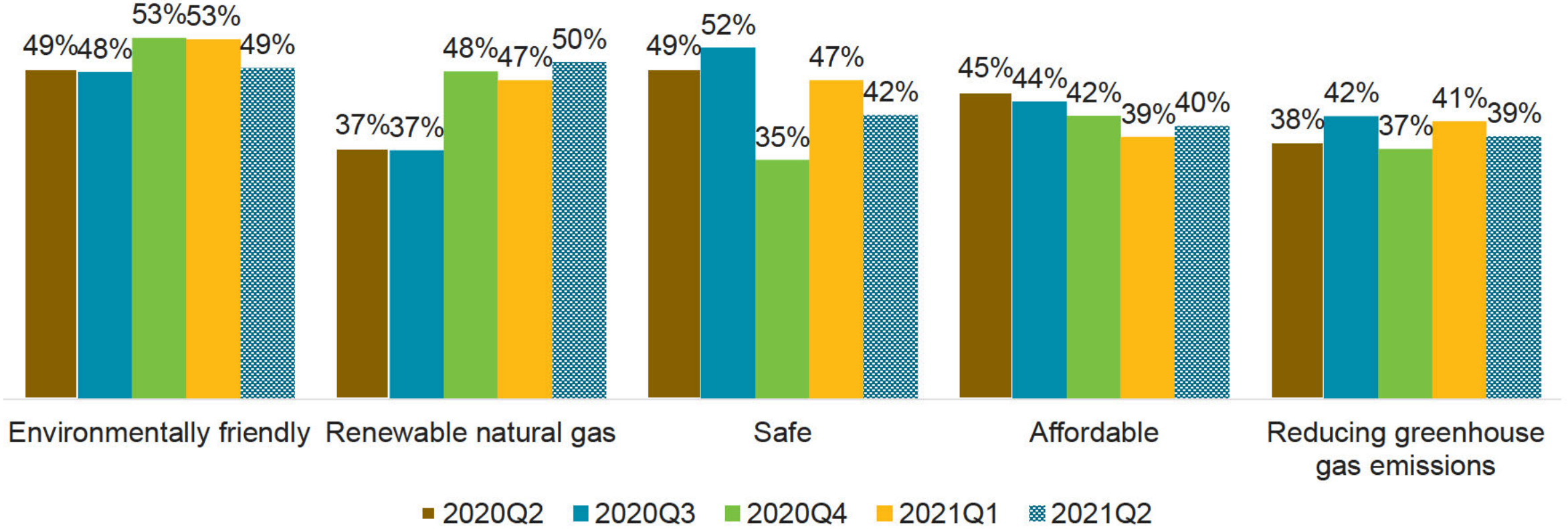
During the past three months, how many advertisements do you recall seeing, reading, or hearing from your utility company?



CUB/119
Jenks/103

NW Natural Ad Message Recall

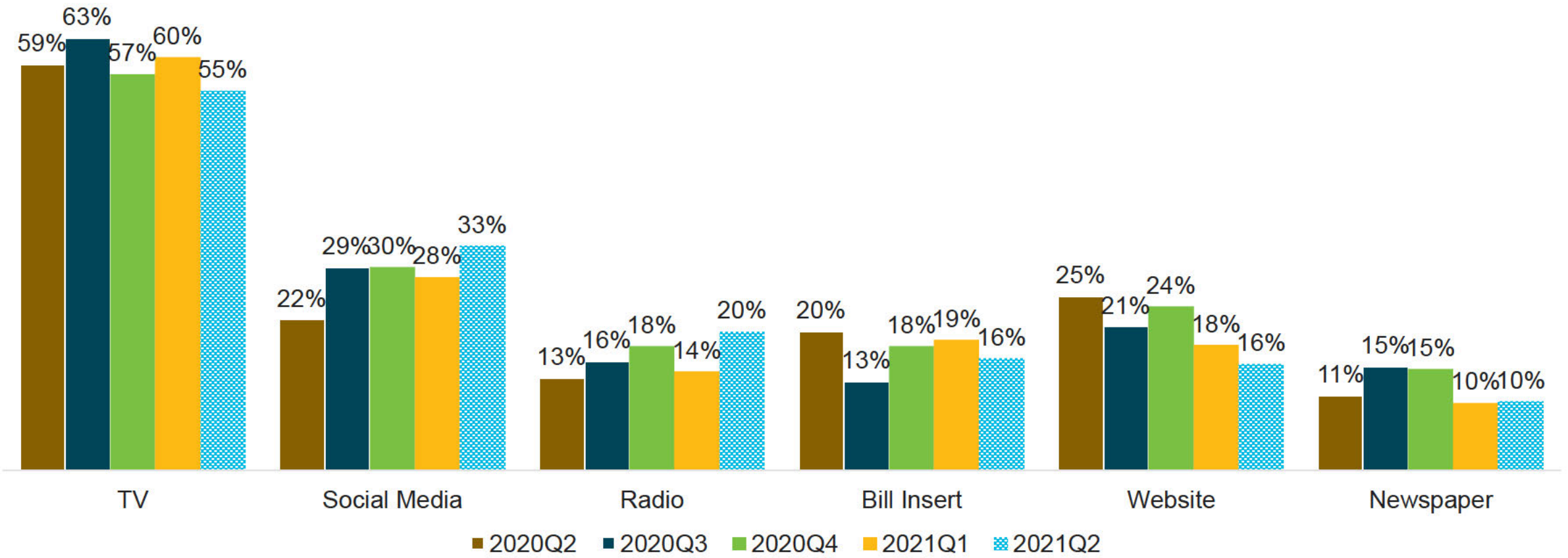
Think about the advertisement(s) you recall from NW Natural, what were the message(s) about? Mark all that apply.



CUB/119
Jenks/104

NW Natural Ad Message Channel

Where did you see or hear this/these communication(s)? Mark all that apply.

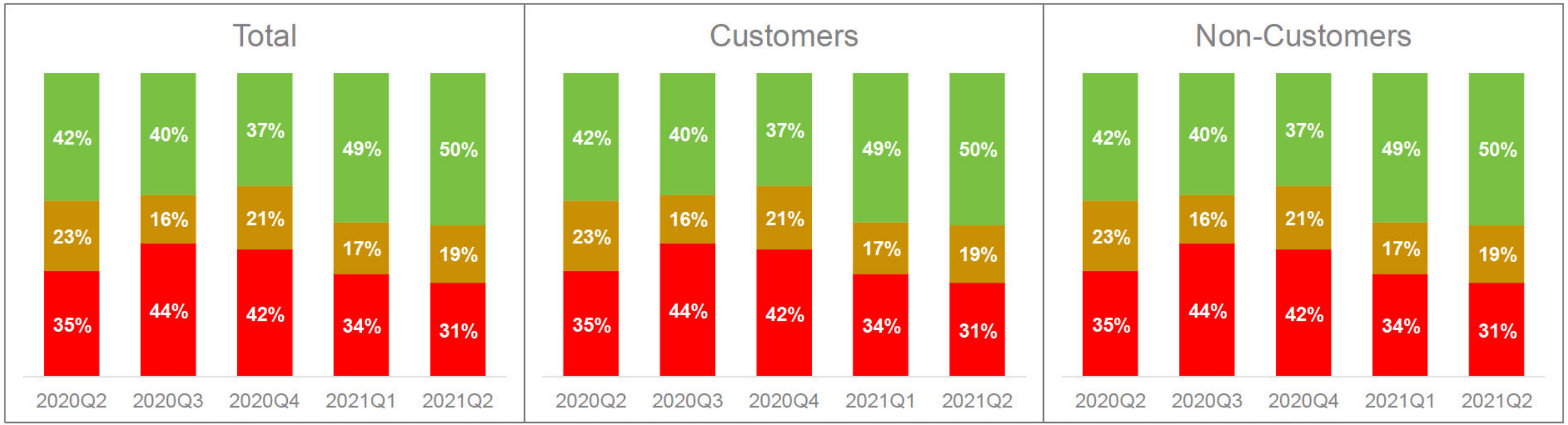


Public Sentiments

CUB/119
Jenks/106

General mood

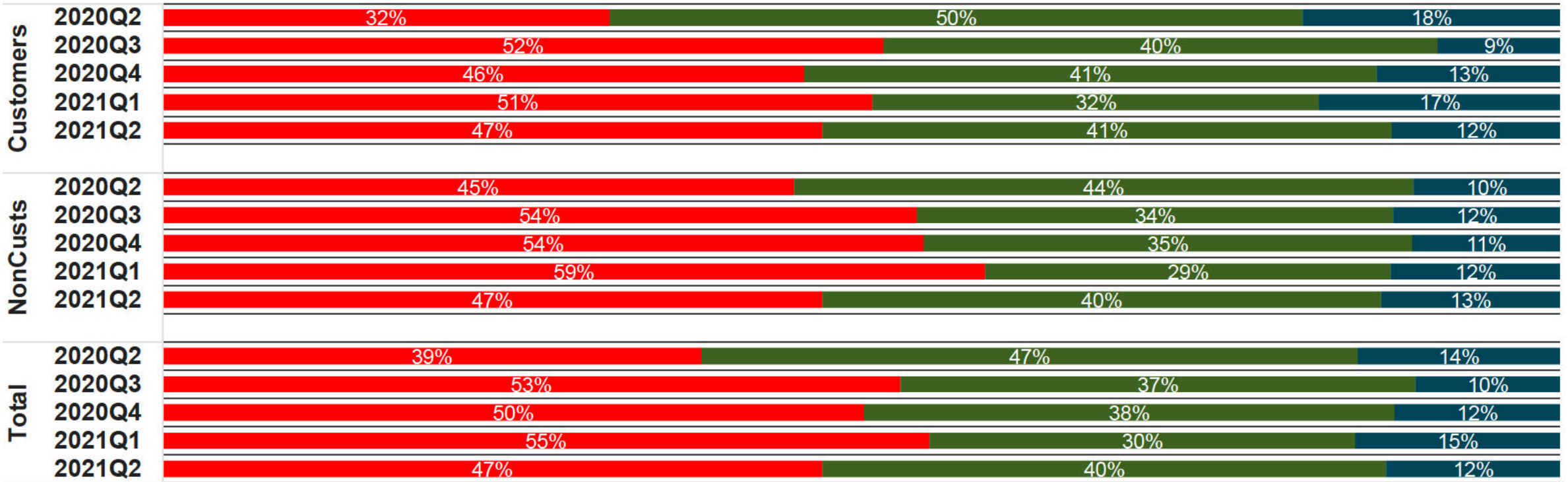
All things considered, would you say that your local community is headed in the right direction, or have things gotten off on the wrong track?



CUB/119
Jenks/107

Carbon Reduction Effort Statement

Which statement comes closest to your point of view?

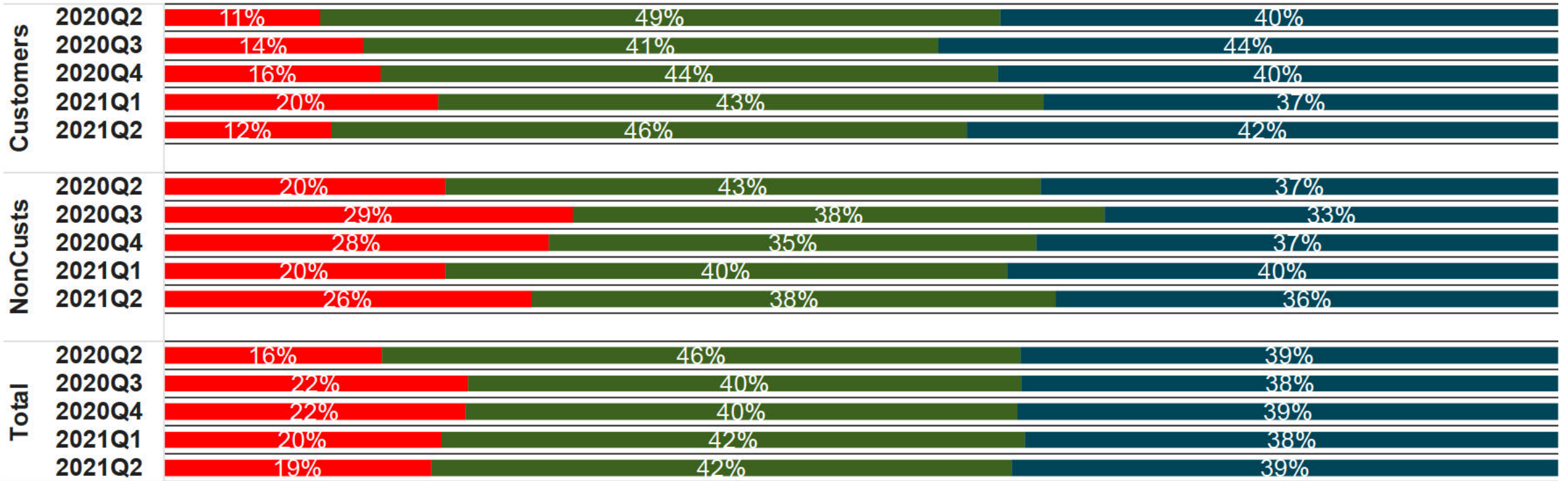


Natural Gas Preference

CUB/119
Jenks/109

Natural Gas Statements

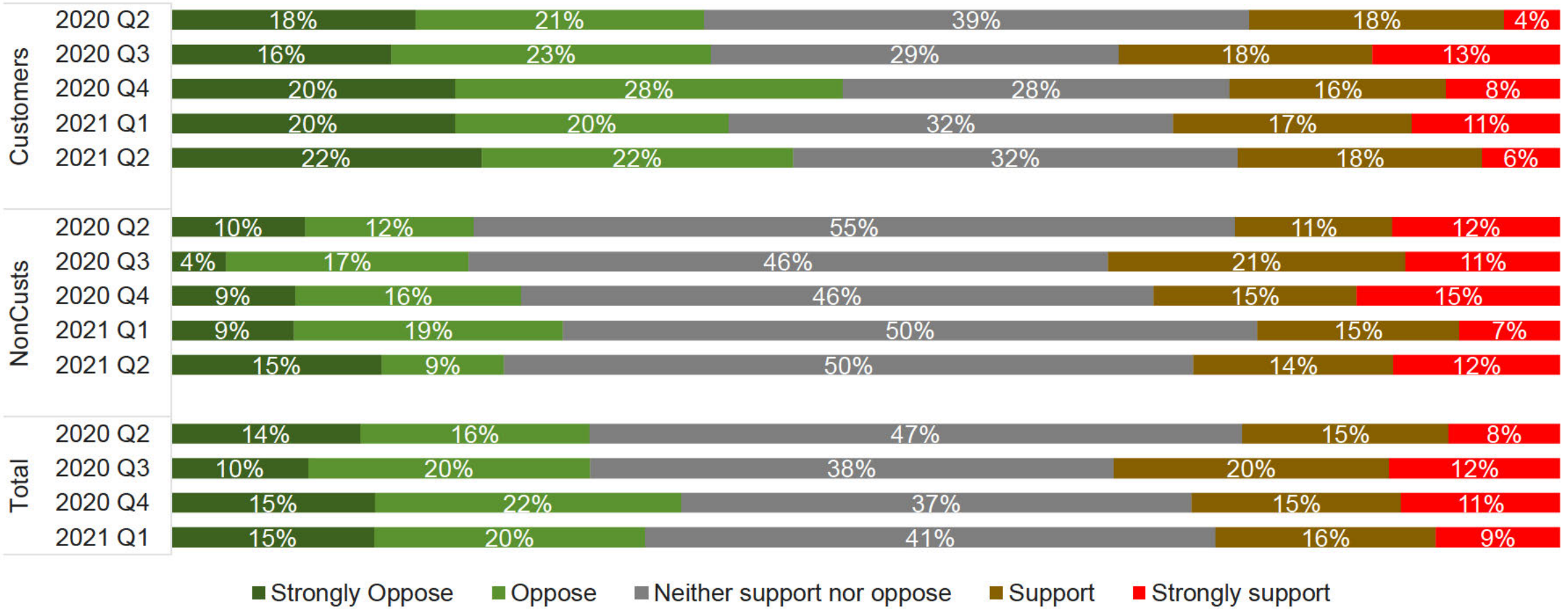
Which statement comes closest to your point of view?



CUB/119
Jenks/110

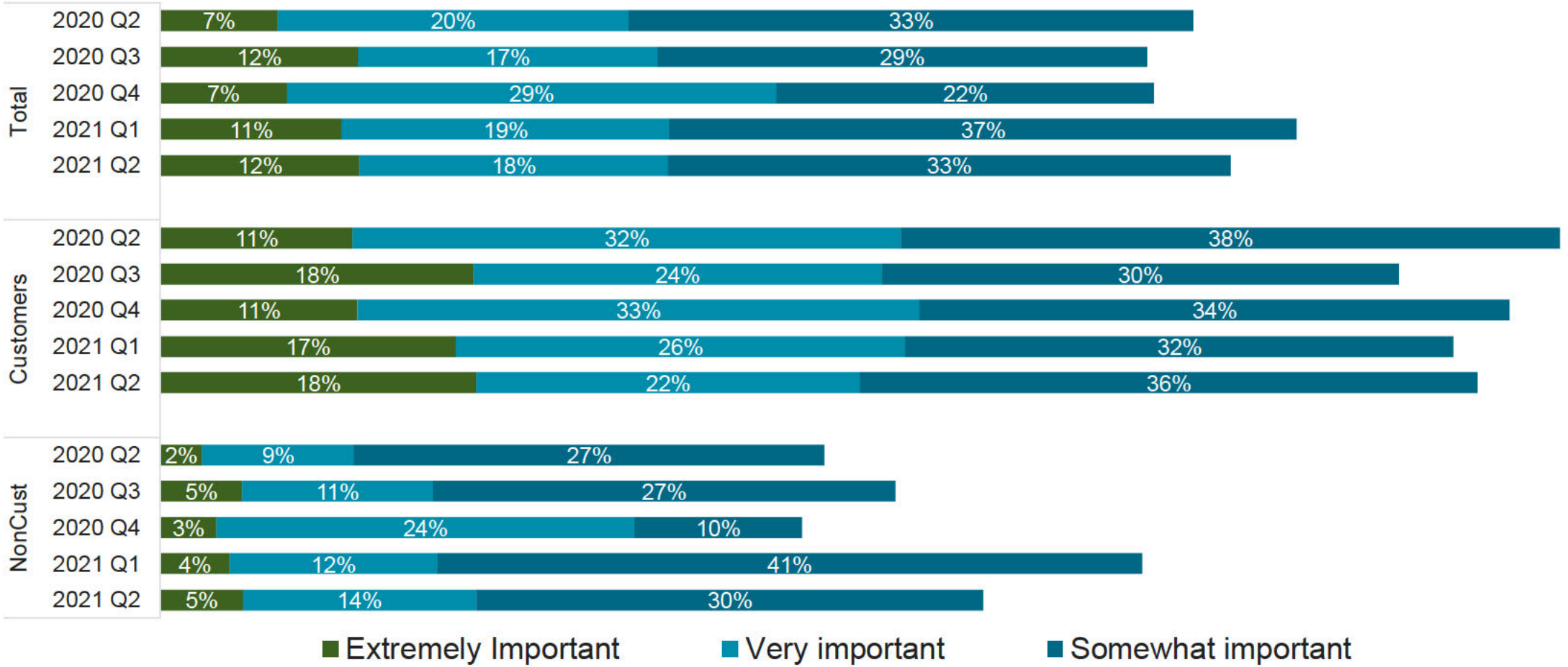
Natural Gas Ban Support

Would you support or oppose your local government banning new natural gas hookups in homes and buildings??



Natural Gas Preference

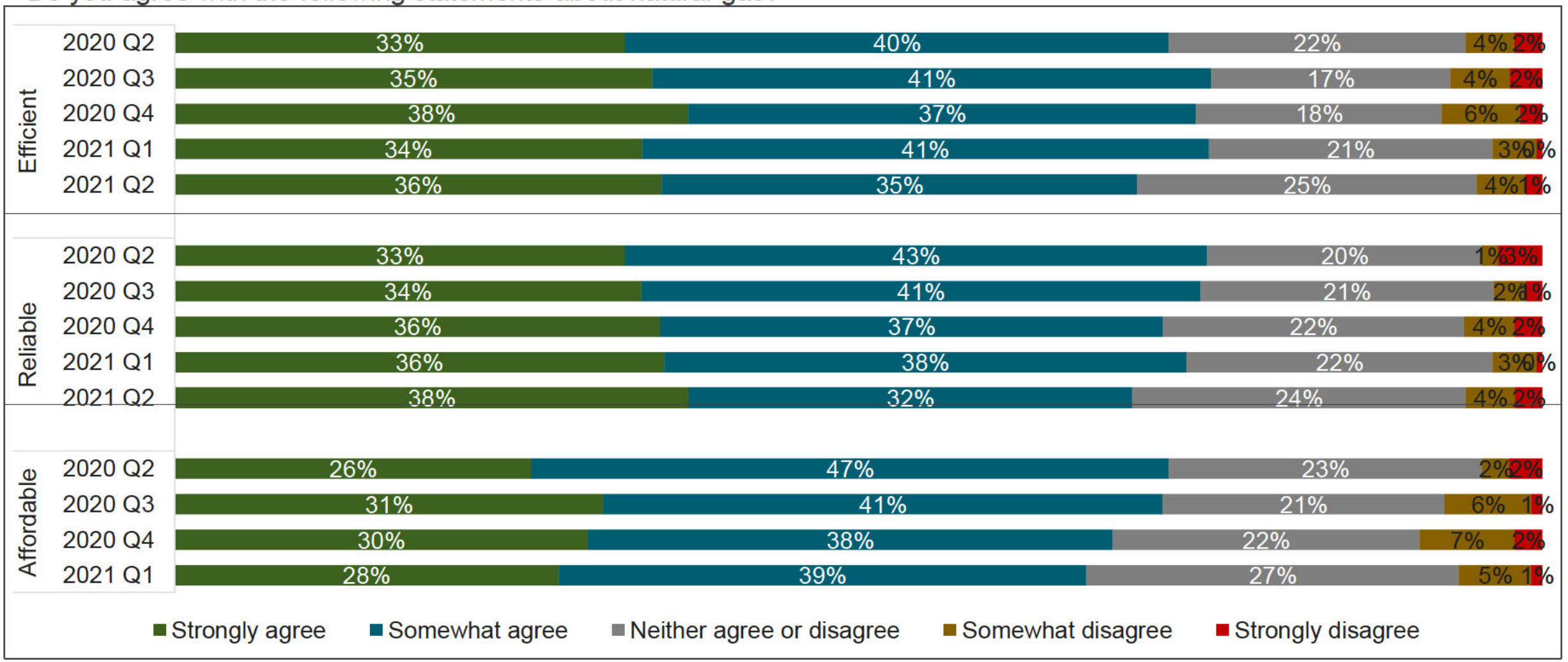
If you were looking for a new home, how important would it be to you that the new home have natural gas appliances?



CUB/119
Jenks/112

Natural Gas Attributes

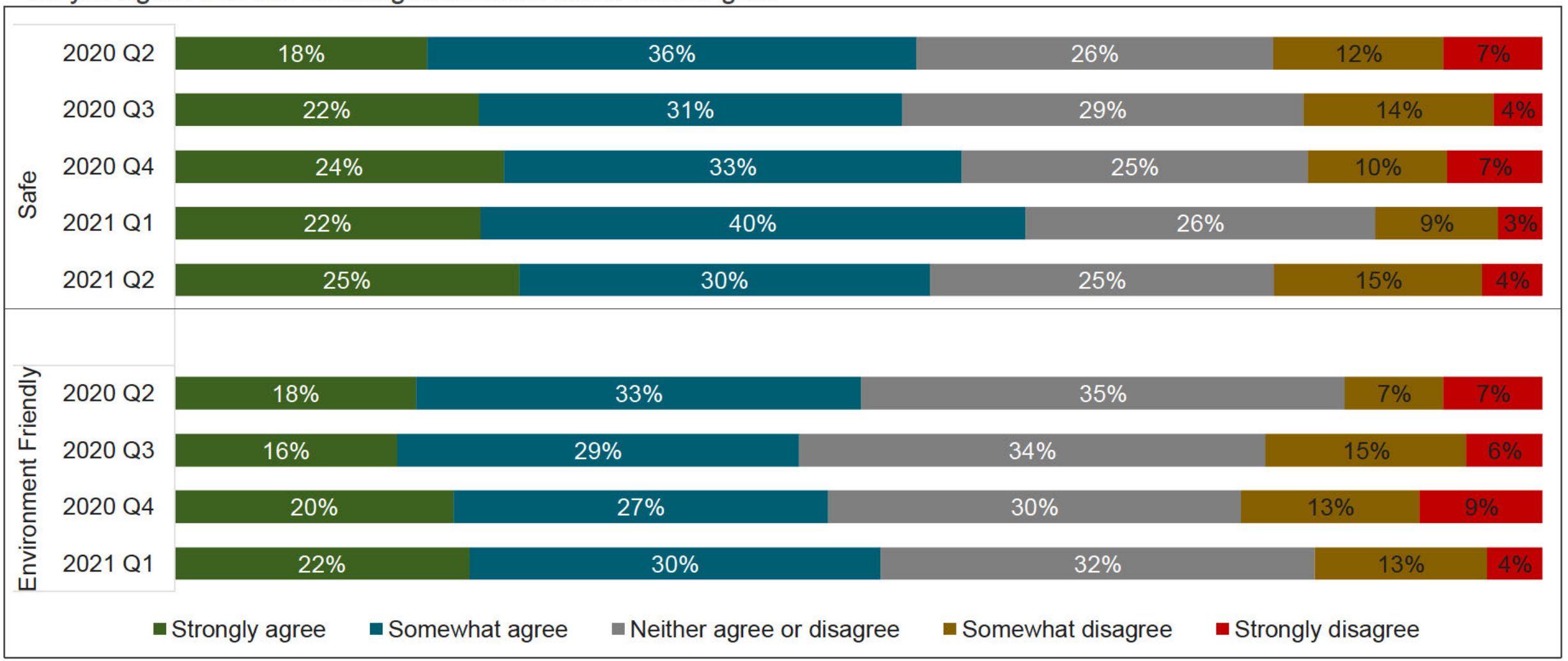
Do you agree with the following statements about natural gas?



CUB/119
Jenks/113

Natural Gas Attributes (continued)

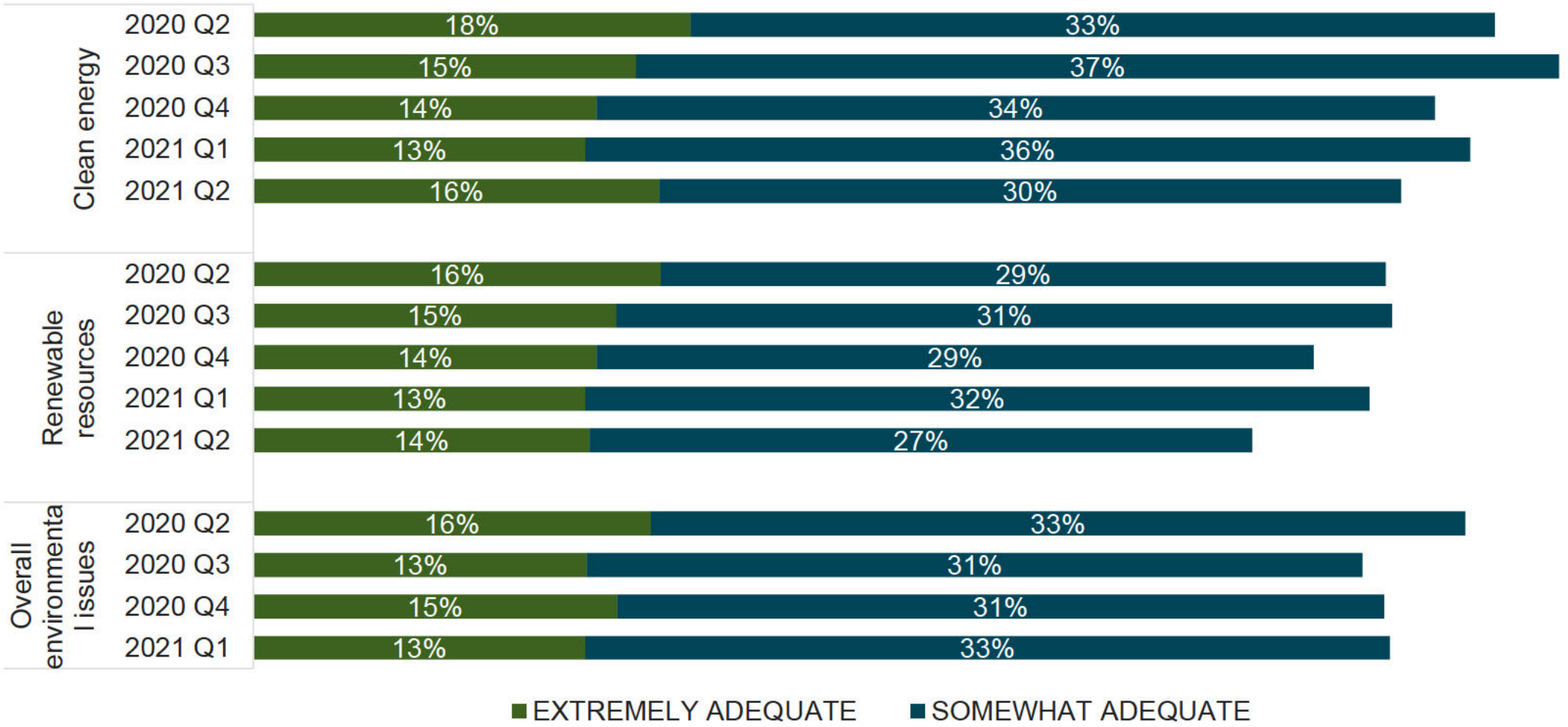
Do you agree with the following statements about natural gas?



CUB/119
Jenks/114

NW Natural Environmental Efforts

How would you rate NW Natural on the following:



NW Natural Advertising Awareness Public Sentiment Tracking - Q3 2021

Methodology

- Online research panels
- Primary residence within NW Natural service territory
- 250 respondents each quarter
  - 125 gas customers
  - 125 non-gas customers
- Repeat every three months
  - September
  - December
  - March
  - June

Executive Summary – Ad Awareness

- 57% of all respondents recalled seeing NW Natural ads during the last quarter, a jump of 5 points comparing to last quarter.
  - Most of the gain were coming from our customers: 70% in Q3 vs. 54% last quarter.
  - By age group: readings from all three groups were increasing this quarter, led by 18 -34 group which added 11 points.
  - Around 50% of three other larger utilities' customers in our region recalled seeing their advertisings.
- Among those recalled seeing NW Natural ads, about half of them saw RNG, Natural Gas is environmentally friendly, Safe, or Affordable (47% - 52%), reducing greenhouse gas emissions is the only one lagging at 36%.
- 57% of the recalls were from TV(+2 pts) , followed by social media 34% (+1 pts) and billing insert 21% (+5 pts).

Executive Summary –Public Sentiment

- 44% (-6 pts) of all who surveyed agreed that our local community is headed in the right direction, while those said we are getting off the wrong track jumped from 31% to 39%.
- The percentage of people claiming not enough is being done to reduce carbon emissions remained unchanged while those who said too much effort is being spent to reduce carbon emissions increased 4 points to 16%. 36% said the right amount is being spent.

CUB/119
Jenks/119

Executive Summary – Natural Gas Preference

- 42% of respondents believed that natural gas should be used(+2 pts) , 41% natural gas is critical to reach climate goals, and only 17% (-2 pts) natural gas should be ban.
- Natural gas preference remained stable among people surveyed. Though the preference among customers experienced a 6 points drop in the extremely important category (Q3: 12% vs Q2: 16%).
- About three quarters of all respondents agreed that natural gas is reliable, efficient or affordable, about half safe or environmentally friendly.
- About half of all respondents viewed NW Natural's environmental efforts as adequate.

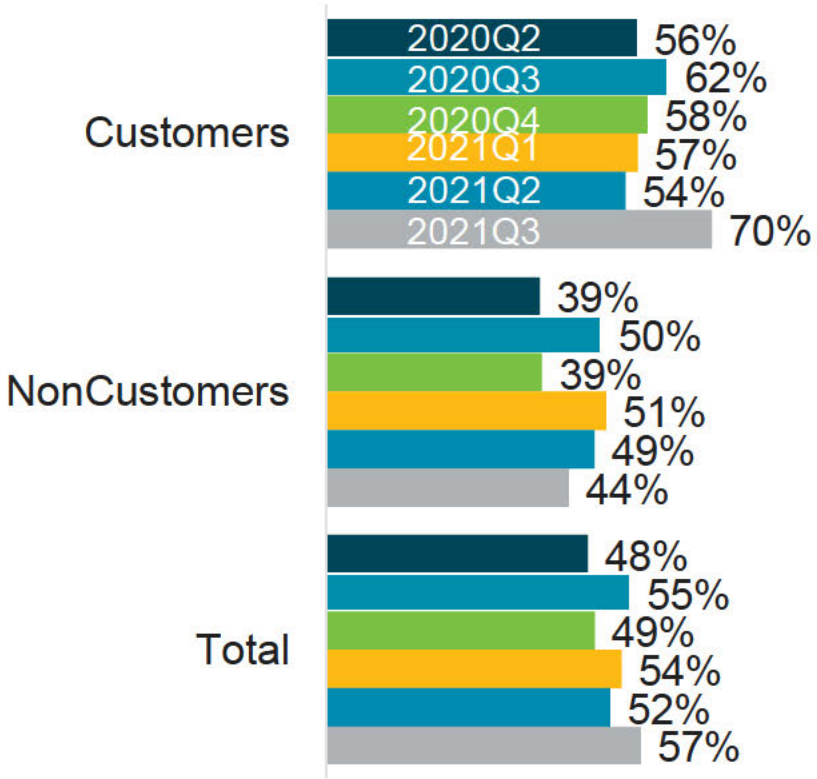
CUB/119
Jenks/120

Advertising Awareness

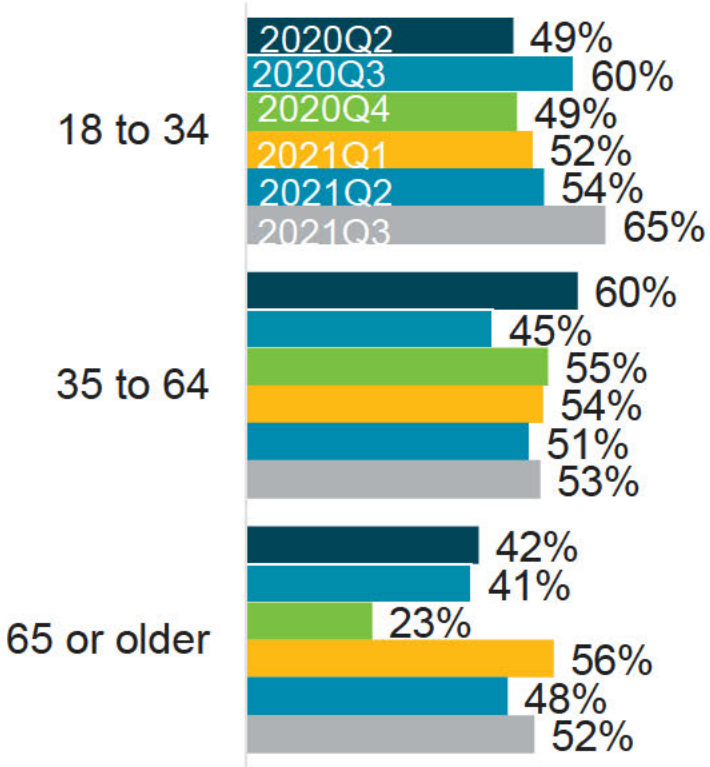
NW Natural Advertising Awareness

During the past three months, how many advertisements do you recall seeing, reading, or hearing from your natural gas company - NW Natural?

By Customers/Non-customers



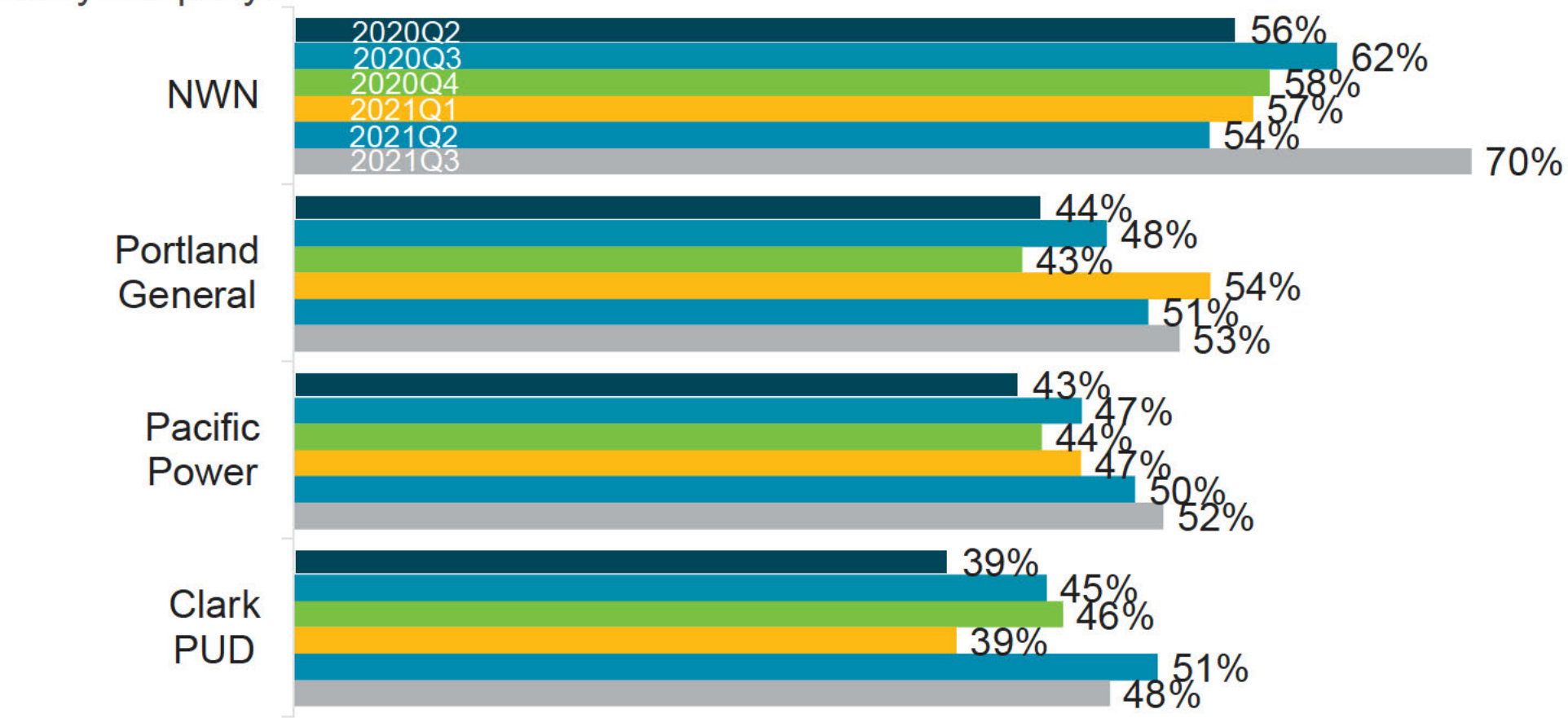
By Age Group



CUB/119
Jenks/122

Utility Company Advertising Awareness among its own customers

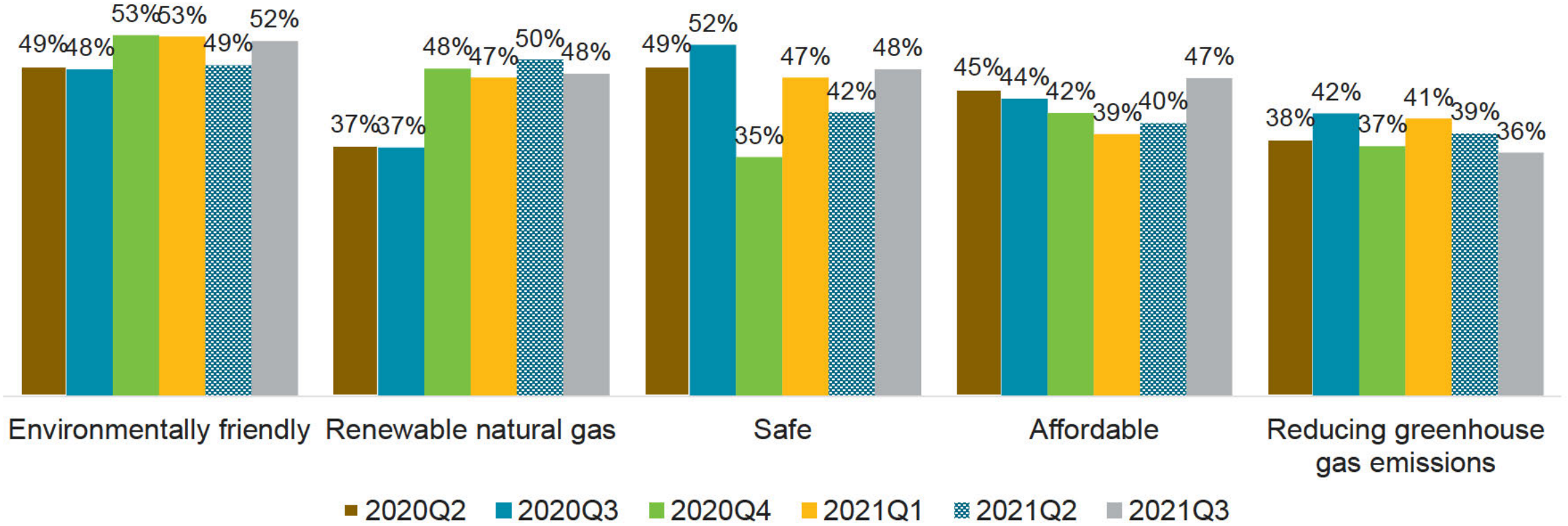
During the past three months, how many advertisements do you recall seeing, reading, or hearing from your utility company?



CUB/119
Jenks/123

NW Natural Ad Message Recall

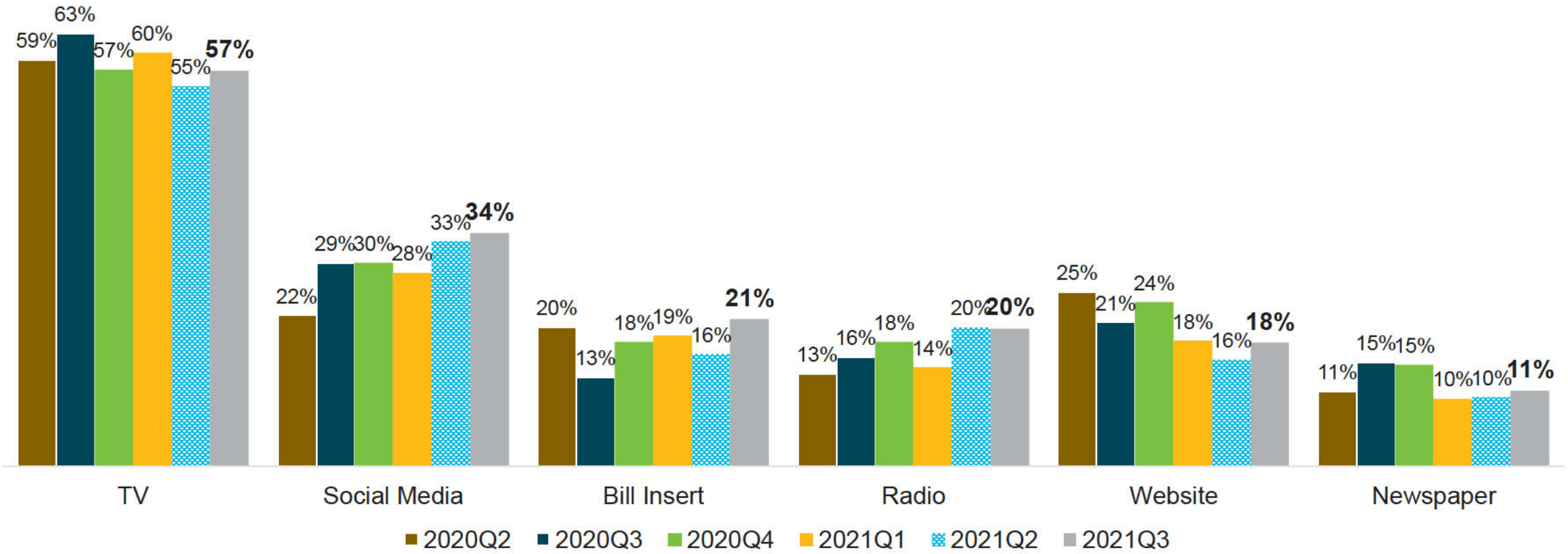
Think about the advertisement(s) you recall from NW Natural, what were the message(s) about? Mark all that apply.



CUB/119
Jenks/124

NW Natural Ad Message Channel

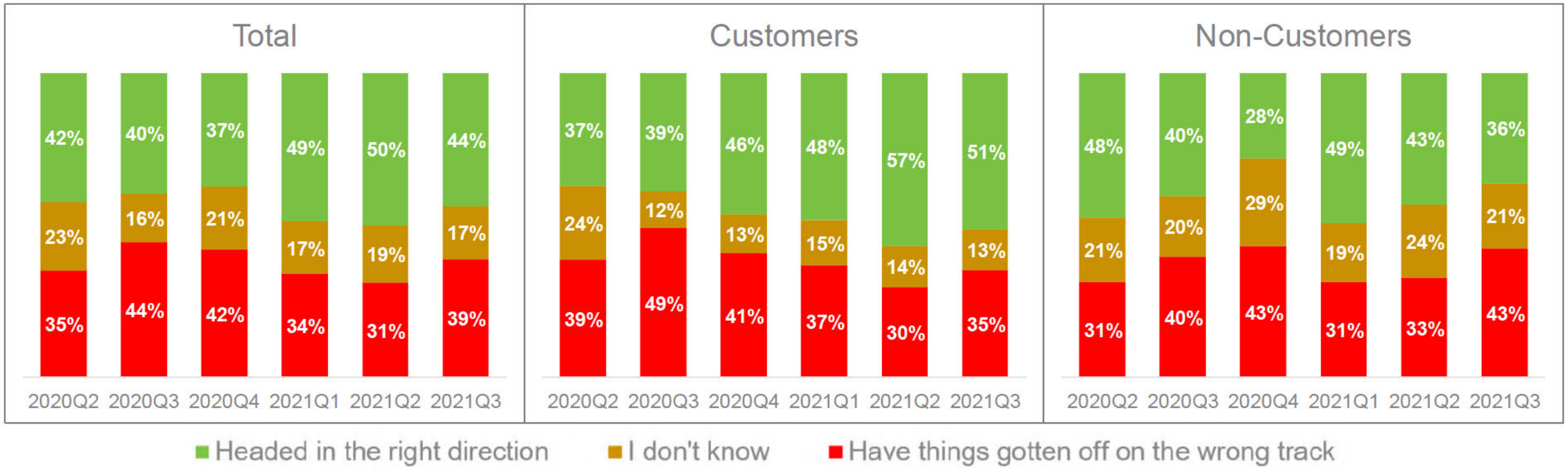
Where did you see or hear this/these communication(s)? Mark all that apply.



Public Sentiments

General mood

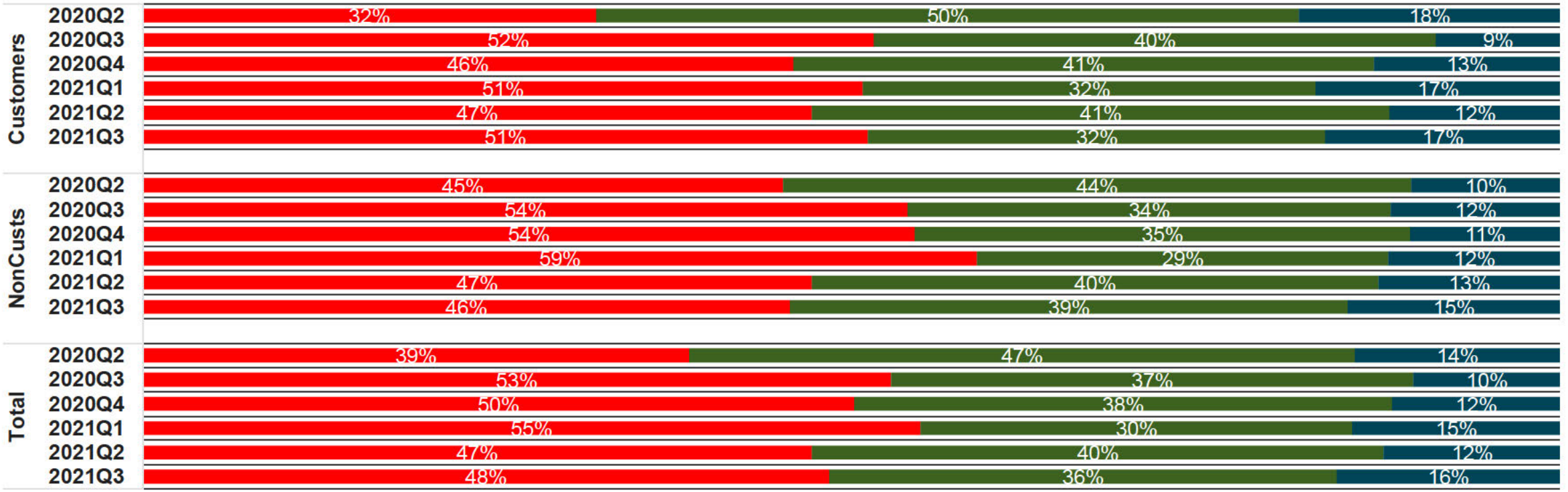
All things considered, would you say that your local community is headed in the right direction, or have things gotten off on the wrong track?



CUB/119
Jenks/127

Carbon Reduction Effort Statement

Which statement comes closest to your point of view?

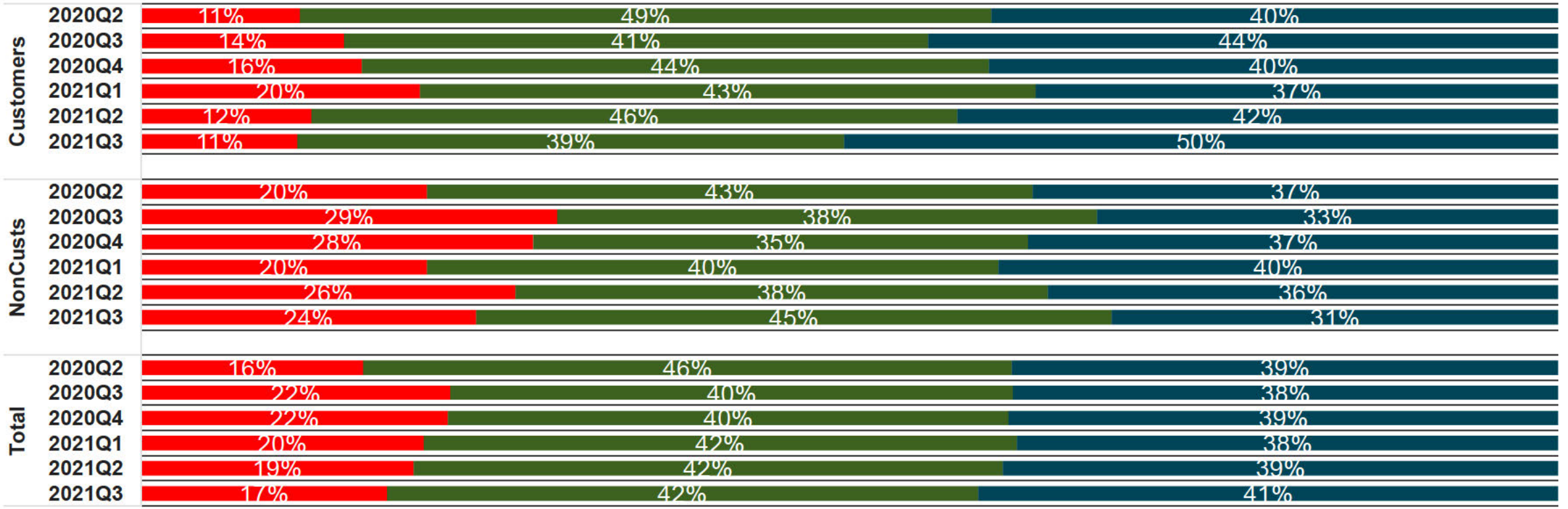


Natural Gas Preference

CUB/119
Jenks/129

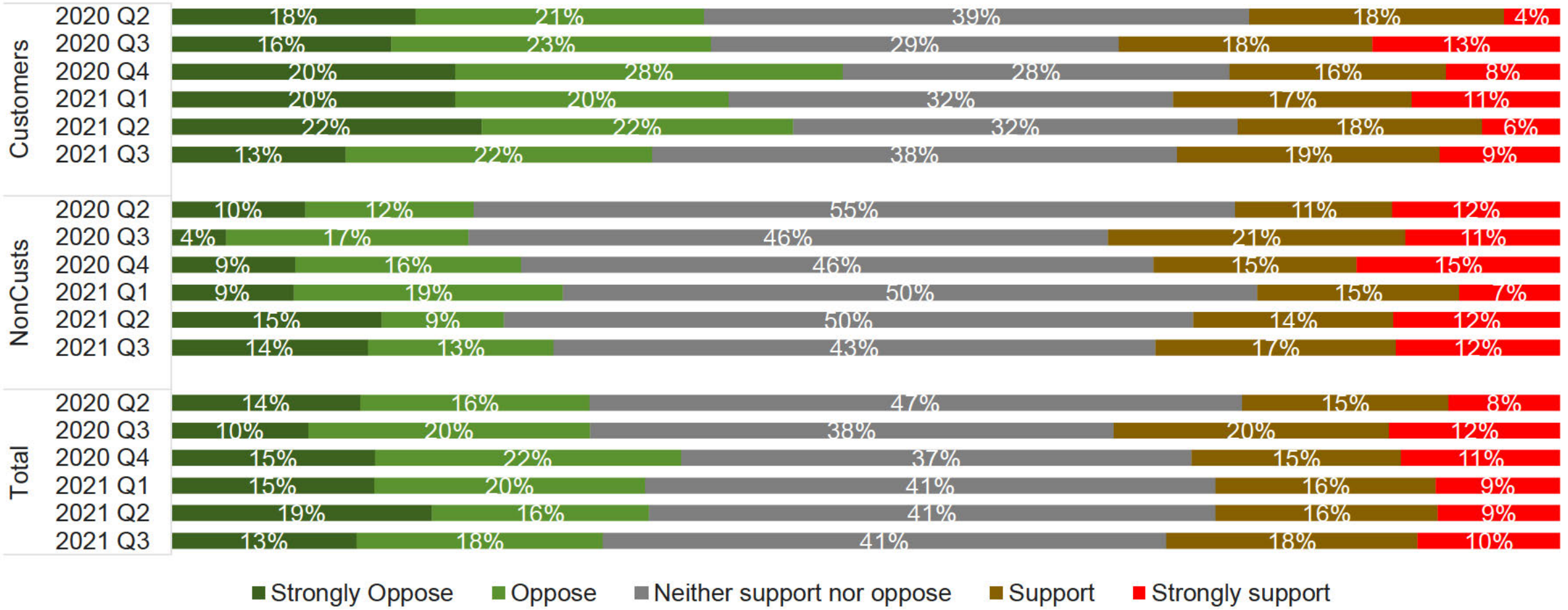
Natural Gas Statements

Which statement comes closest to your point of view?



Natural Gas Ban Support

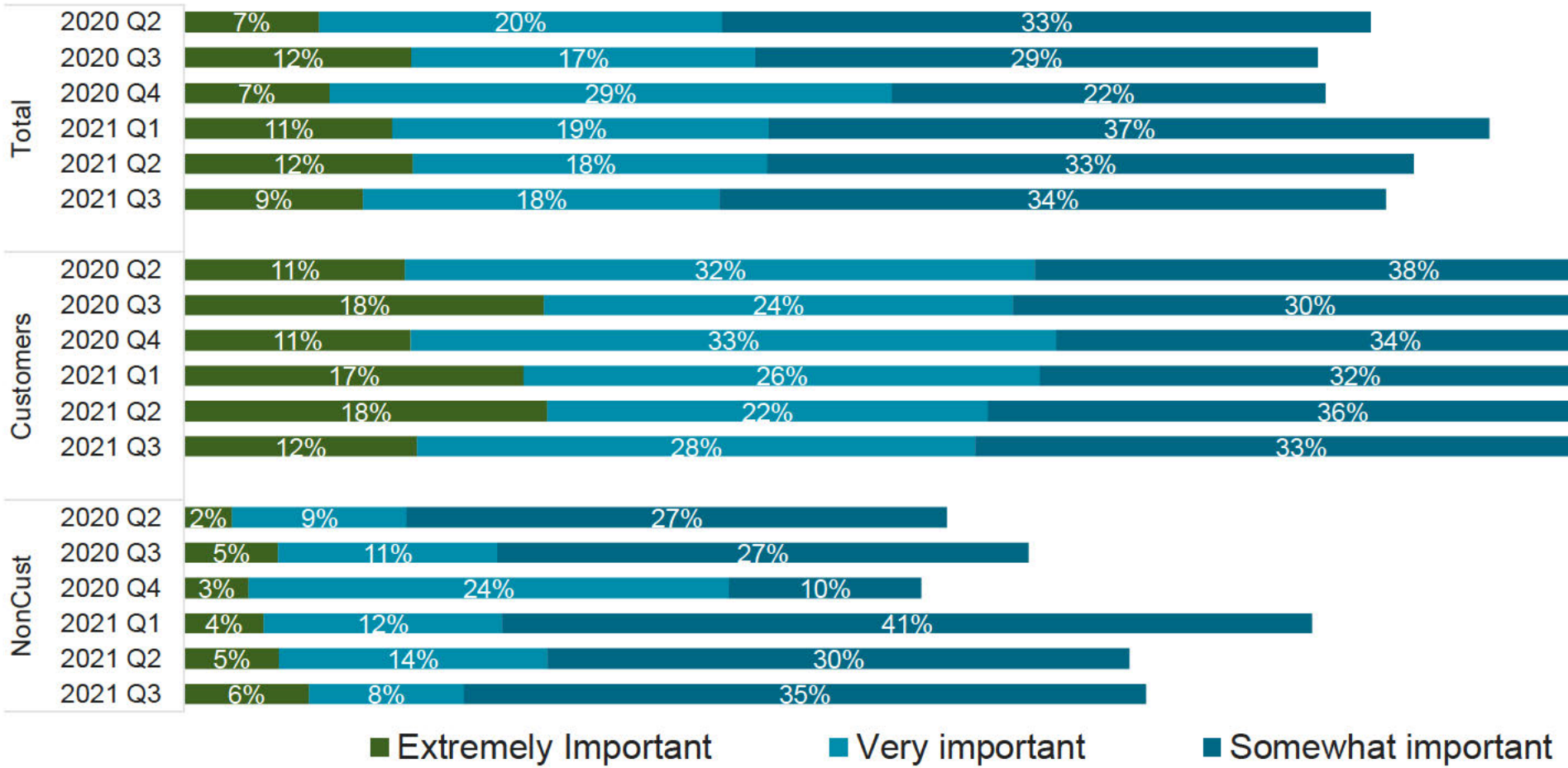
Would you support or oppose your local government banning new natural gas hookups in homes and buildings??



CUB/119
Jenks/131

Natural Gas Preference

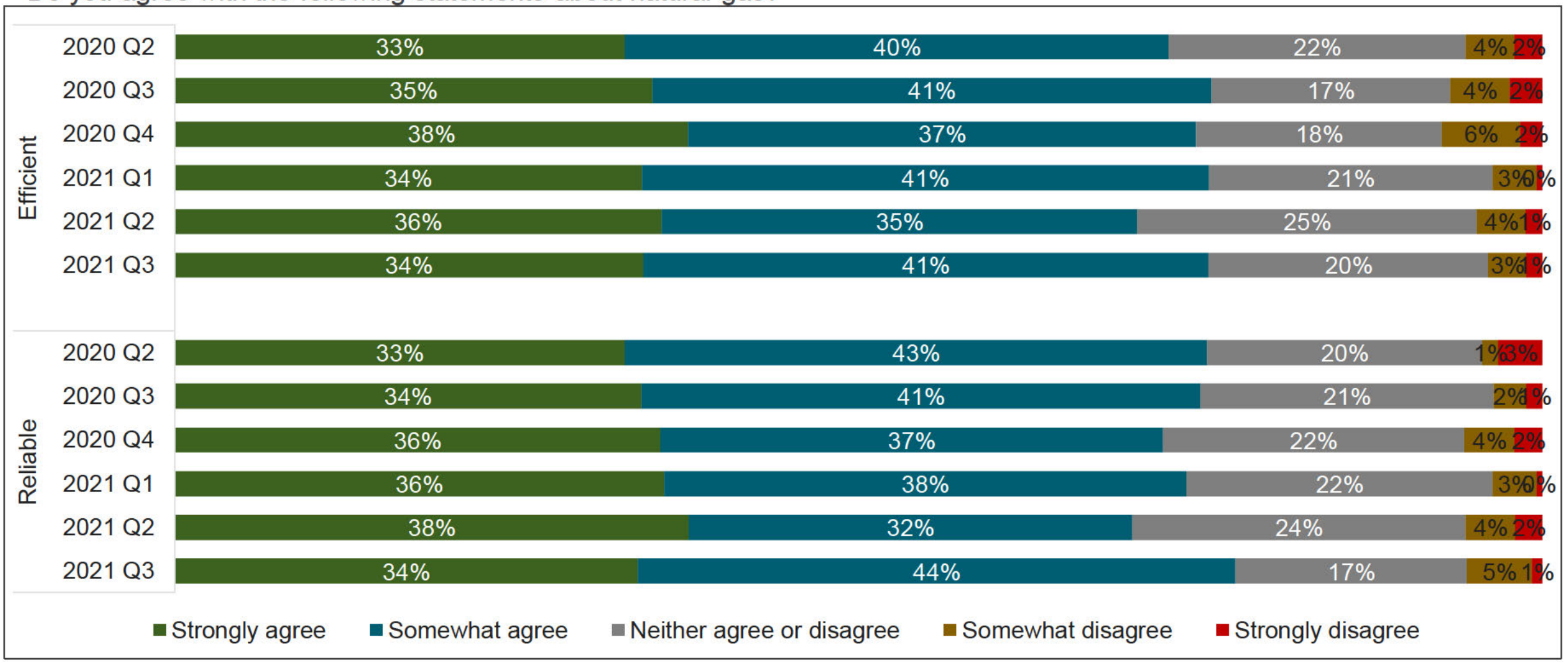
If you were looking for a new home, how important would it be to you that the new home have natural gas appliances?



CUB/119
Jenks/132

Natural Gas Attributes

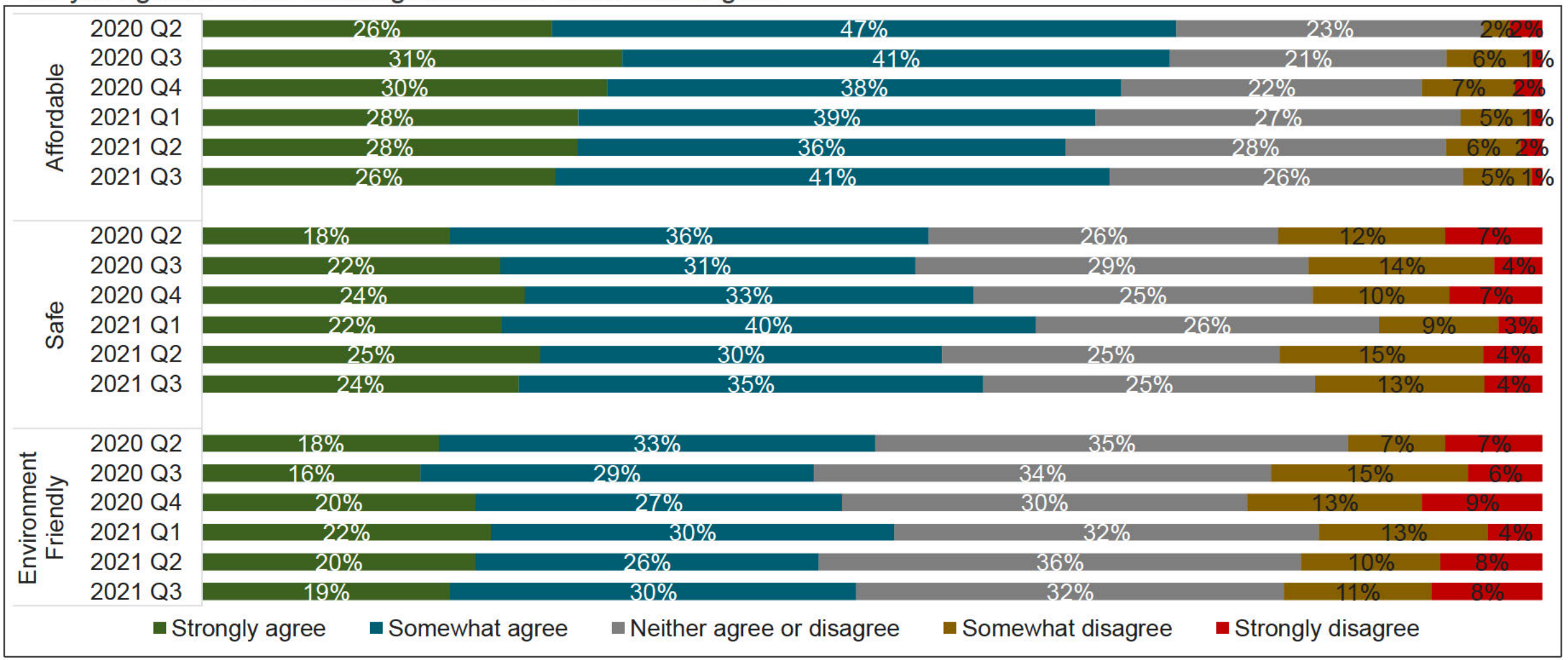
Do you agree with the following statements about natural gas?



CUB/119
Jenks/133

Natural Gas Attributes (continued)

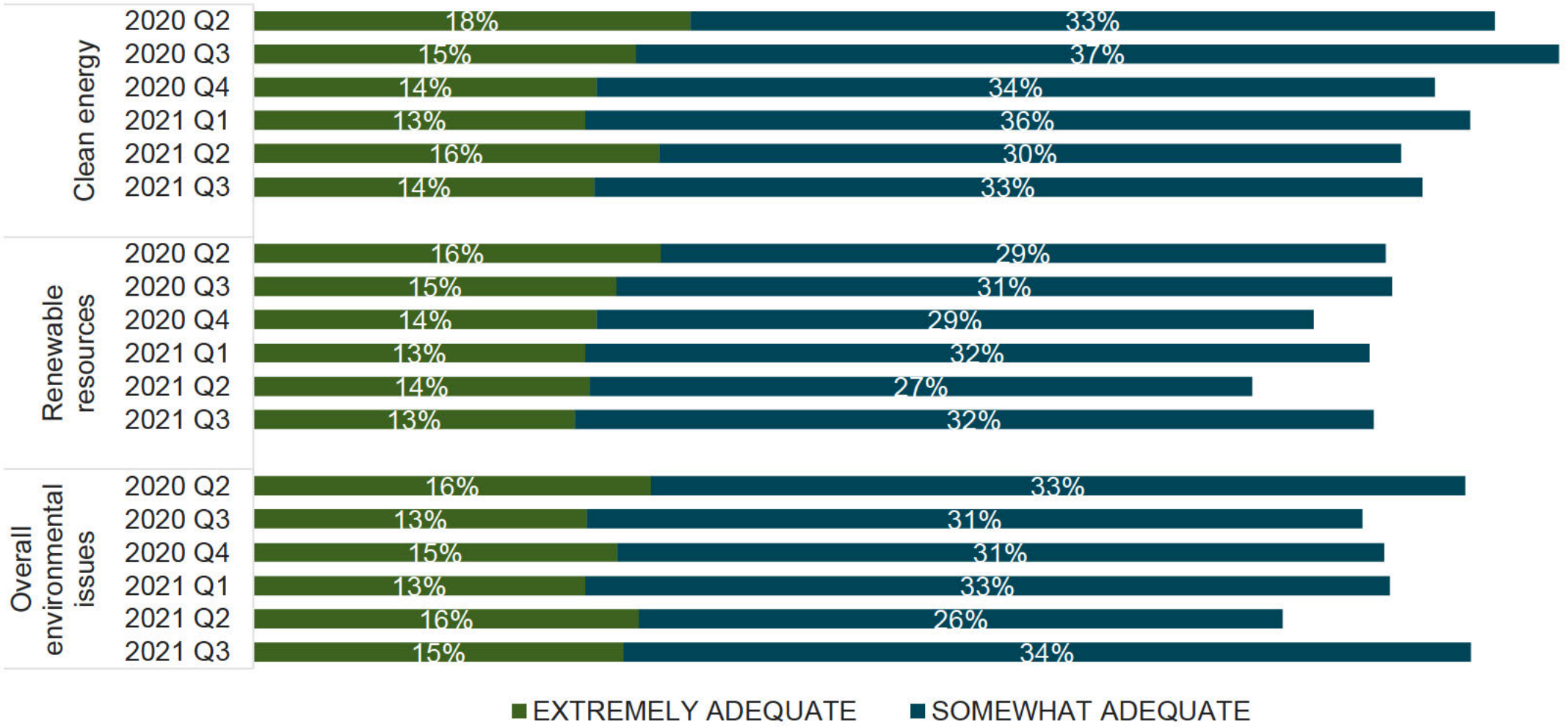
Do you agree with the following statements about natural gas?



CUB/119
Jenks/134

NW Natural Environmental Efforts

How would you rate NW Natural on the following:



NW Natural Advertising Awareness Public Sentiment Tracking - Q4 2021

Methodology

- Online research panels
- Primary residence within NW Natural service territory
- 250 respondents each quarter
  - 125 gas customers
  - 125 non-gas customers
- Repeat every three months
  - September
  - December
  - March
  - June

Executive Summary – Ad Awareness

- 54% of all respondents recalled seeing NW Natural ads during the last quarter, a drop of 4 points comparing to last quarter.
  - The one-time blip in last quarter was mostly due to our climate policies outreach campaign in August and September.
  - By age group: 18 -34 and older age group dropped slightly while 35 – 64 group remained unchanged.
  - Around 50% of three other larger utilities' customers in our region recalled seeing their advertisings.
- Among those recalled seeing NW Natural ads, between 40% to 50% of them saw RNG, natural gas is environmentally friendly, safe, affordable, or reducing greenhouse gas emissions ad.
- 63% of the recalls were from TV(+5 pt.s) , followed by social media 26% (-8 pts) and billing insert 18% (+3 pt.s).

Executive Summary –Public Sentiment

- 44% (+/- 0 pts) of all who surveyed agreed that our local community is headed in the right direction, while those said we are getting off the wrong track dropped from 39% to 33%.
- The percentage of people who claimed not enough is being done to reduce carbon emissions jumped 6 points to 54%.

CUB/119
Jenks/139

Executive Summary – Natural Gas Preference

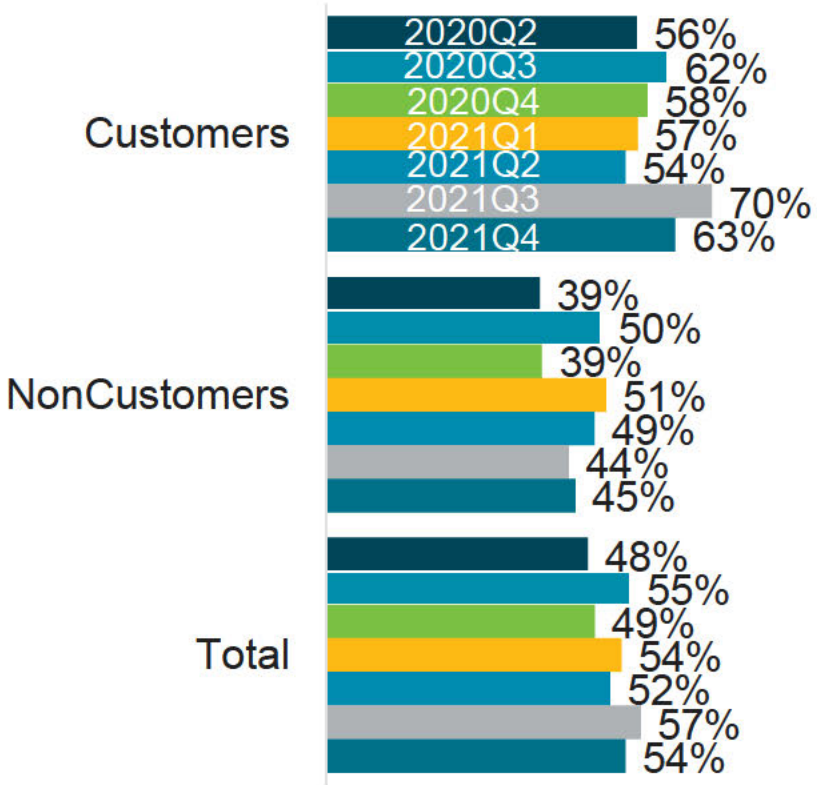
- 34% of respondents believed that natural gas should be used(-8 pts) , 40% natural gas is critical to reach climate goals (-1 pt.), and 26% (+9 pts) natural gas should be ban.
- Natural gas preference remained stable among people surveyed: 60% of
- About three quarters of all respondents agreed that natural gas is reliable, efficient or affordable, about half safe or environmentally friendly.
- About half of all respondents viewed NW Natural's environmental efforts as adequate.

Advertising Awareness

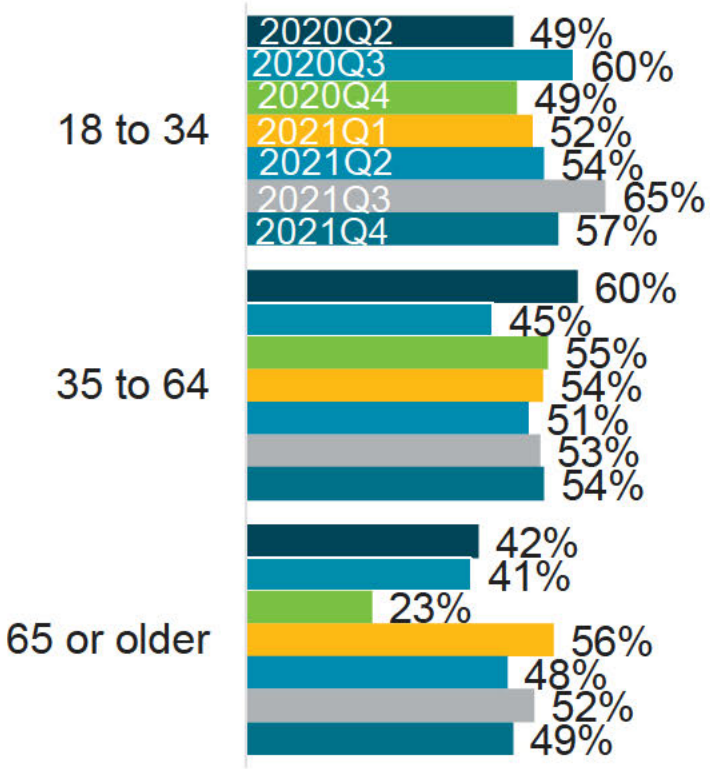
NW Natural Advertising Awareness

During the past three months, how many advertisements do you recall seeing, reading, or hearing from your natural gas company - NW Natural?

By Customers/Non-customers



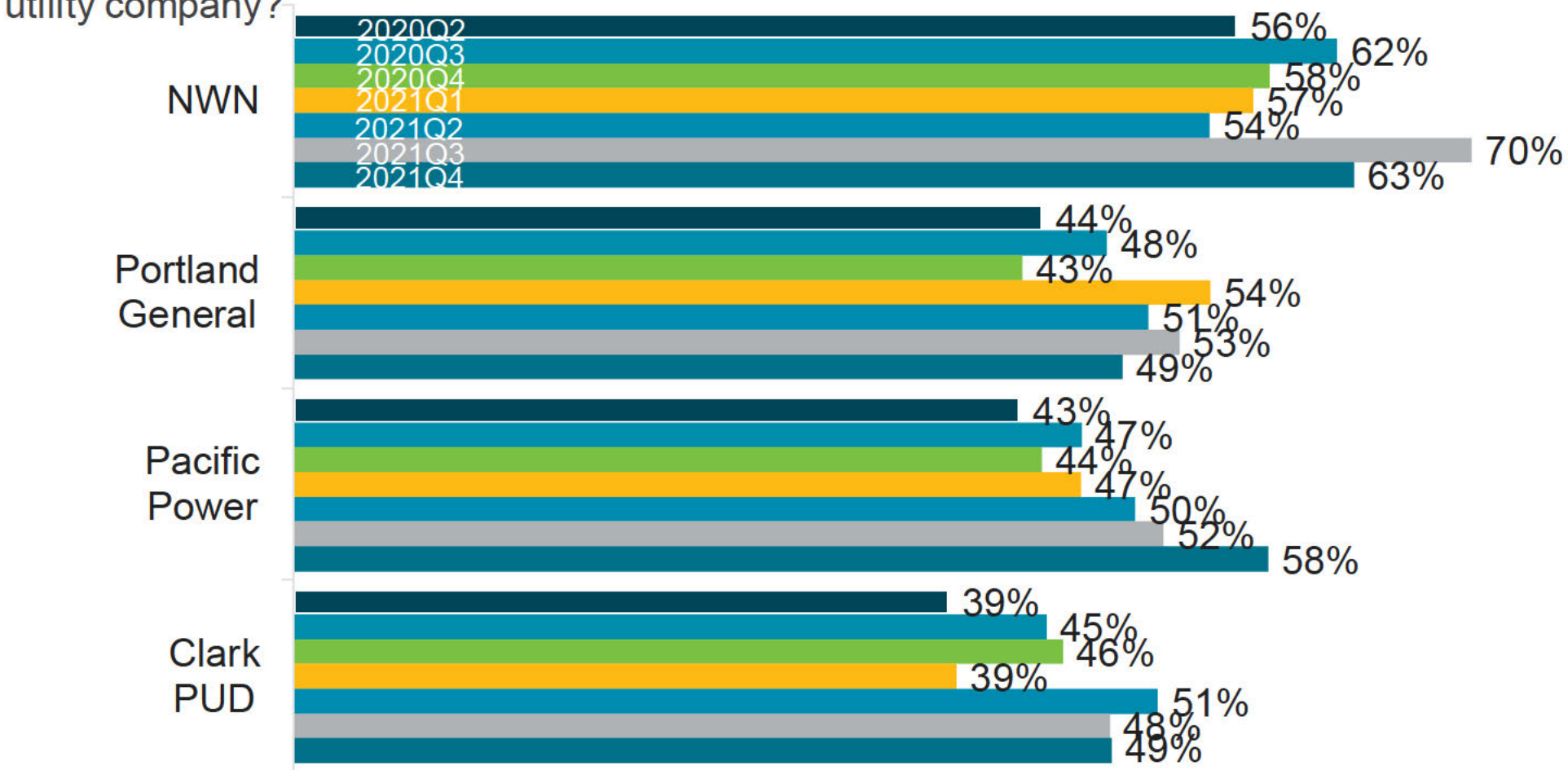
By Age Group



CUB/119
Jenks/142

Utility Company Advertising Awareness among its own customers

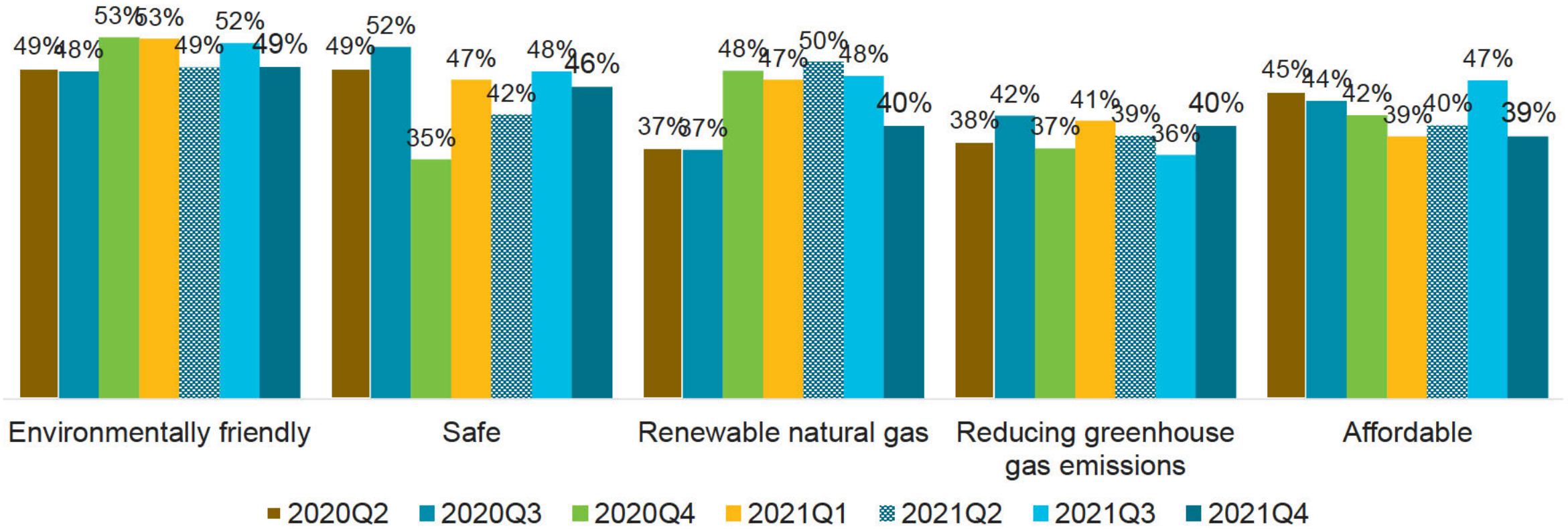
During the past three months, how many advertisements do you recall seeing, reading, or hearing from your utility company?



CUB/119
Jenks/143

NW Natural Ad Message Recall

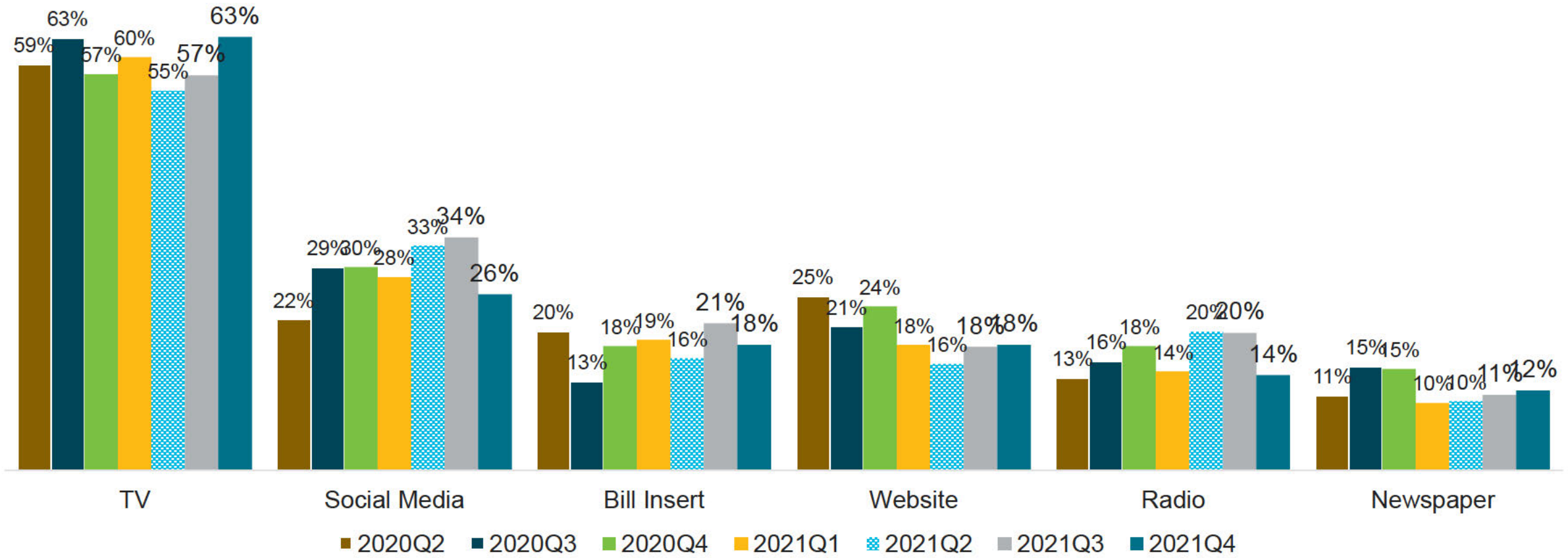
Think about the advertisement(s) you recall from NW Natural, what were the message(s) about? Mark all that apply.



CUB/119
Jenks/144

NW Natural Ad Message Channel

Where did you see or hear this/these communication(s)? Mark all that apply.

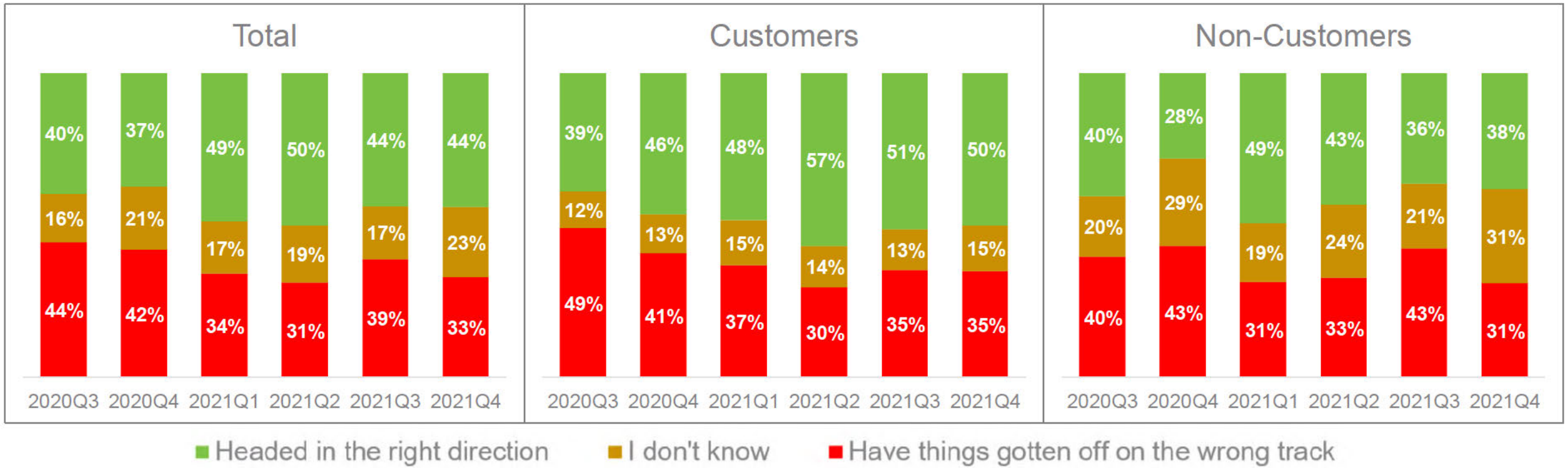


Public Sentiments

CUB/119
Jenks/146

General mood

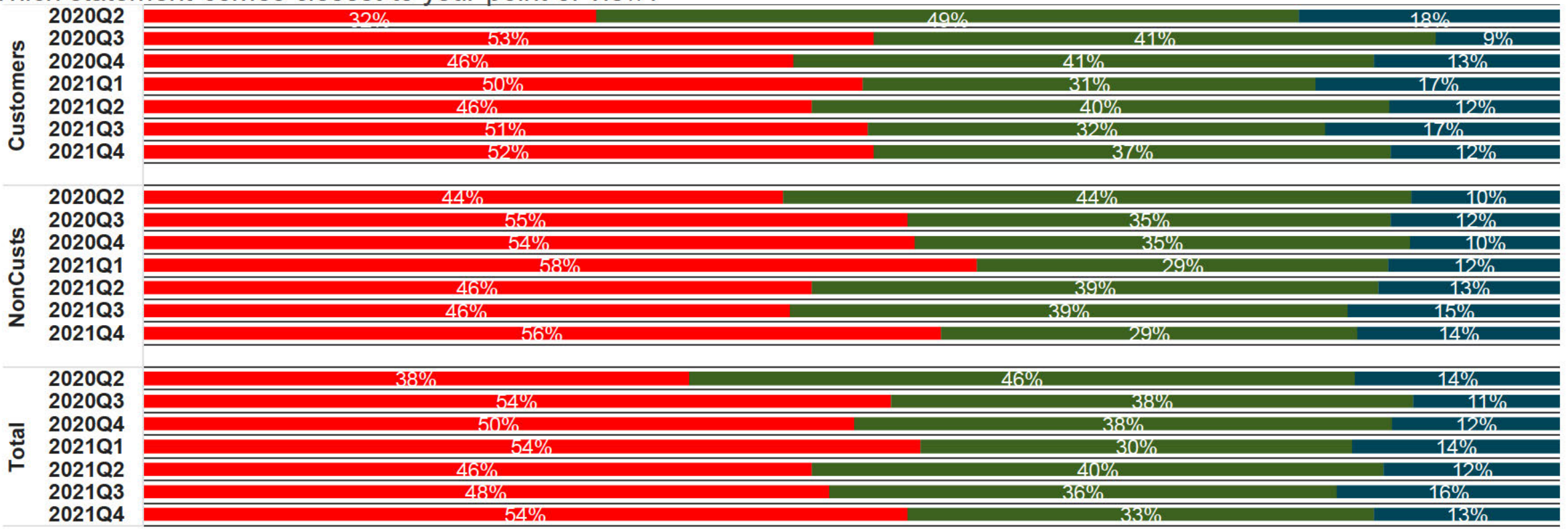
All things considered, would you say that your local community is headed in the right direction, or have things gotten off on the wrong track?



CUB/119
Jenks/147

Carbon Reduction Effort Statement

Which statement comes closest to your point of view?

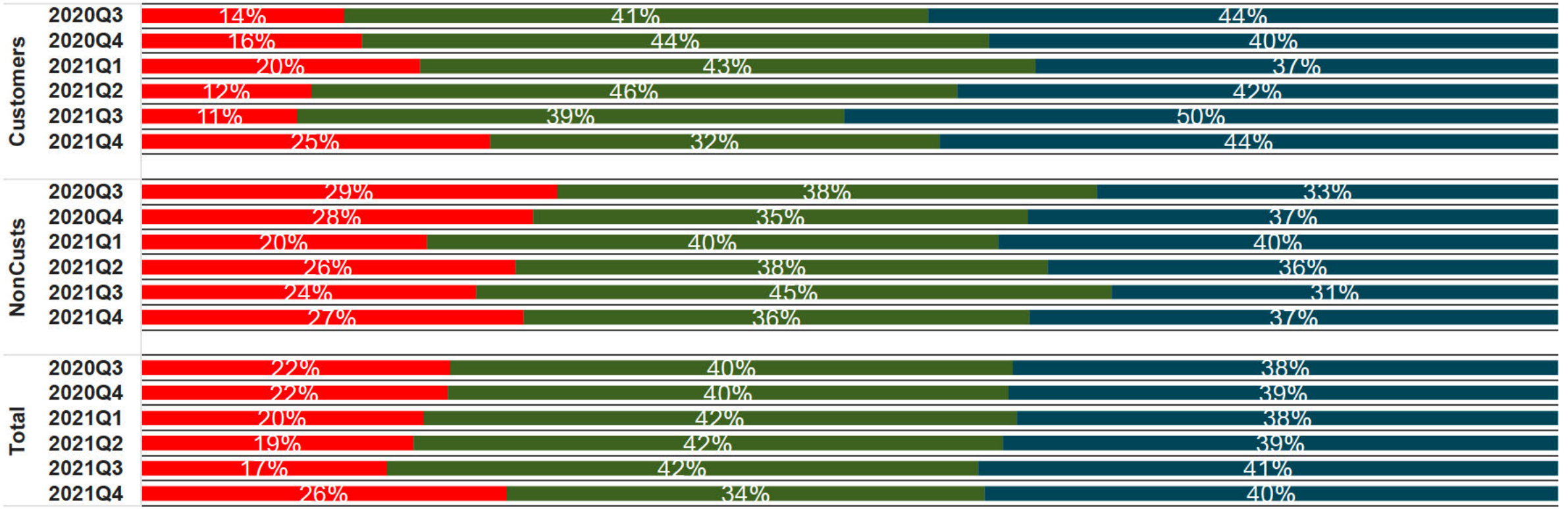


Natural Gas Preference

CUB/119
Jenks/149

Natural Gas Statements

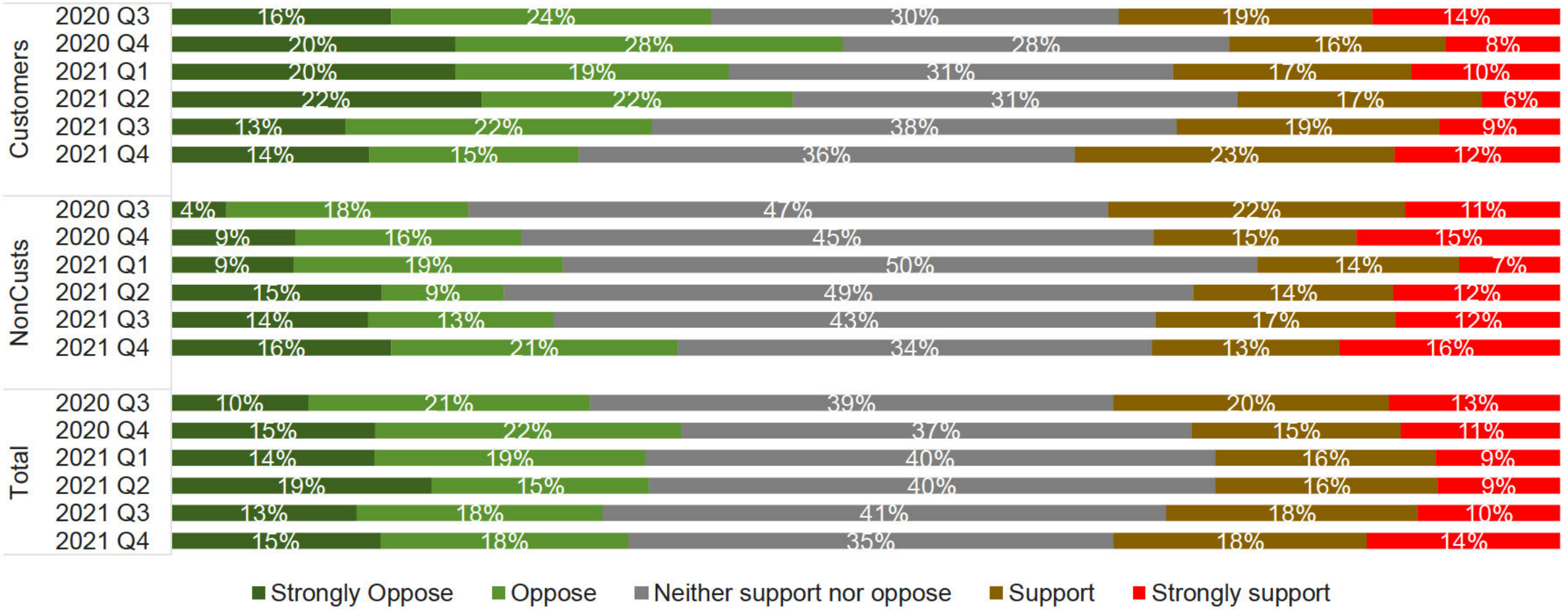
Which statement comes closest to your point of view?



CUB/119
Jenks/150

Natural Gas Ban Support

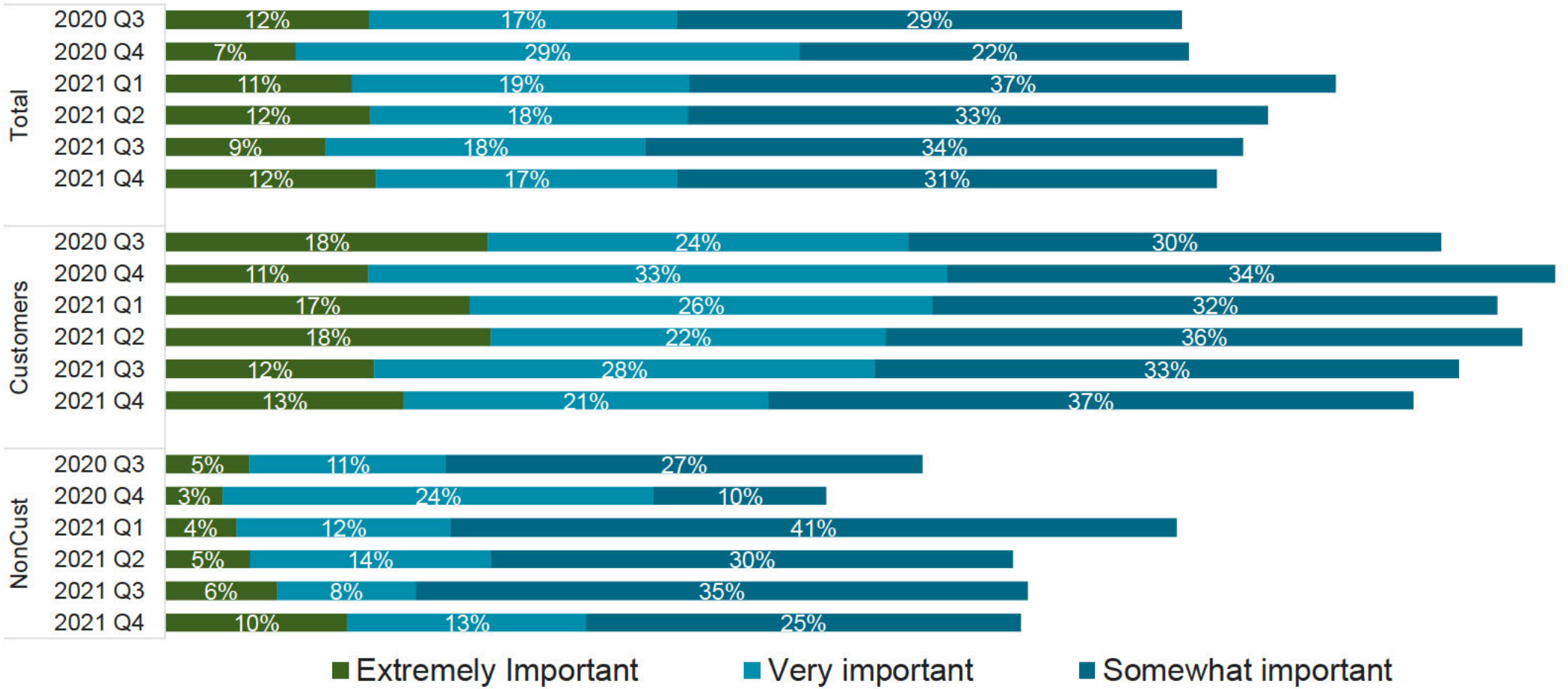
Would you support or oppose your local government banning new natural gas hookups in homes and buildings??



CUB/119
Jenks/151

Natural Gas Preference

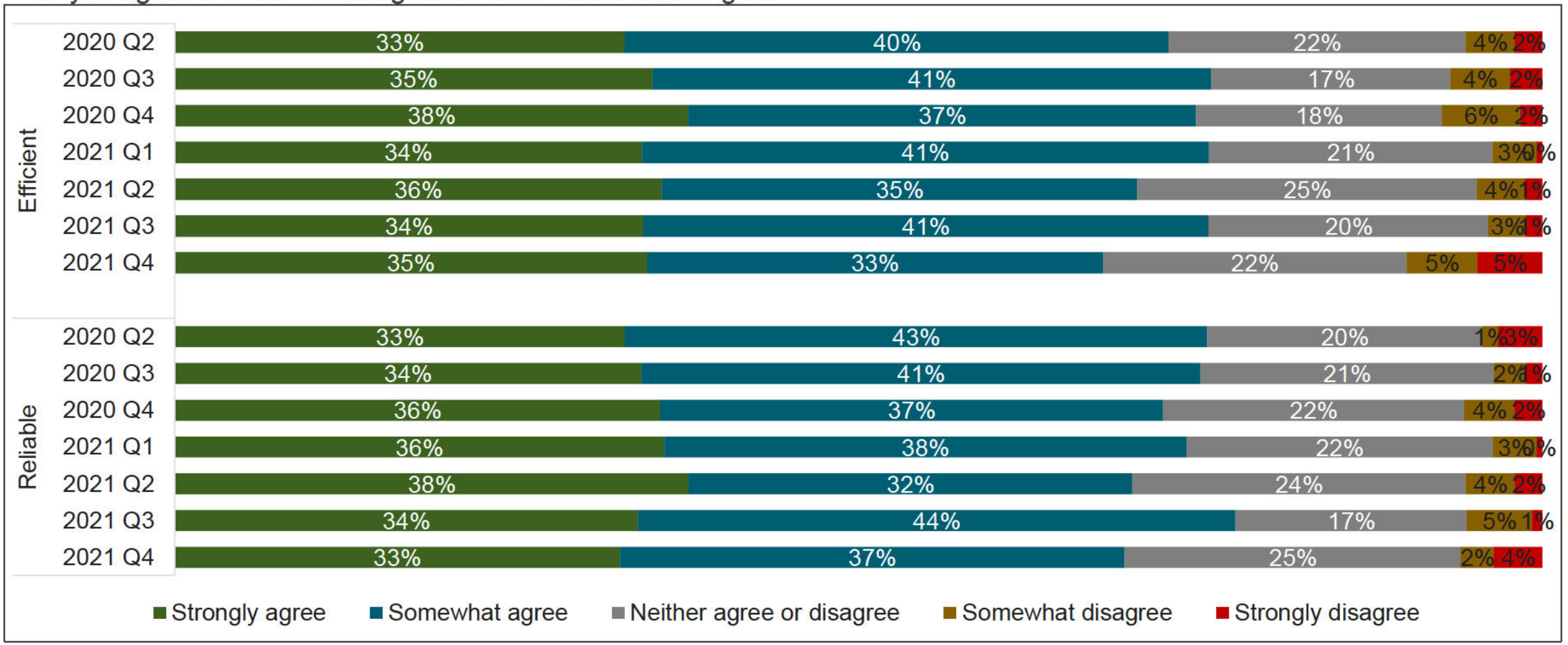
If you were looking for a new home, how important would it be to you that the new home have natural gas appliances?



CUB/119
Jenks/152

Natural Gas Attributes

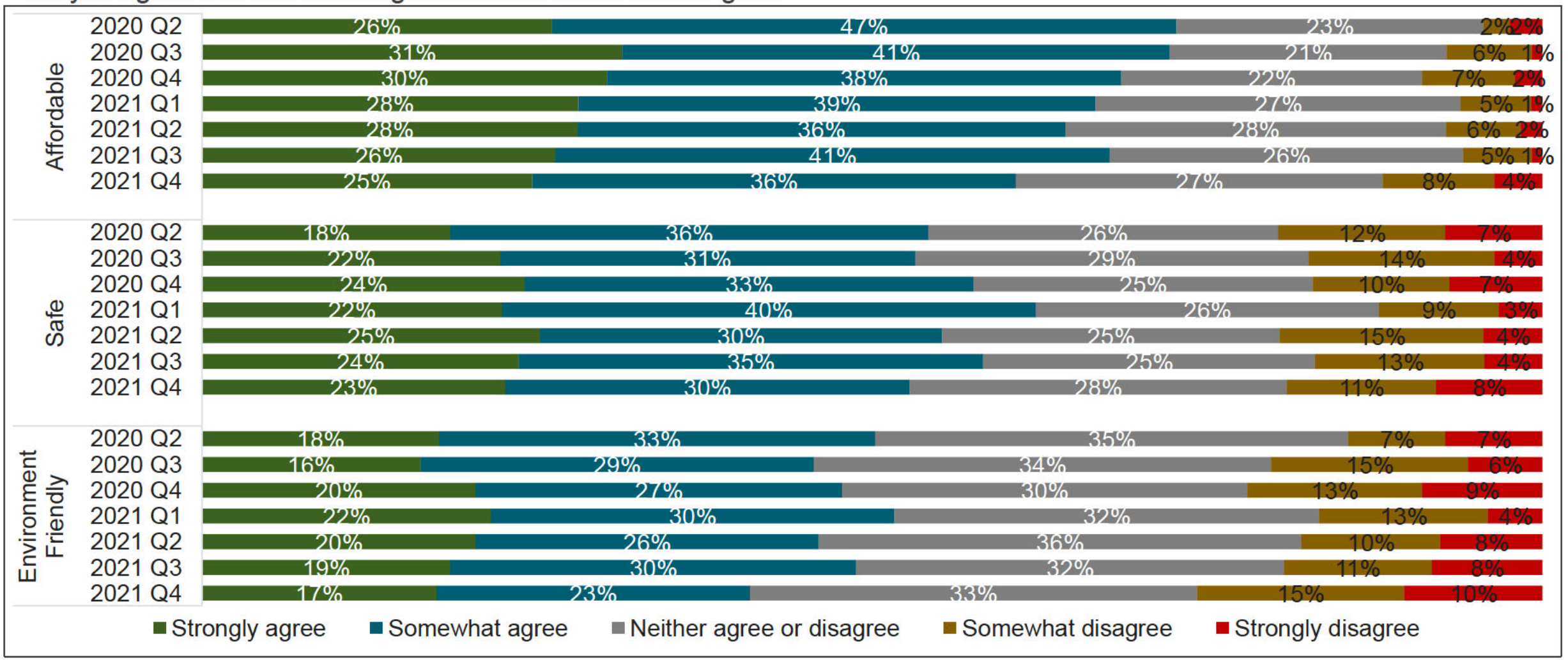
Do you agree with the following statements about natural gas?



CUB/119
Jenks/153

Natural Gas Attributes (continued)

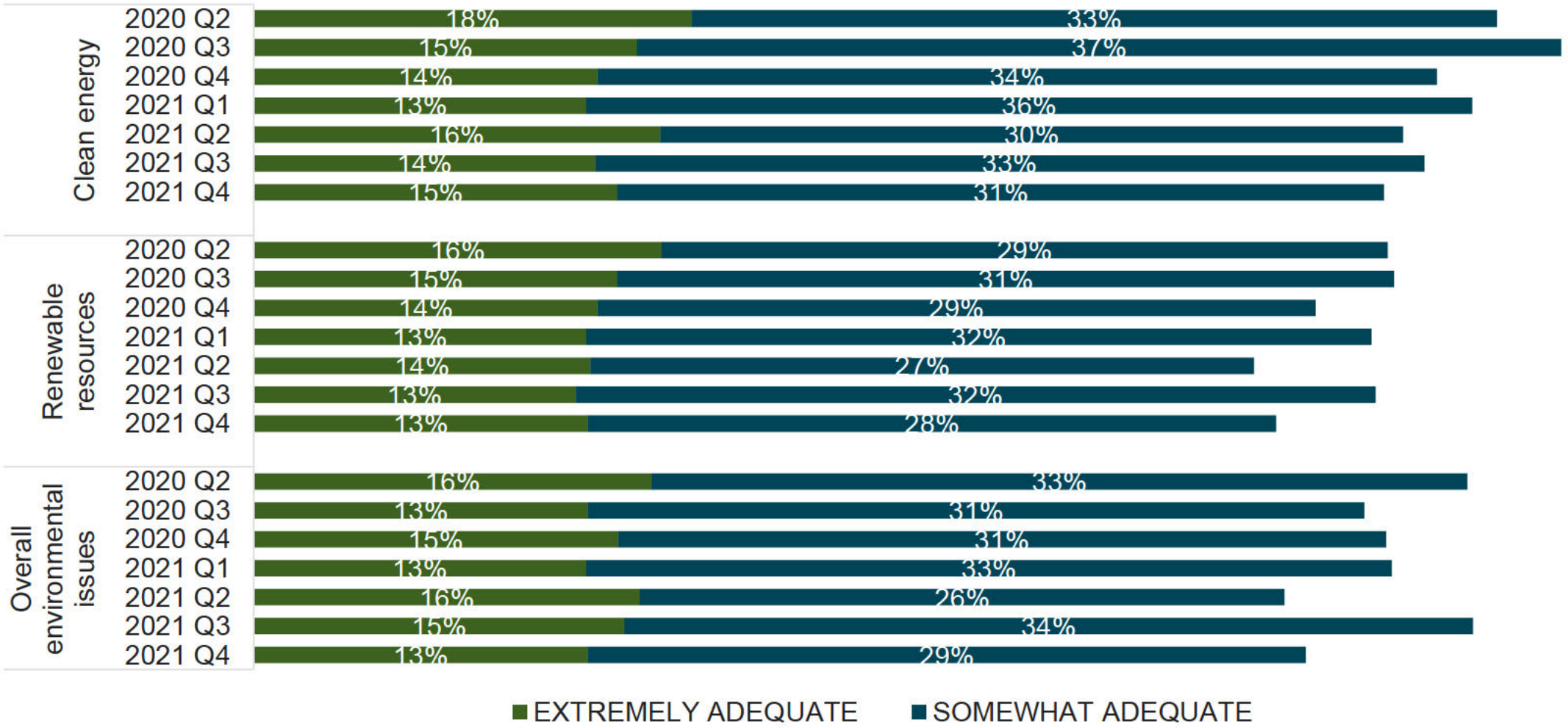
Do you agree with the following statements about natural gas?



CUB/119
Jenks/154

NW Natural Environmental Efforts

How would you rate NW Natural on the following:



TOTAL CATEGORY A

Category A Channels		Total Budget		OR Test Year
Salaries/Overhead	$	725,000	$	639,813
Bill inserts	$	282,500	$	249,306
Brochures/ Customer support Items	$	125,000	$	110,313
eNewsletter	$	30,500	$	26,916
Professional Services - Design & Writing	$	100,000	$	88,250
Website support/development	$	30,000	$	26,475
Postage	$	85,000	$	75,013
Media - Production	$	200,000	$	176,500
Media - IVR	$	10,000	$	8,825
Media - Telephone directory	$	30,000	$	26,475
Media - TV/Digital/Streaming	$	475,000	$	419,188
Category A Totals	$	2,093,000	$	1,847,073

CATEGORY A BUDGET SUMMARY

Expense Category		OR Test Year Budget	% of Total Budget
Salaries/Overhead	$	639,813	35%
Professional Services (design, writing, editing, postage)	$	366,238	20%
Communicaitons (TV, digital, streaming, print, email)	$	841,023	46%
Total	**$**	**1,847,073**	

TOTAL CATEGORY B

Category B Channels		Total Budget		OR Test Year
Salaries/Overhead	$	274,000	$	241,805
Bill inserts/Brochures	$	75,000	$	66,188
Professional Services - Design & Writing	$	50,000	$	44,125
Postage	$	75,000	$	66,188
Community Events	$	50,000	$	44,125
Public Safety Awareness Program & Materials	$	375,000	$	330,938
Media - production	$	125,000	$	110,313
Media - TV, digital, streaming	$	200,000	$	176,500
Category B Totals	$	1,224,000	$	1,080,180

CATEGORY B BUDGET SUMMARY

Expense Category		OR Test Year Budget	% of Total Budget
Salaries/Overhead	$	241,805	22%
Professional Services (design, writing, editing, postage)	$	220,625	20%
Communicaitons (TV, digital, streaming, print, email, events)	$	617,750	57%
Total	**$**	**1,080,180**	

TOTAL CATEGORY C

Category C Channels		Total Budget		OR Test year
Salaries/Overhead	$	100,000	$	88,250
Professional Services - Design & Writing	$	150,000	$	132,375
Community events	$	150,000	$	132,375
Media - Production	$	80,000	$	70,600
Media - TV, digital, streaming	$	200,000	$	176,500
Category C Totals	$	680,000	$	600,100

CATEGORY C BUDGET SUMMARY

Expense Category		OR Test Year Budget	% of Total Budget
Salaries/Overhead	$	88,250	15%
Professional Services (design, writing, editing, postage)	$	202,975	34%
Communicaitons (TV, digital, streaming, print, email, events)	$	308,875	51%
Total	**$**	**600,100**	

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Natural gas offers better control for better cooking.

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Natural gas helps create the cozy comforts of home.

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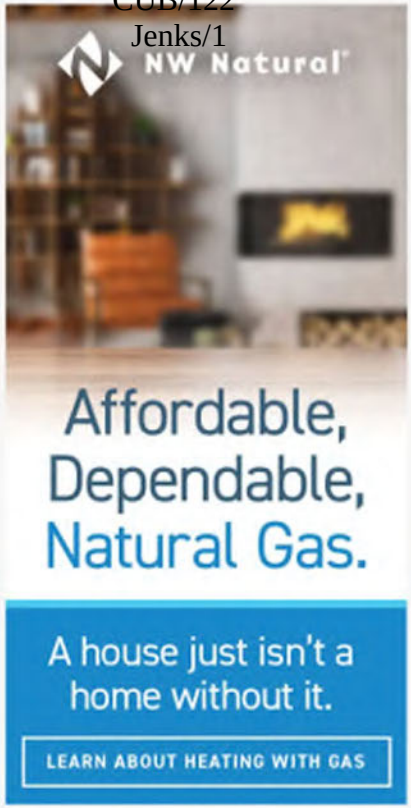
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The instant heat and precise control of natural gas helps create the cozy comforts of home.

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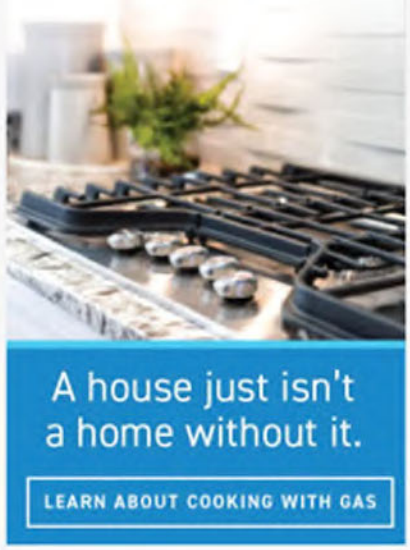
NW Natural®

8 out of 10 homebuyers prefer natural gas.



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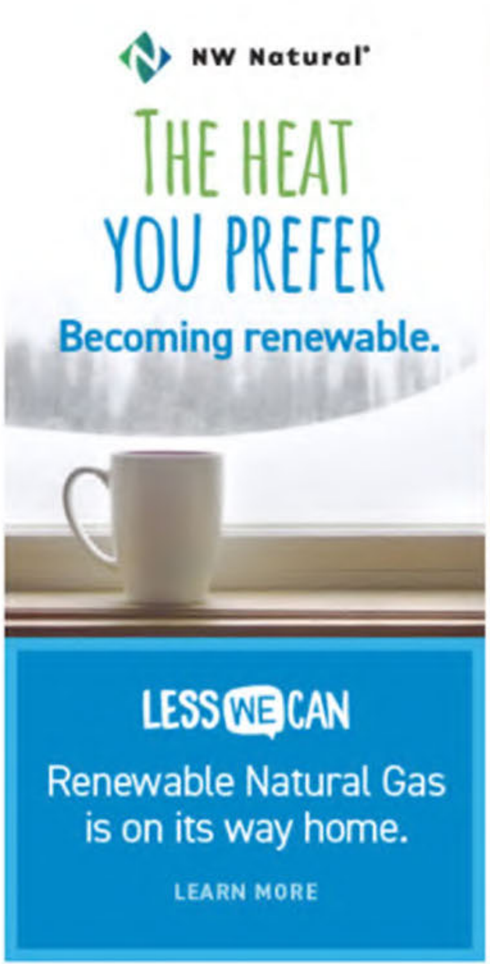

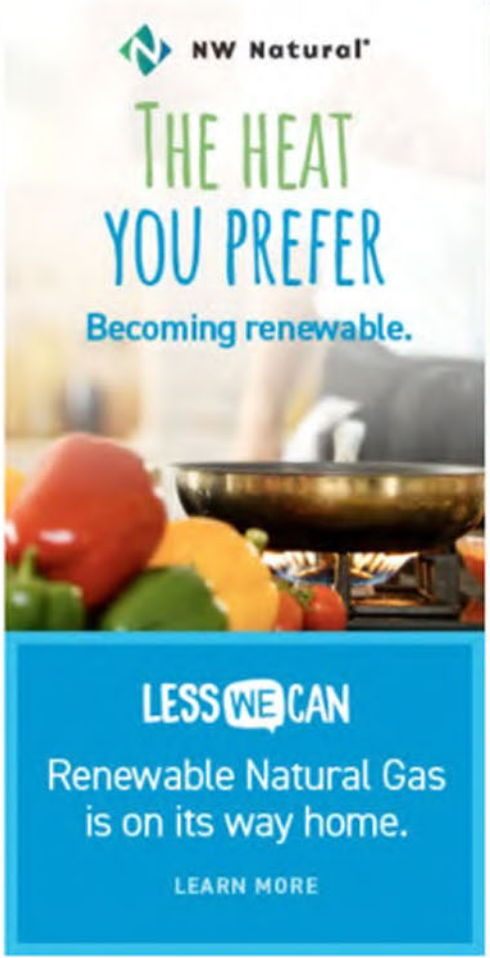

NW Natural

Rates & Regulatory Affairs
UG 435
Request for a General Rate Revision
Data Request Response

Request No.: UG 435 CUB DR 63

63. Refer to UG 435 NW Response to CUB DR 5, Please provide the Company's expenses related to customer survey results and focus groups in the Company's test year projection on both an Oregon-allocated and system basis.

Response:

TEST YEAR CUSTOMER SURVEY

Survey	System Budget	OR Allocation
Quarterly Ad Message Awareness	$ 5,000	$ 4,413
JD Power Customer Satisfaction	$ 36,000	$ 31,770
NW Natural Customer Satisfaction	$ 20,000	$ 17,650
Safety	$ -	$ -
Trade Ally	$ -	$ -
	$ 61,000	$ 53,833

Safety and Trade Ally surveys are conducted using internal resources and do not incur external expenses.

OREGON

THE HOME ENERGY AFFORDABILITY GAP 2021

(2ND SERIES) PUBLISHED APRIL 2022

Finding #1

Poverty Level	Home Energy Burden
Below 50%	23%
50 – 100%	13%
100 – 125%	8%
125 – 150%	7%
150 – 185%	6%
185% - 200%	5%

Home energy is a crippling financial burden for low-income Oregon households. Oregon households with incomes of below 50% of the Federal Poverty Level pay 23% of their annual income simply for their home energy bills.

Home energy unaffordability, however, is not only the province of the very poor. Bills for households with incomes between 150% and 185% of Poverty take up 6% of income. Oregon households with incomes between 185% and 200% of the Federal Poverty Level have energy bills equal to 5% of income.

Finding #2

Poverty Level	Number of Households	
	Last Year	This Year
Below 50%	95,621	95,621
50 – 100%	118,666	118,666
100 – 125%	70,595	70,595
125 – 150%	69,978	69,978
150 – 185%	99,712	99,712
185% - 200%	46,181	46,181
Total < 200%	500,753	500,753

The number of households facing unaffordable home energy burdens is staggering. According to the most recent five-year American Community Survey, nearly 96,000 Oregon households live with income at or below 50% of the Federal Poverty Level and face a home energy burden of 23%. And nearly 119,000 *additional* Oregon households live with incomes between 50% and 100% of the Federal Poverty Level and face a home energy burden of 13%.

In 2021 the total number of Oregon households below 200% of the Federal Poverty Level stayed relatively constant from the prior year.

Finding #3

Home Energy Affordability Gap: 2011 (base year)	$240,193,088
Home Energy Affordability Gap: 2021 (current year)	$299,896,752
Home Energy Affordability Gap Index (2011 = 100)	124.9

The Home Energy Affordability Gap Index (2nd Series) indicates the extent to which the Home Energy Affordability Gap has increased between the base year and the current year. In Oregon, this Index was 124.9 for 2021.

The Home Energy Affordability Gap Index (2nd Series) uses the year 2011 as its base year. The Index for 2011 is set equal to 100. A current year Index of more than 100 thus indicates that the Home Energy Affordability Gap for has increased since 2011. A current year Index of less than 100 indicates that the Home Energy Affordability Gap has decreased since 2011.

Finding #4

	Last Year	This Year
Gross LIHEAP Allocation ($000's)	$34,207	$33,168
Number of Households <150% FPL	354,860	354,860
Heating/Cooling Bills "Covered" by LIHEAP	44,310	42,687

Existing sources of energy assistance do not adequately address the Home Energy Affordability Gap in Oregon. LIHEAP is the federal fuel assistance program designed to help pay low-income heating and cooling bills. The gross LIHEAP allocation to Oregon was $33.2 million in 2021 and the number of average annual low-income heating and cooling bills "covered" by LIHEAP was 42,687.

In comparison, the gross LIHEAP allocation to Oregon in 2020 reached $34.2 million and covered 44,310 average annual bills.

Finding #5

Primary Heating Fuel	Penetration by Tenure	
	Owner	Renter
Electricity	38%	72%
Natural gas	48%	21%
Fuel Oil	2%	1%
Propane	2%	1%
All other	10%	5%
Total	100%	100%

The Home Energy Affordability Gap in Oregon is not solely a function of household incomes and fuel prices. It is also affected by the extent to which low-income households use each fuel. All other things equal, the Affordability Gap will be greater in areas where more households use more expensive fuels.

In 2021, the primary heating fuel for Oregon homeowners was Natural Gas (48% of homeowners). The primary heating fuel for Oregon renters was Electricity (72% of renters).

Changes in the prices of home energy fuels over time are presented in Finding #6 below.

Finding #6

Fuel	2019 Price	2020 Price	2021 Price
Natural gas heating (ccf)	$0.888	$1.091	$1.097
Electric heating (kWh)	$0.113	$0.114	$0.115
Propane heating (gallon)	$2.552	$2.085	$2.335
Fuel Oil heating (gallon)	$3.339	$3.055	$2.800
Electric cooling (kWh)	$0.117	$0.118	$0.119

In Oregon, natural gas prices stayed relatively constant during the 2020/2021 winter heating season. Fuel oil prices fell modestly 8.3% and propane prices rose 12.0%.

Heating season electric prices stayed relatively constant in the same period and cooling season electric prices stayed relatively constant.

Home Energy Affordability Gap Dashboard -- Oregon 2021 versus 2020

AVERAGE DOLLAR AMOUNT BY WHICH ACTUAL HOME ENERGY BILLS EXCEEDED AFFORDABLE HOME ENERGY BILLS FOR HOUSEHOLDS BELOW 200% OF POVERTY LEVEL.

2020: $577 per household

2021: $599 PER HOUSEHOLD

AVERAGE TOTAL HOME ENERGY BURDEN FOR HOUSEHOLDS BELOW 50% OF POVERTY LEVEL.

2020: 23% of household income

2021: 23% OF HOUSEHOLD INCOME

PERCENT OF INDIVIDUALS BELOW 100% OF POVERTY LEVEL.

2020: 13% of all individuals

2021: 13% OF ALL INDIVIDUALS

NUMBER OF AVERAGE LOW-INCOME HEATING/COOLING BILLS COVERED BY FEDERAL HOME ENERGY ASSISTANCE.

2020: 44,310 bills covered

2021: 42,687 BILLS COVERED

PRIMARY HEATING FUEL (2021):

HOMEOWNERS - NATURAL GAS *** TENANTS - ELECTRICITY

NOTES AND EXPLANATIONS

The 2012 Home Energy Affordability Gap, published in May 2013, introduced the 2nd Series of the annual Affordability Gap analysis. The 2012 Home Energy Affordability Gap going forward cannot be directly compared to the Affordability Gap (1st Series) for 2011 and earlier years. While remaining fundamentally the same, several improvements have been introduced in both data and methodology in the Affordability Gap (2nd Series).

The most fundamental change in the Home Energy Affordability Gap (2nd Series) is the move to a use of the American Community Survey (ACS) (5-year data) as the source of foundational demographic data. The Affordability Gap (1st Series) relied on the 2000 Census as its source of demographic data. The ACS (5-year data) offers several advantages compared to the Decennial Census. While year-to-year changes are smoothed out through use of 5-year averages, the ACS nonetheless is updated on an annual basis. As a result, numerous demographic inputs into the Affordability Gap (2nd Series) will reflect year-to-year changes on a county-by-county basis, including:

- The distribution of heating fuels by tenure;
- The average household size by tenure;
- The number of rooms per housing unit by tenure;
- The distribution of owner/renter status;
- The distribution of household size;
- The distribution of households by ratio of income to Poverty Level;

Data on housing unit size (both heated square feet and cooled square feet) is no longer calculated based on the number of rooms. Instead, Energy Information Administration/Department of Energy (EIA/DOE) data on square feet of heated and cooled living space per household member is used beginning with the Home Energy Affordability Gap (2nd Series). A distinction is now made between heated living space and cooled living space, rather than using total living space.

The change resulting in perhaps the greatest dollar difference in the aggregate and average Affordability Gap for each state is a change in the treatment of income for households with income at or below 50% of the Federal Poverty Level. In recent years, it has become more evident that income for households with income below 50% of Poverty Level is not normally distributed. Rather than using the mid-point of the Poverty range (i.e., 25% of Poverty Level) to determine income for these households, income is set somewhat higher (40% of Poverty). By setting income higher, both the average and aggregate Affordability Gap results not only for that Poverty range, but also for the state as a whole, will be lower. The Affordability Gap results for other Poverty ranges remain unaffected by this change.

Another change affecting both the aggregate and average Affordability Gap is a change in the definition of "low-income." The Home Energy Affordability Gap (2nd Series) has increased the definition of "low-income" to 200% of the Federal Poverty Level (up from 185% of Poverty). While this change may increase the aggregate Affordability Gap, it is likely to decrease the average Affordability Gap. Since more households are added to the analysis, the aggregate is likely to increase, but since the contribution of each additional household is less than the contributions of households with lower incomes, the overall average will most likely decrease.

Most of the Home Energy Affordability Gap calculation remains the same. All references to "states" include the District of Columbia as a "state." Low-income home energy bills are calculated in a two-step process: First, low-income energy consumption is calculated for the following end-uses: (1) space heating; (2) space cooling; (3) domestic hot water; and (4) electric appliances (including lighting and refrigeration). All space cooling and appliance consumption is assumed to involve only electricity. Second, usage is multiplied by a price per unit of energy by fuel type and end use by time of year. The

price of electricity, for example, used for space cooling (cooling months), space heating (heating months), and appliances (total year) differs to account for the time of year in which the consumption is incurred.

Each state's Home Energy Affordability Gap is calculated on a county-by-county basis. Once total energy bills are determined for each county, each county is weighted by the percentage of persons at or below 200% of the Federal Poverty Level to the total statewide population at or below 200% of the Federal Poverty Level to derive a statewide result. Bills are calculated by end-use and summed before county weighting.

LIHEAP comparisons use gross allotments from annual baseline LIHEAP appropriations as reported by the federal LIHEAP office. They do not reflect supplemental appropriations or the release of LIHEAP "emergency" funds. The number of average heating/cooling bills covered by each state's LIHEAP allocation is determined by dividing the total base LIHEAP allocation for each state by the average heating/cooling bill in that state, the calculation of which is explained below. No dollars are set aside for administration; nor are Tribal set-asides considered.

State financial resources and utility-specific rate discounts are not considered in the calculation of the Affordability Gap. Rather, such funding should be considered available to fill the Affordability Gap. While the effect in any given state may perhaps seem to be the same, experience shows there to be an insufficiently authoritative source of state-by-state data, comprehensively updated on an annual basis, to be used as an input into the annual Affordability Gap calculation.

Energy bills are a function of the following primary factors:

- Tenure of household (owner/renter)
- Housing unit size (by tenure)
- Heating Degree Days (HDDs) and Cooling Degree Days (CDDs)
- Housing size (by tenure)
- Heating fuel mix (by tenure)
- Energy use intensities (by fuel and end use)

Bills are estimated using the U.S. Department of Energy's "energy intensities" published in the DOE's Residential Energy Consumption Survey (RECS). The energy intensities used for each state are those published for the Census Division in which the state is located. Heating Degree Days (HDDs) and Cooling Degree Days (CDDs) are obtained from the National Weather Service's Climate Prediction Center on a county-by-county basis for the entire country.

End-use consumption by fuel is multiplied by fuel-specific price data to derive annual bills. State price data for each end-use is obtained from the Energy Information Administration's (EIA) fuel-specific price reports (e.g., Natural Gas Monthly, Electric Power Monthly). State-specific data on fuel oil and kerosene is not available for all states. For those states in which these bulk fuels have insufficient penetration for state-specific prices to be published, prices from the Petroleum Administration for Defense Districts (PADD) of which the state is a part are used.

The Home Energy Affordability Gap Index (2nd Series) uses 2011 as its base year. The base year (2011) Index has been set equal to 100. A current year Index of more than 100 thus indicates that the Home Energy Affordability Gap has increased since 2011. A current year Index of less than 100 indicates that the Affordability Gap has decreased since 2011. The Affordability Gap Index was, in other words, re-set in 2011. The Affordability Gap Index (2nd Series) for 2012 and beyond cannot be compared to the Affordability Gap Index (1st Series) for 2011 and before.

The Home Energy Affordability Gap is a function of many variables, annual changes in which are now tracked for nearly all of them. For example, all other things equal: increases in income would result in

decreases in the Affordability Gap; increases in relative penetrations of high-cost fuels would result in an increase in the Gap; increases in amount of heated or cooled square feet of living space would result in an increase in the Gap. Not all variables will result in a change in the Affordability Gap in the same direction. The annual Affordability Gap Index allows the reader to determine the net cumulative impact of these variables, but not the impact of individual variables.

Since the Affordability Gap is calculated assuming normal Heating Degree Days (HDDs) and Cooling Degree Days (CDDs), annual changes in weather do not have an impact on the Affordability Gap or on the Affordability Gap Index.

Price data for the various fuels underlying the calculation of the Home Energy Affordability Gap (2nd Series) was used from the following time periods:

Heating prices	
Natural gas	February 2021
Fuel oil ***	Week of 02/8/2021
Liquefied petroleum gas (LPG) ***	Week of 02/8/2021
Electricity	February 2021
Cooling prices	August 2021
Non-heating prices	
Natural gas	May 2021
Fuel oil ***	Week of 10/04/2021
Liquefied petroleum gas (LPG) ***	Week of 10/04/2021
Electricity	May 2021

*****Monthly bulk fuel prices are no longer published. Weekly bulk fuel prices are published during the heating months (October through March). The prices used are taken from the weeks most reflective of the end-uses to which they are to be applied. Prices from the middle of February best reflect heating season prices. Bulk fuel prices from October best reflect non-heating season prices.**

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 435

REDACTED OPENING TESTIMONY OF THE OREGON CITIZENS' UTILITY BOARD

EXHIBIT 200

I. INTRODUCTION

Q. Please state your name, occupation, and business address.

A. My name is William Gehrke. I am a Senior Economist employed by the Oregon Citizens' Utility Board (CUB). My business address is 610 SW Broadway, Ste. 400 Portland, Oregon 97205.

Q. Please describe your educational background and work experience.

A. My witness qualification statement is found in exhibit CUB/201.

Q. How is your testimony organized?

A. My testimony responds to issues raised in NW Natural's (NWN or the Company) initial filing and addresses the following:

II. At-Risk Compensation
III. Employee Stock Purchase Plan
IV. C-TRAN Public Transportation Benefit
V. Renewable Natural Gas Automatic Adjustment Clause
VI. Lexington Project
VII. Williams Pipeline Outage Deferral
VIII. COVID-19 Deferral and Arrange Management Plan
IX. Rate Spread
X. Renewable Natural Gas Cost Allocation

II. AT- RISK COMPENSATION

Q. Please summarize your testimony on this issue.

A. CUB recommends that the Public Utility Commission of Oregon (Commission) follow its policy on employee at-risk compensation and reject NW Natural's request to alter this longstanding policy. This means that the Commission should

disallow 100% of expenses related to executive at-risk compensation and share non-executive at-risk compensation 50% with customers and shareholders.

Q. What is "at-risk" or "pay-at-risk" compensation?

A. Pay-at-risk is compensation made to employees only if certain performance goals are met within a defined timeframe. According to NW Natural, pay-at-risk is intended to foster high performance.[1]

Q. What is NW Natural's proposal?

A. NW Natural has asked the Commission to treat cost recovery of at-risk compensation on a case-by-case basis.[2] The Company has asked the Commission to update rates to include the full costs of executive at-risk compensation, and non-executive at-risk compensation. Due to the recent Commission decision in UE 374, NW Natural has chosen to not request at-risk compensation associated with net income on NW Natural's Executive Annual Incentive Plan.

Q. What has been the Commission's policy on at-risk compensation?

A. The Commission excludes 100% of executive incentives, 50% of non-executive incentives, and 75% of non-executive incentives from rates if they are based on financial performance measures.[3]

Q. How does NW Natural determine executive compensation?

A. Executive compensation is approved by the Organization and Executive Compensation Committee (OECC) of NW Natural's Board of Directors (BOD). (Start Highly Confidential) [redacted]

[1] UG 435 – NW Natural/800/Rogers/7, lines 6-8
[2] UG 435 – NW Natural/800/Rogers/16, lines 12-16.
[3] OPUC Order No. 99-033 at 62.

[redacted] (End Highly Confidential) [4] According to NW Natural, the OECC strives to align executives' interest with Northwest Natural's performance. NW Natural's executives have extensive managerial control over NW Natural's actual operations and budget. Shareholders find executive bonuses to be beneficial to their interests because executive compensation is aligned with shareholder's profit goals. Despite incentives not being recoverable from rates, shareholders at NW Natural's annual shareholder meeting approved incentive compensation for executives.[5]

Q. What at-risk compensation does NW Natural offer?

A. NW Natural offers two programs for both the short and long-term:

The first, short-term incentive program, is the Executive Annual Incentive Plan (EAIP).[6] This program is designed to align executive pay with achievement of financial, operating, and individual performance goals. Each March, NW Natural's executives receive a payout based on criteria selected the OECC. 70% of the award is based on a combination of NW Natural's net income, and operational goals. The remaining 30% of the goals are based on the executive's individual performance. The CEO's individual performance is based on review from the OECC of the BOD.

[4] CUB Exhibit 202 – Highly Confidential
[5] The Company's shareholders approved an advisory vote on executive compensation for the NW Natural Holding Company at NW Natural's 2021 Annual Meeting of Shareholders.
[6] UG 435 – NW Natural/800/Rogers/9.

The second is the long-term incentive awards program (LTIP). This program consists of two components:

The first component is performance shares. This program awards NW Natural equity to executives based on a three-year lookback of the Company's performance. The amount of shares awarded to executives is based on an index which consists of a three-year lookback at earnings per share and total shareholder return.

The second component are restricted stock units (RSUs). RSUs are a form of compensation whereby employees are compensated with company shares. RSUs vest for the employee over several years. All of NW Natural's RSU grants are subject to a performance threshold. Essentially, if an executive works for NW Natural during the vesting period, and NW Natural earns more than the long-term cost of debt, that executive is allowed to receive its vested restricted stock units and cash dividends.

Q. How does NW Natural negotiate executive compensation with its employees?

A. Unlike bargaining unit negotiations between NW Natural and its Union, executive compensation between the Company and NW Natural executives are not done at arm's length. NW Natural's executives have exercised considerable influence over the structuring of executive incentives. For example, in 2016, NW Natural's LTIP consisted of RSUs which vested over 4 years, and performance share awards that vested over 3 years. In 2015, NW Natural's previous CEO Gregg Kantor announced that he was stepping down from his position. Under the terms

of the RSU award agreements, executives are required to employed by NW Natural to receive RSU payouts. However, these agreements also provide 100% payout if executive employment terminates earlier than expected because death, disability, or retirement.[7] **(Start Highly Confidential)** [redacted] **(End Highly Confidential)**[8] It is clear to CUB that NW Natural's executives have influence over the terms of their incentive compensation, which is improper.

Q. Why does CUB believe that it is reasonable to exclude at-risk compensation for executives?

A. It is reasonable to exclude at-risk compensation for executives from rates because these incentives provide significant benefits to shareholders and provide no articulable benefit to customers. The Company's proxy statement clearly indicates these compensation metrics are designed to align executive pay to company performance.[9] The Company states that they use performance-based and stock-based compensation tools with metrics that correlate to enhancing shareholder value.[10]

[7] CUB Exhibit 203.
[8] CUB Exhibit 202– Highly Confidential.
[9] CUB Exhibit 203.
[10] CUB Exhibit 203.

Q. What are the objects of the NW Natural's at-risk compensation for executives?

A. When providing reports to investors, the Company's objectives around at-risk compensation contradict the Company's testimony on at-risk compensation in this proceeding.

For the EAIP, the Company's listed objective in its investor reporting is to drive achievement of annual performance goals, recognizing that annual goals are essential to long-term performance.[11]

For the LTIP: the Company's listed objectives to shareholders are: [12]

- Drive key long-term business results that align with shareholder value over the long term;
- Align executives' interests with shareholders' interests;
- Reward executives for driving long-term performance; and
- Encourage executive stock ownership.

Q. What is CUB's position on at-risk compensation?

A. The Commission should maintain its policy on at-risk compensation. As can be seen from the Company's communications with its shareholders, these incentive programs have objectives to drive shareholder value and should not be charged to customers.

[11] CUB Exhibit 203.
[12] *Id.*

Q. Why does NW Natural believe it is reasonable for customers to fund non-executive incentives?

A. NW Natural asserts that pay-at-risk is an important part of competitive total compensation.[13] NW Natural also states that pay-at-risk is needed to compete for labor and meet the expectations of the workforce.[14] NW Natural also states that the Commission's historical approach of disallowing pay-at-risk for non-executive employees relies too much on shareholder benefits.[15]

Q. What is CUB's reaction to NW Natural's request to change Commission policy for non-executive employees?

A. NW Natural's arguments are not compelling. NW Natural asserts that pay-risk is needed to compete for labor and meet the expectations of the workforce. This is incorrect. In NW Natural's most recent Collective Bargaining Agreement, NW Natural and NW Natural's Union agreed to eliminate pay-at-risk compensation for bargaining unit employees. In fact, (**Start Confidential** [redacted] **(End Confidential)**[16] Despite ending pay-at-risk compensation, the Company has been able to attract and retain union labor since making this compensation change. The Company cannot reasonably argue that at-risk compensation helps it attract and retain labor.

Under the Commissions multi-decade policy, customers and shareholders equally share the cost of incentive compensation for non-executive incentives, which is a

[13] UG 435 – NW Natural/800/Rogers/13, lines 8-9.
[14] UG 435 – NW Natural/800/Rogers/7,, lines 8-9.
[15] UG 435 – NW Natural/800/Rogers/14, lines 4-7.
[16] CUB Exhibit 204.

fair outcome. The Commission should reject NW Natural's proposal to change its longstanding, well-operating policy regarding at-risk compensation.

Q. What is the revenue requirement associated with this adjustment?

A. CUB estimates the revenue requirement is 6.418 million.

III. EMPLOYEE STOCK PURCHASE PLAN

Q. Please summarize your testimony on this issue.

A. CUB recommends that the Commission remove expense associated with Employee Stock Purchase Plan (ESPP) from NW Natural's rate request. The ESPP is designed to boost utility stock ownership and provides no articulable benefit to NWN's customers.

Q. What is the Employee Stock Purchase Plan?

A. NW Natural offers an ESPP. All employees of NW Natural, except the Board of Directors, are allowed to purchase stock through the ESPP. NW Natural offers a 15% discount on stock purchased by employees.[17] NW Natural is requesting to collect the cost related to this discount from customers in this case.

Q. Why does NW Natural believe that it is reasonable for ratepayers to fund a stock discount plan to customers?

A. NW Natural asserts that the ESPP enables the Company to attract and retain talent.[18]

Q. Is CUB convinced by this argument?

[17] UG 435 – NW Natural/1204/Davilla/85.
[18] CUB Exhibit 205.

A. No. NW Natural has not demonstrated that a 15% discount on NWN's equity for employees will enable the Company to retain and attract talent. CUB is skeptical that a 15% discount on NW Natural's equity will enable it to attract talent.

Q. What is CUB's position on this plan?

A. CUB views this program as one that provides value to shareholders. By allowing for subsidized stock purchase, NW Natural is hoping that employees are motivated to increase value for shareholders. Again, there is no articulable benefit to the Company's customers.

Q. What evidence supports this statement?

A. NW Natural's 2022 Proxy Statement states "[the ESPP's] purpose is to encourage employees to become shareholders in the Company, to stimulate interest on their part in the affairs of the Company, to afford them the opportunity to share in the earnings and growth of the Company, and to promote systematic savings by them."[19]

Q. The Company may argue that ESPP may encourage efficiency savings, and therefore it may be appreciated for customers to fund. What is CUB's response to that argument?

A. A prudent utility will seek to pursue systematic savings. Employees' roles are funded with ratepayer dollars, and these employees should not need a profit incentive to prudently work on behalf of NW Natural's customers and deliver natural gas to customers. Federal civil service employees at Bonneville Power Administration can prudently run a complex electricity generation and

[19] CUB Exhibit 203.

transmission system on behalf of the region without providing a profit incentive to reduce costs. It stands to reason that NW Natural's employees can do the same. NW Natural should be seeking to minimize costs to customers rather than proposing to shift unnecessary costs onto them.

Q. Does the ESPP have additional benefits for shareholders?

A. Yes. The Company has imposed Stock Ownership Guidelines on NW Natural's executives.[20]

Position	Dollar Value of Stock Owned as Multiple of Base Salary
Chief Executive Officer and President	5x
Executive Vice President or Chief Operating Officer	3x
Senior Vice Presidents or NEOs	2x
Vice Presidents and all other Executive Officers	1x

These requirements ensure that executives have a substantial number of investments associated with NW Natural, which provides a benefit to the Company's shareholders. The Company states that these stock ownership guidelines are in place to align executive officer's investments align with Company performance. This ownership requirement ensures that executive's wealth is affected by Company performance and that their decisions will be

[20] CUB Exhibit 203.

influenced by NW Natural's share performance. The ESPP enables executives to more cost effectively acquire equity at a discount.

Q. Was the ESPP included in NW Natural's testimony regarding "pay-at-risk"?

A. No. The Company explained that the ESPP is not considered to be "pay-at-risk" because it is not based on financial results, instead it is employee's participation in the program. CUB agrees that this program is distinct from the Company's pay-at-risk program. However, the record justifying NW Natural's treatment of ESPP-related expenses is sparse.

Q. Based on the evidence, what is CUB's position on this expense?

A. This program is used to align shareholders' and employees' values. All costs associated with the ESPP should be excluded from the calculation of base rates. Customers should not be subsidizing the discounted purchase of equity by Employees to benefit shareholders. NW Natural has not demonstrated that this expense is not necessary for customers to fund

Q. What is revenue requirement associated with this adjustment?

A. NW Natural's estimated expense associated with the ESPP program is **(Start Confidential** [redacted] **End Confidential)** in the test year. CUB estimates that the revenue requirement reduction associated with this adjustment is $169,000.

IV. C-TRAN PUBLIC TRANSPORTATION BENEFIT

Q. Please summarize your testimony on this issue.

A. NWN provides public transportation benefits to employees who work at the Company's downtown Portland headquarters. Employees that live in Oregon

receive transportation benefits for TriMet. Employees that live in Washington receive benefits for C-TRAN. The cost of these programs is recovered in base rates. CUB finds NWN's filed test year expense related to transportation benefits to be reasonable. However, CUB proposes that the Company and NWN employees that receive transit benefits under the C-TRAN option share the cost of the program. There is no revenue requirement adjustment associated with this adjustment.

Q. What was the per employee cost of an annual pass for Washington and Oregon employees?

A. Oregon employees received service under the TriMet's Universal Annual Pass Program. The 2021 annual cost per employee was $170.94.[21] Unlike conventional annual passes, Universal Annual Passes annual cost is based on actual employee usage. Given a $2.50 per trip fare, the average number of annual transit trips per employee is sixty-eight.

Q. What is the per employee cost of an annual pass for Washington employees of NWN?

A. Washington employees receive service under C-Tran's Annual Pass Program. The annual cost is $1,375 per employee. NWN was unable to provide the annual trips transit trips per Washington employee.[22] Therefore, CUB estimates a per transit cost of $20.22 per trip cost, assuming the same number of annual transit trips from the Oregon employees.[23] This approximation is reasonable given the results

[21] CUB Exhibit 206.
[22] CUB Exhibit 207.
[23] $1375 / 68 = $20.22.

of NW's Natural most recent transit survey.[24] Only 32% of respondents of the NW Natural transportation survey used public transit.[25]

Q. Given the high estimated per trip cost of the C-TRAN program, which is included in base rates, what is CUB's proposal?

A. CUB proposes that Washington employees and NW Natural's customers both equally contribute to Washington Annual C-Tran Passes. NW Natural has not met its burden of proof to demonstrate that these costs are reasonable for customers to completely fund. CUB proposes to have NW Natural's Washington-located employees contribute 50% of the cost these programs as a cost control measure. NW Natural's Washington-located employees are currently eligible to receive a C-Tran transit pass, with no cost to the employee. There is not an incentive for NW Natural's Washington-located employees to not take a transit pass—it is paid for by customers either way. This results in a scenario where many Washington-located employees may take a transit pass and not use it. This is not a problem for NW Natural's Oregon-located employees, because the universal annual transit passes cost changes based on usage. There is evidence that CUB's proposed change will not significantly discourage transit usage by NW Natural employees. In the transit survey, only 8% of NW Natural's employees reasoned that NW Natural paying for all or part of the cost of a TriMet Pass was a reason to use public transportation for their commute.[26]

Q. What is CUB's recommendation?

[24] CUB Exhibit 208.
[25] *Id.*
[26] *Id*.

A. A general rate case is an investigation into a utility's costs which results in a just and reasonable rate for the Company and customers. CUB has identified an opportunity for NW Natural to reduce costs for its customers and recommends that NWN require Washington-located Employees to contribute 50% of the annual cost of C-Tran transit passes.

V. RENEWABLE NATURAL GAS AUTOMATIC ADJUSTMENT CLAUSE

Q. Please summarize your testimony on this issue.

A. My testimony on this topic responds to NW Natural/1500 around NW Natural's proposed automatic adjustment clause for renewable natural gas investments. CUB is concerned that the Company's proposed mechanism is too favorable for shareholders. CUB proposes an alternative mechanism that uses an annual forecasted test year to recover expenses associated with RNG investments.

Q. What is an automatic adjustment clause?

A. An Automatic Adjustment Clause (AAC) is:

> a provision of a rate schedule that provides for rate increases or decreases or both, without prior hearing, reflecting increases or decreases or both in costs incurred, taxes paid to units of government or revenues earned by a utility and is subject to review by the Commission at least once every two years.[27]

Q. How does the cost of renewable natural gas (RNG) compare to the cost of conventional natural gas?

A. RNG is more expensive than conventional natural gas. When NWN filed this rate case in December 2021, the forward Henry Hub price of natural gas in the test year was $3.76.[28] RNG's final cost varies based on feedstock, location, and

[27] ORS 757.210(1)(b).
[28] Henry Hub is the national pricing point for the North American Natural Gas market.

ownership structure. However, broadly, RNG is more expensive than conventional natural gas.

Q. Given this price difference, why is NW Natural procuring renewable natural gas?

A. In 2019, the Oregon legislature passed SB 98, creating RNG procurement targets for NW Natural and peer gas utilities. The legislation makes the following findings and declarations about renewable natural gas:

- Renewable natural gas provides benefits to natural gas utility customers and to the public; and
- The development of renewable natural gas resources should be encouraged to support a smooth transition to a low carbon energy economy in Oregon.[29]

To further these findings, SB 98 contains the following *voluntary* procurement targets for NW Natural's RNG portfolio.

Table 1: SB 98 – Voluntary Portfolio Targets for NWN		
Years	Voluntary Portfolio Target	Sales Volumes Target (MMBTU) [30]
2020 - 2024	5%	3,600,00
2025 – 2029	10%	7,300,000
2030 – 2034	15%	11,000,000
2035 – 2039	20%	14,600,000

[29] ORS 757.390(1)(a)-(b).
[30] For simplicity, this number is expressed as percentage of sales volumes in the test year of this case.

2040 – 2044	25%	18,300,000
2045 – 2050	30%	22,000,000

Q. Since SB 98, have other government regulations also spurred investments in renewable natural gas?

A. Yes. The Oregon Department of Environmental Quality enacted the Climate Protection Program (CPP). This program requires stationary fuel providers to reduce greenhouse gas emissions to established levels.

Q. Has NW Natural presented RNG development as an opportunity to investors?

A. Yes. Refer to CUB Exhibit 209. NW Natural expects to spend $30 million of capital per year to procure RNG.[31] NW Natural clearly expects RNG investments to bolster its earnings.

Q. What are qualified investments?

A. As defined by SB 98, qualified investments are any capital investment in renewable natural gas infrastructure incurred by a natural gas utility for the purpose of providing natural gas service.[32]

Q. How is NW Natural profiting from projects associated RNG?

A. NW Natural will profit from financing qualified investments associated with RNG. While CUB expects that NW Natural will acquire renewable natural gas through a combination of procurement methods, NW Natural will have some

[31] CUB Exhibit 209.
[32] ORS § 757.392(5)(a).

RNG projects that have qualified investments. Indeed, capital costs associated with a qualified investment are included in this rate case.

Q. How is NW Natural proposing that the Commission allow it to recover costs associated with RNG?

A. NW Natural is proposing a rate recovery framework that is extremely favorable to the Company. NW Natural proposed the following:

- NW Natural's revenue requirement will include the capital structure and cost of capital from the Company's most recent GRC.[33]
- NW Natural's proposed AAC will track revenue requirement associated with RNG investments.[34]
- NW Natural will be able to seek to defer the costs of qualified investments until they can be placed into rates.[35]
- NW Natural requests a rate effective date of November 1st for rate changes associated with RNG, but requests flexibility in the rate effective date.[36]
- NW Natural will be allowed to annually make a filing that enables it to update the cost-of-service for qualified investments that have previously been included in rates. This filing will include a true-up for actual cost and volumes of previously included costs.[37]

Q. Why does NW Natural request to use the Company's cost of capital from the Company's most recent GRC in its RNG AAC?

[33] UG 435 – NW Natural/1500/Kravitz/5-6.
[34] UG 435 – NW Natural/1500/Kravitz/5, lines 16-19.
[35] UG 435 – NW Natural/1500/Kravitz/10, lines 13-14.
[36] UG 435 – NW Natural/1500/Kravitz/5/, lines 9-11.
[37] UG 435 – NW Natural/1500/Kravitz/12, lines 1-3.

A. While I am not an attorney, SB 98 Section 5(3) states:

> [w]hen a large natural gas utility makes a qualified investment in the production of renewable natural gas, the costs associated with the qualified investment shall include the cost of capital established by the commission in the large natural gas utility's most recent general rate case.

According to NW Natural, it is proposing this condition to comply with SB 98.

NW Natural's cost of capital is calculated using a mix of cost of equity and debt. A balanced capital structure uses a mix of debt and equity to fund capital investments. The cost of equity is typically higher than the cost of debt. Debt holders have a higher claim to a company's assets in case of default. Before paying dividends to shareholders, companies are obligated to pay coupon payments associated with debt. The cost of equity is higher because it tends to be risker for investor. Capital gains and dividends associated with equity are not guaranteed, unlike debt, which has a more stable coupon payment.

Q. Does CUB oppose allowing NW Natural to use the cost of capital from its most recently approved GRC in its RNG AAC?

A. No.

Q. Why does NW Natural request that the Commission allow the Company to defer all costs until they are placed into rates?

A. NW Natural asserts that ORS § 757.394 and ORS § 757.396 requires NW Natural to recover all prudently incurred costs.[38] NW Natural asserts that, without its proposed AAC structure, deferrals would be required to ensure that NW Natural

[38] UG 435 – NW Natural/1500/Kravitz/6, lines 4-5.

recovers all of its prudently incurred costs.[39] However, even with the AAC covering qualified capital investments, NW Natural wants to be able to seek to defer the operating and maintenance costs of qualified investments until they can be placed in rates.[40] NW Natural's RNG ratemaking proposal is too favorable to the Company. There are alternatives to NW Natural's proposed favorable ratemaking treatment. Later in this testimony, CUB details an alternative ratemaking mechanism that more equitably balances the interests of NW Natural and its customers.

Q. Are there any other reasons that NW Natural believes render its AAC necessary?

A. Yes. NW Natural asserts that qualified investments are different than typical utility investments.[41] NW Natural also states that RNG projects are undertaken with co-developers[42] and that NW Natural lacks the level of control over the timing of projects it typically has when making a utility investment and cannot always ensure that such projects can be included for review in a GRC.[43]

This statement is unpersuasive to CUB. NW Natural has a variety of assets that are out of the utility's control and the costs of these investments are frequently recovered through a rate case, rather than a single-issue ratemaking mechanism like a deferral or AAC. For example, NW Natural manages the cost of

[39] UG 435 – NW Natural/1500/Kravitz/6, lines 9-12.
[40] UG 435 – NW Natural/1500/Kravitz/10, lines 13-14.
[41] UG 435 – NW Natural/1500/Kravitz/6, lines 13-14.
[42] UG 435 – NW Natural/1500/Kravtiz/6, lines 16-17.
[43] UG 435 – NW Natural/1500/Kravtiz/6, lines 20-22.

government-mandated utility pipe relocation without need for a deferral for these investments. An additional example is failed plant in the natural gas pipeline distribution system. NW Natural can manage these costs without the use of extraordinary ratemaking mechanisms.

Q. Why does NW Natural request to annually update the cost-of-service for qualified investments that were previously included in rates?

A. Unlike traditional ratemaking, a utility's capital investment is generally not reduced annually to reflect depreciation, but is only updated when a utility files a general rate case. NW Natural asserts that reducing rate base due to depreciation each year will benefit customers, even if operating expenses and other costs are also trued-up.[44]

Q. What is the role of economic regulation?

A. The primary purpose of economic regulation is to establish just and reasonable rates that enable the utility an *opportunity* to recover its prudently incurred costs and are affordable to customers.[45] Dollar for dollar cost recovery is not the primary purpose of economic regulation. In a rate proceeding, customers rates are examined to determine if rate charged are "fair, just and reasonable."

Under the traditional ratemaking process, *projected* company costs and loads are forecasted in a test year and are used to establish rates. The use of a future test year to establish rates is a just and reasonable avenue to recover prudently

[44] UG 435 – NW Natural/1500/Kravitz/8, lines 7-13.
[45] OPUC Order No. 08-487 at 7 (According to the Commission, its "ultimate goal is to set rates that provide the utility the *opportunity* to collect enough revenue to recover reasonable operating expenses and to earn a reasonable rate of return on investments it had made to provide service.") (emphasis added).

incurred costs. Recovery of a forecast of prudently incurred costs constitutes legitimate and complete cost recovery in Oregon.

Q. What is the impact of NW Natural's proposed changes to the AAC?

A. RNG is more expensive than conventional natural gas. Under a traditional resource acquisition framework, it would not be economic for NW Natural to procure renewable natural gas, given its higher incremental cost compared to fossil gas. However, under SB 98, NW Natural has received permission from the legislature to voluntarily procure renewable natural gas.

RNG is an investment opportunity for the Company. Apart from its past gas reserves project, NW Natural has had limited involvement in extracting and processing natural gas.[46] By operating and funding new RNG projects, the Company has an opportunity to increase its profits because it can make new capital investments to help extract and process RNG. As a local distribution company that primarily purchases natural gas on the market, this represents a novel venture for NW Natural that brings with it uncharted investments. There are risks associated with RNG. As noted in NWN/ 1100, there are several unique risks associated with RNG projects including underproduction risk, capital cost risk, operating cost risk, bankruptcy risk. While NW Natural has taken steps to reduce these risks for Lexington project, NW Natural still bears risk associated with these RNG investments, and is seeking to shift it to customers.

Q. How is NWN responding to these risks?

[46] CUB is referring to NW Natural's investments in the Jonah Field in Wyoming.

A. NW Natural has responded by proposing a rate recovery framework that is extremely favorable to the Company and shifts these risks onto its captive customers. Further, NW Natural proposes several items from its AAC that eliminate earnings risk for shareholders and eliminates regulatory lag.

Q. What is CUB's reaction to NW Natural proposal?

A. The Company's proposal is imbalanced. NW Natural's AAC structure is extremely favorable to shareholders. Under NW Natural's proposal, shareholders bear little to no risk associated with RNG investment, while being compensated at a Commission-approved cost of capital. The annual true-up removes RNG risk associated with capital costs and operation and maintenance costs for the Company. In response to risks associated with new RNG assets, NW Natural has proposed in opening testimony to shift all the remaining risk associated with new RNG assets to customers, while these customers must simultaneously fund the cost of equity to benefit shareholders under SB 98. The utility's cost of capital—of which its return on equity is a component—is meant to compensate it for risks it incurs in financing investments. NW Natural's proposal will ensure stable earnings on RNG assets, with little to no risk for the Company. NW Natural's proposal also enables the Company to earn a profit on a profit, by allowing deferrals between the commercial operation date and rate effective date.

NW Natural also failed to propose an earnings test to evaluate in its proposed AAC. While CUB acknowledges that the Company proposes to update a project's revenue requirement to account for the reduction in rate base, NW Natural's

proposal is too favorable to shareholders and shifts all risk associated with RNG to customers.

Q. What is CUB's proposed ratemaking mechanism for RNG costs?

A. To provide a more balanced option for the Commission to consider, CUB presents the following alternative cost recovery mechanism for RNG:[47]

- All costs associated with RNG qualified investment will be tracked separate from base rates in the renewable gas cost recovery mechanism.
- NW Natural will file to update RNG costs using a forward test year on February 28th of each year. The rate effective date for the update filing mechanism will be November 1st.
- NW Natural will include the projected revenue requirement associated with new RNG assets and will annually update the forecasted cost of previously approved RNG projects in rates. Capital investments will be subject to recovery based on the undepreciated balance as of the rate-effective date.
- NW Natural will only be allowed to add new RNG assets on November 1st of each year. This will minimize the frequency of rate changes borne by customers and align customer rate changes for conventional natural gas with changes with renewable natural gas.
- Prior to changing rates on November 1st, NW Natural will attest that all RNG projects are currently operating, and providing utility service to Oregon customers. If a project is no longer producing and is retired while there is still

[47] "CUB offers this proposal as a preliminary discussion point regarding the contours of the RNG rate mechanism but reserves the right to change its position in response to alternatives that are offered in this proceeding.

undepreciated capital investment associated with the project, NW Natural will remove that project from its calculation of its return on rate base from the mechanism and will earn the time value of money on its undepreciated capital investment. This is consistent with Commission precedent regarding the retirement of undepreciated capital assets. CUB will address this precedent more thoroughly in briefing.

- The Company will not be allowed to file for a deferral between the in-service date of the RNG project and the rate effective date.
- The Company will be allowed to defer differences between forecasted historic RNG costs and actual RNG costs, subject to an earning test. The earnings test eliminates any annual RNG cost adjustment if the Company earns with plus minus 100 points of its allowed return on equity (ROE).
- Once NW Natural meets the cost cap established in SB 98, CUB proposes that NW Natural, Intervenors, and Commission Staff will timely meet to discuss changes to the mechanism, and how to address ratemaking for RNG should occur once the cost cap is reached.[48]

Q. Why is CUB not proposing to have NW Natural recover RNG costs through a general rate case?

A. CUB recognizes the customer value of updating the revenue requirement of RNG projects for accumulated depreciation on an annual basis, which is not possible under a traditional ratemaking approach.

Q. What is regulatory lag?

[48] CUB Exhibit 210

A. Regulatory lag refers to costs that a utility cannot recover in rates between general rate cases (GRC), and during a tariff investigation. It also refers to the excess accumulated depreciation that customers fund when capital assets depreciate but are still being recovered by the utility at the figure from its previous GRC. Utilities such as NW Natural traditionally carry the risk and rewards associated with costs changes between rate cases. NW Natural's return on equity compensates shareholders for the risk associated with regulatory lag.

Q. Why is accumulated depreciation not updated on an annual basis under traditional ratemaking?

A. Traditionally, rates are established based a forecast of annual costs in the test year. Between GRCs, energy utilities routinely make capital investments. Under traditional ratemaking, the declining balance of plant due to deprecation is offset by the incremental capital investments between GRCs.

Q. In Opening Testimony, the Company stated that it was going to seek the amortization of the deferral associated with Lexington? What is CUB's position on that deferral?

A. This is the first renewable natural gas project that has been brought forward under SB 98. NW Natural filed for a renewable natural gas recovery mechanism in April 2020. The Company could have forced a tariff investigation and a decision on its mechanism. Instead, the Company has diligently worked with AWEC, Staff, and CUB, and has delayed the effective date of its ratemaking mechanism for RNG projects several times to accommodate feedback from the Oregon utility regulatory community. While CUB does not agree that deferrals are necessary to

eliminate regulatory lag between the time a project is in service and in rates, the use of a deferral appears appropriate in this instance. In this specific instance, CUB does not oppose NW Natural's application for deferred accounting for Lexington of the costs between the commercial operation date and the rate effective date.[49] After the rate effective date of this rate case, the costs associated with RNG can be managed with CUB's proposed renewable gas cost recovery mechanism.

Q. Why is CUB proposing an annual update to costs in the test year?

A. While CUB has expressed a preference for traditional ratemaking in a variety of Commission settings, CUB is trying to be fair to both customers and the Company and bring a reasonable proposal before the Commission. CUB expects that that Company will be making significant investments over the next decade to procure RNG to comply with CPP and SB 98. CUB's proposal enables annual rate changes to minimize the regulatory burden associated with renewable natural gas procurement in order to avoid imposing a burdensome review process on the Commission, Commission Staff, and consumer advocates.

In Pacific Power's most recently litigated rate case, the Commission ordered that Pacific Power's wildfire mechanism have annual updates of costs to allow Pacific Power to reduce regulatory lag associated with the recovery of wildfire mitigation capital investments. In Commission Order No. 20-473, the Commission stated "[w]e find that this minimal amount of regulatory lag between annual rate

[49] UM 2145 – NW Natural's Application to Defer of Cost of Service Associated with the Tyson RNG Project.

changes continues to be appropriately borne by shareholders." CUB agrees with the Commission's recent decision for capital costs recovered between general rate cases, and CUB's proposal aligns with the Commission's recent order. Although NW Natural may bear some regulatory lag associated with RNG qualified investments with cost forecasting, CUB believes its proposal aligns with the spirit of SB 98. Consistent with the recovery of prudently incurred capital costs in a GRC, NW Natural will be able to fully recover its prudently incurred RNG costs through CUB's proposal.

Q. Why is CUB's proposal good regulatory policy?

A. NW Natural is going to be investing millions of dollars of capital interconnecting and constructing RNG projects. CUB's proposal provides an incentive for NW Natural to manage operating and capital costs associated with RNG within each gas year. CUB also believes that shareholders should bear some of the risks associated with new RNG assets.

Q. Does CUB's proposed RNG mechanism allow NW Natural to recover its prudently occurred costs?

A. Yes. Dollar-for-dollar deferrals and trackers are not necessary to establish just and reasonable rates. CUB's proposal allows for NWN the opportunity to earn a profit on RNG projects and manage RNG to its forecasted costs. If RNG annual costs are different than forecasted and the utility has abnormal earnings, the utility can true-up actuals to forecasted for RNG with CUB's proposed mechanism.

VI. LEXINGTON PROJECT

Q. Please summarize your testimony on this issue.

A. My testimony on this topic responds to NW Natural/1100 and NW Natural/1300 around the Lexington project. CUB has reviewed NW Natural's decision to invest in the Lexington RNG project. This is the first RNG project that NW Natural has financed. Based on our review, CUB finds the project to be prudent at this time. CUB agrees with the Company that the Lexington RNG project was the one of the least expensive opportunities for NW Natural to develop for customers. CUB reserves the right to change its position based on evidence put on the record throughout this proceeding.

Q. What level of capital investment is associated with NW Natural's Lexington Project?

A. NW Natural assumes that the Lexington Project will require $8.4 million of capital investment.[50]

Q. What is the revenue requirement associated with the Lexington Project?

A. The test year revenue requirement associated with this project is **(Start Confidential** [redacted] **End Confidential)**. This revenue requirement number equates to a cost of **(Start Confidential** [redacted] **(End Confidential)**. Broadly, NW Natural is seeking to recover in rates the costs of the project minus the offsetting revenue the Lexington projects produces.

Q. Why does CUB believe that NW Natural's decision to invest in the Lexington RNG project was prudent?

A. The Oregon Legislature passed SB 98 in 2019. This bill established voluntary targets for Oregon gas utilities to procure RNG. NW Natural will receive

[50] UG 435 – NW Natural/1100/Chittum/23, lines 5-6.

renewable thermal credits (RTCs) with its investment in Lexington. Based on CUB's review of the Company's case and SB 98, CUB finds sufficient evidence that NW Natural is being prudent in its investment in the Lexington Project.

NW Natural also expects that the Lexington project will assist in helping NW Natural's customers comply with the CPP.[51]

Q. What is the prudency standard?

A. To receive recovery of a capital investment, NW Natural must demonstrate that the investment is presently used for providing utility service.[52] NW Natural must also demonstrate that the investment was prudently made, based on the information that it knew or should have known at the time.[53]

Q. Has NW Natural met the first standard?

A. Yes. It CUB's understanding that the Lexington project is currently operating and is generating RTCs for the benefit of ratepayers.

Q. What evidence did NW Natural provide to demonstrate that its investment was prudent?

A. NW Natural has presented testimony detailing its decision to invest in the Lexington Project. In 2020, NW Natural solicited a RNG request-for-proposals for offtake agreements.[54] NW Natural's RNG team reviewed **(Start Confidential)** [redacted] **(End Confidential)** projects before deciding to invest in the Lexington project.

[51] UG 435 – NW Natural/1100/Chittum/5, lines 16-19.
[52] ORS § 757.355(1).
[53] OPUC Order No. 99-033 at 36-37.
[54] UG 435 – NW Natural/1100/Chittum/ 29 / 4-5.

NW Natural stated that it was soliciting both investment opportunities and offtake agreements. CUB participated in UG 432 (the 2021 PGA), and closely reviewed the two offtake agreements that NW Natural presented. NW Natural has demonstrated that it is evaluating a variety of RNG structures for customers.

For each solicitation, NW Natural's employees evaluated each potential project through its incremental cost methodology. The Company initially relied on the cost per RTC metric to differentiate between projects. NW Natural had to select some projects to acquire renewable natural gas resources. Lexington is a reasonable project for the Company to have selected.

Q. What is CUB's recommendation on the Lexington Project?

A. CUB finds that it was reasonable for NW Natural to make its decision to invest in the RNG project. CUB reserves the right to re-evaluate this finding based on information placed on the record throughout this proceeding.

VII. WILLIAMS PIPELINE OUTAGE DEFERRAL

Q. What is the purpose of your testimony?

A. My testimony responds to issues raised in NW Natural/1000 and NW Natural/1300 regarding the Williams Pipeline Outage event and the Company's subsequent proposal for cost recovery in this proceeding.

Q. Please summarize your testimony on this issue.

A. The Company's proposal for cost recovery in this proceeding is premature. NW Natural is continuing to work on finalizing settlement of applicable insurance

claims stemming from the events that led to the Williams Pipeline Outage.[55] NW Natural should withdraw its request for cost recovery until its insurance claims have been finalized. It is both administratively efficient and aligns with prior utility practice to pursue applicable insurance claims before seeking cost recovery. Further, the Company has not met its burden of proof that cost recovery for these amounts is appropriate under the deferred accounting standard.

Q. Please briefly describe the events that led to the Williams Pipeline Outage and the Company's request for cost recovery in this proceeding.

A. On December 20, 2020, a vehicle traveling northbound across the Hood River bridge failed to stop at a stop sign and eventually collided into a Williams Pipeline gate station, causing severe damage.[56] The damage resulted in a complete shut-in of the gate station, causing NW Natural to lose supply in the region. As a result, approximately 5,710 customers in the central Columbia River Gorge area lost natural gas service during the outage.[57] On December 21, 2020, the Company filed a deferral application, docketed as UM 2139.[58] According to NW Natural, the deferral encompasses a number of costs, including costs incurred related to addressing the damage, keeping customers safe, restoring service, and relighting customers' gas appliances.[59] Total deferred costs are $569,348 on an Oregon-allocated basis.[60]

Q. What is the Company's proposal for cost recovery in this proceeding?

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[55] CUB Exhibit 211
[56] UG 435 – NW Natural/1000/Shampine/2, lines 1-9.
[57] *Id*. lines 12-18.
[58] *Id*. at 6, lines 4-5.
[59] *Id*. lines 6-9.
[60] *Id*. line 10.

A. The Company proposes to recover $652,000 from Oregon customers, including interest, and to amortize this amount over a one-year temporary rate through a separate Adjustment Schedule, starting November 1, 2022.[61] The Company's proposed tariff is included as NW Natural/1315, Walker.[62]

Q. Did NW Natural seek insurance proceeds for the incident? If so, how does it propose to use the potential insurance proceeds from these claims?

A. Yes. The Company filed insurance claims to recover the costs of the incident.[63] NW Natural's submitted claim totaled $1,032,526.95.[64] The Company is currently working on finalizing settlement of this claim with the insurer.[65] If the Company receives insurance proceeds from the claims filed, it proposes to credit back customers the amount of proceeds to ensure it "does not double recover the costs of the incident."[66]

Q. Does CUB support this proposal? If not, why?

A. No. It is premature for the Company to request cost recovery for this deferral in this proceeding before first determining whether applicable insurance proceeds will be awarded. The Company's proposal to credit amounts back to customers if it receives insurance proceeds is cumbersome and administratively inefficient. Further, it departs from actions taken by NW Natural's peer utilities that have benefitted customers, stakeholders. and the Commission. For example, in Docket No. UM 1791, Portland General Electric Company (PGE) filed a deferred

[61] UG 435 – NW Natural/1300/Walker/30, lines 15-22.
[62] *Id*. at 30, line 22.
[63] *Id*. at 31, lines 8-11.
[64] CUB Exhibit 211.
[65] *Id.*
[66] UG 435 – NW Natural/1300/Walker/30, lines 12-15.

accounting application to track cost overruns associated with the construction of its Carty Generating Station.[67] In its application, PGE explicitly sought "delay of Commission review of this Application until all legal actions, including PGE's claims against Liberty Mutual Insurance Company and Zurich American Insurance Company, are resolved."[68] Eventually, PGE's legal actions and claims were resolved favorably and it withdrew its application, obviating the need for the Commission to act and for parties to spend time and resources scrutinizing the application.[69] This result saved the Commission, Staff, intervenors, and customers time and money.

Q. What does CUB recommend?

A. CUB recommends that the Company withdraw its proposal for cost recovery stemming from the Williams Pipeline Outage event in this proceeding. Consistent with actions taken from Commission-regulated utilities, NW Natural should seek to finalize settlement of its applicable insurance claims before seeking cost recovery. If, after finalizing its insurance settlement, there are outstanding amounts that remain unrecovered, NW Natural and parties can address the issue in the UM 2139 Williams Pipeline Outage deferral docket.

Q. Does CUB have any other positions on this issue?

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[67] *In re Portland General Electric Company's Application for Deferral of Incremental Revenue Requirement Associated with the Carty Generating Station and Delay of Commission Review of PGE's Application until Legal Actions are Resolved*, OPUC Docket No. UM 1791, Initial Application (July 29, 2016).

[68] *Id*.

[69] *In re Portland General Electric Company's Application for Deferral of Incremental Revenue Requirement Associated with the Carty Generating Station*, OPUC Docket No. UM 1791, Order No. 18-291 (Aug. 13, 2018).

A. Yes. Beyond being premature, the Company has failed to meet its burden of proof that amounts in the UM 2139 deferral are eligible for cost recovery in this proceeding.

Q. Please explain.

A. While I am not an attorney, it is my understanding that the Commission examines whether to allow amortization of amounts accrued in a deferred account under its statutory and discretionary deferral criteria. The Commission's review of a request to defer costs involves two stages of review.[70] The first stage of the Commission's review involves a determination of whether a deferral application meets the criteria set forth in ORS § 757.259(2)(e), which allows deferral of:

> [i]dentifiable utility expenses or revenues, the recovery or refund of which the commission finds should be deferred in order to minimize the frequency of rate changes or the fluctuation of rate levels or to match appropriately the costs borne by and the benefits received by ratepayers.[71]

The second stage of the Commission's review involves an exercise of the Commission's discretion under ORS 757.259(2), providing, in pertinent part:

> [u]pon application of a utility or ratepayer or upon the Commission's own motion . . . the commission by order may authorize deferral of the following amounts for later incorporation into rates.[72]

When exercising this discretion, the Commission considers two interrelated factors: the type of event that caused the deferral, and the magnitude of the event's effect.[73] The Commission draws a distinction between risks that can be

[70] *In re Public Utility Comm'n of Oregon, Staff Request to Open an Investigation Related to Deferred Accounting*, OPUC Docket No. UM 1147, Order No. 05-1070 at 2 (Oct. 5, 2005) (hereafter OPUC Order No. 05-1070).
[71] OPUC Order No. 05-1070 at 2-3.
[72] *Id*. at 3 (emphasis added).
[73] *Id.*

predicted to occur as part of the normal course of events (stochastic risks) and risks that are not susceptible to prediction and quantification (scenario risks).[74] Stochastic risks are generally not appropriate for deferred accounting unless the magnitude of the financial impact of the event on the utility is substantial. The Commission has held that magnitude of harm to justify deferral of scenario risks is lower—material, rather than substantial.[75]

Q. Why has NW Natural failed to meet its burden of proof?

A. UM 2139 is a deferred accounting application. Therefore, in order to be eligible for potential amortization, NW Natural must prove that the amounts in the deferral meet the Commission's standard to justify amortization. Nowhere in the record does the Company address the deferral standard. Indeed, in the Company's testimony around cost recovery for amounts in UM 2139, NW Natural does not even mention the deferred accounting application.[76]

Q. Does CUB want NW Natural to present detailed testimony regarding whether UM 2139's meets the deferred accounting standard?

A. No. CUB continues to prefer that NW Natural withdraw its request for cost recovery in this proceeding until it has fully pursued all applicable insurance claims. However, should NW Natural continue to seek recovery of amounts deferred in UM 2139 in this proceeding, CUB reserves the right to present any arguments relevant to the Company's proposal at a later phase of this proceeding

[74] *Id.*
[75] *Id.* at 7.
[76] UG 435 – NW Natural/1300/Walker/30-31.

VIII. COVID-19 DEFERRAL AND ARREARAGE MANAGEMENT PLAN

Q. Please summarize your testimony on this issue.

A. The Staff of the Oregon Public Utility Commission (Staff) has indicated that they plan on addressing the amortization of COVID-19 Arrearage Management plan in this proceeding.[77] In their memo on the subject, Staff stated, "For PacifiCorp and Northwest Natural, and perhaps Avista, Staff intends to raise as an issue in their respective general rate cases, and review for prudence, the 2020 and 2021 COVID-related costs and cost-savings as well as consider amortization period and the ratespread of any monies to be collected from ratepayers." CUB will review Staff's proposal articulated in its forthcoming Opening Testimony, and respond to it in the next round of testimony.

In this testimony, CUB proposes that all costs related to COVID-19 be borne by all customers. CUB proposes that these public policy costs be recovered on an equal cents per therm basis to all customers.

Q. Does CUB agree that expenses related to COVID-19 are appropriate for deferred accounting?

A. Yes. 2020 and 2021 COVID-related costs, from CUB's perspective, meet the criteria for deferred accounting. CUB believes that COVID-19 deferral qualifies as a scenario risk. CUB was a signatory to the UM 2114 energy utility term sheet and intends to abide by the terms of the stipulation.

[77] *In re Northwest Natural, Application for the Reauthorization of Deferred Accounting of Costs from COVID-19 Public Health Emergency*, OPUC Docket No. UM 2068, Staff Report at pg. 7 (Mar. 9, 2022).

Q. Please describe the events leading up to COVID-19 costs being tracked in a deferral.

A. In March 2020, the Oregon government declared a state of emergency due the Coronavirus pandemic. Governor Kate Brown issued numerous executive orders in response to the Coronavirus pandemic that imposed the following conditions on Oregon:

- Gatherings of more than 250 were prohibited – March 12, 2020;
- K-12 Schools were closed to in person instruction – March 12, 2020;
- Visits to Long Term Care facilities, prisons and state hospitals were prohibited – March 16, 2020;
- Gathering of more than twenty-five were prohibited – March 17, 2020;
- In person Dining Banned statewide – March 17, 2020;
- Higher Education Centers were closed to in person instruction – March 18. 2020;
- Many Oregon businesses were shut down in response to COVID – March 24, 2020;
- Telework was required for offices – March 24, 2020; and
- Childcare facilities were allowed to function at reduced capacity – March 24, 2020.

Q. What was the impact of the COVID-19 pandemic on Oregon's economy and Oregonians?

A. In order to stop the transmission of the COVID-19, the Oregon state government shut down significant portions of Oregon's economy. This "Great Shutdown"

caused a significant economic downturn in Oregon. Prior to the pandemic, Oregon's seasonally adjusted unemployment rate spiked from 3.5% to 13.5%.[78]

Actions taken by the Oregon government to stop the transmission of the coronavirus had spill over impacts on Oregon families. Several thousand Oregonians were no longer employed and no longer earning income. In-person instruction was not allowed at Oregon schools, which forced parents to supervise their children. Daycare facilities for children were running at a reduced capacity. Oregon ordered individuals to stay home to the greatest extent possible. Many employers closed operations and laid off or furloughed employees statewide.

Q. What was Oregon's utilities' response to the COVID-19 pandemic in 2020?

A. After filing for deferred accounting, NW Natural and their peer energy utilities enacted several actions to protect customers:

- Disconnections of residential and non-residential customers were suspended;
- Late notices and final notices were suspended;
- Flexible Time Payment Arrangements were provided;
- Deposit requirements were waived for residential customers;
- Late payment fees, interest, and penalties for all residential customers were waived; and

[78] U.S. Bureau of Labor Statistics, Unemployment Rate in Oregon [ORUR], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/ORUR.

- Residential Customer arrearages due to the Pandemic equal to 1% of utilities 2019 Oregon retail revenues.

Q. Why does CUB recommend that all customers be responsible for these costs?

A. The COVID-19 was an emergency that affected all of Oregon's utility customers. NW Natural's and peer utilities response was unprecedented and necessary to protect customers. NW Natural's customers are now being faced with the cost of these measures, and this burden associated with these costs should be borne by all customers.

Q. What is CUB's proposal?

A. CUB proposes that these costs be allocated to all customers on an equal cents per therm basis. The costs associated with COVID-19 were not built into base rates and do not represent a knowable, ongoing expense. These costs were a public policy cost that benefited society and arose from an unprecedented, unanticipated event. Ensuring that utility customers interests were protected and safeguarded through this emergency represents a significant public policy goal. Similar to other public policy goals that are subject to nonbypassable ratemaking, the costs arising from the COVID-19 deferred accounting applications should be borne by all of NW Natural's customers.

IX. RATE SPREAD

Q. How does NW Natural propose to spread its overall requested increase across individual rate schedules?

A. Company witness Robert Wyman recommends a multistep process for spreading the Company's requested $73.5 million incremental revenue requirement across customer classes:

- Apply a cap equal to 1.05 times the overall incremental margin increases to Schedule 2 Residential, RS 3 Commercial, and RS 27 Dry-Out;
- Apply a floor equal to 0.50 times the overall incremental margin increases to the Industrial and Transportation rate classes;
- The remaining revenue requirement will be allocated to Large Commercial Sales rate schedules, on an equal percent of margin basis;
- Adjust the floor such that RS 31 and 32, and RS 3 Industrial, keep the same LRIC study indicated ratios relative to each other; and
- Apply to lower floor and reallocate the remaining revenue requirement to the Large Commercial Sales rate schedules only on an equal percent of margin basis.

Q. Do you agree with Mr. Wyman's recommended rate spread?

A. Yes. CUB finds Mr. Wyman's recommended rate spread proposal to be reasonable, and agrees with Company's proposal to spread margin costs among the rate classes. The Company is proposing a large rate increase in this proceeding, and if the Commission were to strictly adhere to the results of the LRIC study, such a shift would result in rate shock for residential and small commercial customers.

Q. Should the Commission strictly stick to the results of the LRIC when allocating costs to all customers?

A. No. The Commission should consider the results of the LRIC as evidence, but not rely on its solely. If the results of the LRIC were strictly relied upon, rates would increase significantly for small commercial and residential customers and decrease for large customers. NW Natural has recognized the large rate increase that they are requesting in this proceeding and has recommended a reasonable rate spread that helps mitigate rate shock for small customers.

X. RENEWABLE NATURAL GAS COST ALLOCATION

Q. Please summarize your testimony on this issue.

A. With one change, CUB supports NW Natural's proposed cost allocation for RNG projects. CUB proposes that the RNG cost allocation also apply to special contract customers.

Q. What is NW Natural's proposed cost allocation for the Lexington Natural Gas Project?

A. NW Natural has proposed that all customer classes pay for the costs associated with the Lexington Renewable Project.[79] The Company's rate spread proposal allocates RNG on an equal cents per therm basis to all customers.[80]

Q. What is NW Natural's proposed cost allocation for renewable natural gas projects under its proposed Schedule 198 AAC?

A. The Company has proposed to allocate Schedule 198 costs to all customer classes, except for storage customers.[81]

Q. Why has NWN proposed to allocate RNG costs to all customers?

[79] UG 435 – NWN/1300/Walker/28, lines 16-17.
[80] UG 435 – NWN/1404/Wyman/1.
[81] UG 435 – NW Natural/1500/Kravitz/13, lines 18-19.

A. The CPP has made NWN the point of regulation for all its customers' emissions. Oregon has made NWN responsible for the emissions associated with transport customers' natural gas usage.

Q. What is CUB response to NWN's position?

A. CUB supports NWN's rate allocation proposal in the proceeding. Throughout the UG 411 RNG AAC proceeding, CUB has consistently advocated for this fair rate allocation for renewable natural gas. However, CUB has one proposed change to NWN's rate spread proposal.

Q. What is the State's policy on greenhouse gas emissions?

A. Through the CPP, the state of Oregon is mandating reductions in greenhouse gas emissions.

Q. What was NW Natural's initial rate allocation for RNG costs?

A. When NWN initially filed Schedule 198, the Company proposed to allocate the costs of RNG only to sales customers. This was appropriate because SB 98 established a renewable natural gas target for sales customers. Therefore, transport customers were due to not be subject to any cost associated with RNG procurement. However, with the CPP, the regulatory paradigm around both emissions reductions and RNG cost recovery has changed.

Q. How many therms of weather-normalized gas does NWN expect to deliver to their customers in the Company's test year?

A. NW Natural expects to deliver 1.02 billion therms of natural gas in the 2023 test year.

Q. How many therms of weather-normalized gas does NWN expect to deliver to transport customers in the Company's test year?

A. NW Natural expects to deliver 287 million therms of natural gas in the 2023 test year to transport customers. Transport customers are expected to represent approximately 28% of NW Natural's natural deliveries in the test year.[82]

Q. How many therms of weather-normalized gas does NWN expect to deliver to transport customers in the Company's test year?

A. NW Natural expects to deliver 287 million therms of natural gas in the 2023 test year to transport customers. Transport customers represent approximately 28% of NW Natural's thermal deliveries in the test year.

Q. Is there an incremental cost associated with renewable natural procurements?

A. Yes. RNG is more expensive than conventional natural gas.

Q. Given Oregon's stated goal to reduce greenhouse gas emissions, is it reasonable to only impose the incremental costs associated with renewable natural gas on sales customers?

A. No. The Energy Information Agency estimates that each therm of natural gas used emits 11.7 pounds of CO2.[83] From an emissions perspective, there is no difference between a transport customer or a residential customer using a therm of natural gas. It is not fair to only make small commercial and residential customers pay for expensive renewable natural gas.

[82] CUB used the following rate schedules to calculate this number. NW Natural Schedules 31CTF, 32ITF, 32CTF, 32ITF, 32CTI, 32ITI.
[83] CUB Exhibit 212.

Q. How does natural gas enter NW Natural's system?

A. NW Natural's customers that are transport, sales, or special contract receive natural gas from the same interstate pipeline system, and from the same supply basins. Transport and sales customers are reliant on the Northwest Pipeline, which is a bi-directorial interstate pipeline to bring gas supplies to NW Natural's service territory. Rates for interstate pipeline transportation services are established by FERC within the United States. All of NW Natural's customers contribute to the shipping fees, which cover the fixed costs associated with transporting gas from supply basins to load.

Q. Where do transport, and sales customers get their natural gas from?

A. Transport and sales customers obtain natural gas supplies from the Alberta and British Columbia provinces and the US Rocky Mountains. These supply basins move gas to customers from the interstate pipeline system towards NW Natural's distribution system.

Q. Who runs the distribution system for transport and sales customers?

A. As a local distribution company, NW Natural owns and operates the distribution system to get gas to its end use customers. NW Natural performs a variety of roles to ensure the safe and reliable transportation of natural gas on the distribution system. NW Natural retains and develops engineering staff to design, reinforce and monitor the safety of the distribution system. NW Natural handles the billing, metering, and capital planning of the distribution system. All of NW Natural's customers pay for these costs.

Q. What storage facilities support the transport and sales customers load?

A. Transport and Sales customers rely on the same major storage facilities to ensure reliable access. The Jackson Prairie storage facility and the Mist storage facility serve the gas needs of transport and sales customer to provide natural gas in a safe manner and provide gas capacity.

Q. Why does CUB believe it is reasonable to allocate RNG costs to transport customers?

A. Industrial, commercial, and residential customers of natural gas rely on the same major storage facilities, natural supply basins, gas transmission system, and distribution system. The State of Oregon has directed fuel suppliers such as NW Natural to decarbonize its heating system. Part of this new role will be procuring renewable natural gas to reduce emissions associated with natural gas use.

CUB has demonstrated that the natural gas system is interconnected. The Commission should spread RNG across all customer classes to ensure that the entire system is paying to decarbonize the natural gas system.

Q. Does CUB recommend a change to NW Natural's proposed rate spread of renewable natural gas projects?

A. Yes. CUB recommends that the RNG costs be imposed on all customers except storage. NW Natural made this proposed allocation because of CPP rules, which have made NW Natural the single point of regulation for all their customer emissions. In the Company's initial filing, the Company did not allocate these costs to special contract customers. CUB proposes to include special contract

customers because NW Natural is responsible for emissions associated with these customers under the CPP.

Q. What are special contract customers?

A. Special contract customers receive service under a special agreement with NW Natural. These customers receive service under OAR 860-022-0035(1), which provides:

> Energy and telecommunications utilities within Oregon entering into special contracts with certain customers prescribing and providing rates, services, and practices not covered by or permitted in the general tariffs, schedules, and rules filed by such utilities are in legal effect tariffs and are subject to supervision, regulation, and control as such.

There are eight special contract customers on NW Natural's system. In the test year of this case, these customers are expected to use 8.7 million therms of natural gas.

Q. What are the implications of not spreading the costs to special contract customers?

A. Special contract customers are drivers of greenhouse gas emissions on NW Natural's system. Since these customers are driving the costs needed to reduce emissions, these customers should help contribute to costs needed to reduce emissions systemwide.

Q. What is the difference between NWN's proposed renewable natural gas rate spread and CUB's rate spread?

A. CUB Exhibit 212 details the difference between NWN's proposed rate spread and CUB's proposed rate spread.

Q. Does this conclude your testimony?

A. Yes.

WITNESS QUALIFICATION STATEMENT

NAME: William Gehrke

EMPLOYER: Oregon Citizens' Utility Board

TITLE: Senior Economist

ADDRESS: 610 SW Broadway,
Suite 400 Portland,
OR 97205

EDUCATION:

MS, Applied Economics
Florida State University, Tallahassee, FL

BS, Economics
Florida State University, Tallahassee, FL

EXPERIENCE:

Provided testimony for the Oregon Citizens' Utility Board in numerous dockets such as UE 335, UE 374, UG 344. UG 347, UG 366, UE 374, UG 388, UE 391, and UE 394. Worked as an Economist for the Florida
Department of Revenue. Worked as Utility Analyst at the Florida Public
Service Commission, providing advice on electric rate cases. Attended the Institute of Public Utilities Annual Regulatory Studies program in 2018.

CUB Exhibit 202 is Highly Confidential and has been served upon the Commission and each party designated to receive confidential information pursuant to Order 21-465.

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

SCHEDULE 14A INFORMATION

Proxy Statement Pursuant to Section 14(a) of the Securities Exchange Act of 1934
(Amendment No.)

Filed by the Registrant ☒ Filed by a Party other than the Registrant ☐

Check the appropriate box:

☐ Preliminary Proxy Statement

☐ **Confidential, for Use of the Commission Only (as permitted by Rule 14a-6(e)(2))**

☒ Definitive Proxy Statement

☐ Definitive Additional Materials

☐ Soliciting Material under §240.14a-12

NORTHWEST NATURAL HOLDING COMPANY
(Name of registrant as specified in its charter)

(Name of person(s) filing proxy statement, if other than the registrant)

Payment of Filing Fee (Check the appropriate box):

☒ No fee required.

☐ Fee paid previously with preliminary materials.

☐ Fee computed on table in exhibit required by Item 25(b) per Exchange Act Rules 14a6(i)(1) and 0-11.

250 SW TAYLOR STREET
PORTLAND, OR 97204

April 14, 2022

To the Shareholders of Northwest Natural Holding Company:

We are pleased to share that at the time we are preparing this notice of the 2022 Annual Meeting of Shareholders of Northwest Natural Holding Company (NW Holdings or the Company), we have received notice that NW Holdings has been designated as one of the 2022 World's Most Ethical Companies®. NW Holdings is one of only nine honorees in the energy and utilities industry. In all, 136 honorees were recognized spanning 22 countries in 45 industries. According to Ethisphere, "this recognition honors companies that demonstrate exceptional leadership and a commitment to business integrity through best-in-class ethics, compliance and governance practices."[1] We are proud of all of the work we do in these areas on behalf of our shareholders.

Also at the time we are distributing this notice the world has grappled with the COVID-19 pandemic for over two years, with widespread global, national, and local impacts and disruptions. We are heartened by declines in reported infections nationally and locally after the peak of the Omicron wave. At the same time we are cognizant of possible resurgences or variants of the virus and concerns regarding in-person gatherings. After careful consideration, the NW Holdings' Board of Directors has determined to hold the 2022 Annual Meeting virtually, via a live webcast. We believe this format is important to protect the health and well-being of our shareholders, employees, directors and communities. While we will miss welcoming our shareholders in person, we have made arrangements to hold an electronic, webcast meeting that will afford shareholders the same rights and access as if the meeting were held in person, including the ability to vote shares and submit questions electronically during the meeting. We appreciate your understanding and support as we navigate what we hope is the final stage of the pandemic. We look forward to gathering with our shareholders in person at our next annual meeting.

We cordially invite you to attend the 2022 Annual Meeting of Shareholders of Northwest Natural Holding Company, which will be held on Monday, May 23, 2022, commencing at 2:00 p.m. Pacific Daylight Time, conducted via live webcast at **www.virtualshareholdermeeting.com/NWN2022**. At the meeting you will be asked to consider and vote upon four proposals: (1) the election of four Class II directors for terms of three years; (2) the amendment of the Company's Employee Stock Purchase Plan to modify eligibility requirements and increase shares reserved for issuance; (3) an advisory vote to approve named executive officer compensation; and (4) the ratification of the appointment of PricewaterhouseCoopers LLP as NW Holdings' independent registered public accountants for the fiscal year 2022. Your Board of Directors unanimously recommends that you vote FOR each of Proposals 1, 2, 3, and 4. In connection with the meeting, we enclose a notice of the meeting, a Proxy Statement, and a proxy card. You are entitled to participate in the Annual Meeting if you were a holder of record of NW Holdings common stock at the close of business on **April 7, 2022**, the record date set for the meeting. **Please see page 2 for further instructions on attending the Annual Meeting.**

Detailed information relating to NW Holdings' business activities and operating performance is contained in our 2021 Annual Report, which is also enclosed. We also invite you to review NW Holdings' second annual Environmental, Social and Governance (ESG) report found at **www.nwnatural.com/about-us/environment/business-practices**, which highlights all of the important work NW Holdings has accomplished in these areas.

It is important that your shares are represented and voted at the meeting. Whether or not you plan to attend, please vote your shares in one of three ways: via internet, telephone or mail. Instructions regarding internet and telephone voting are included on the proxy card or Voting Instruction Form. If you elect to vote by mail, please sign, date and return the proxy card or Voting Instruction Form in the enclosed postage-paid envelope. Your proxy may be revoked at any time before it is exercised in the manner set forth in the Proxy Statement.

Sincerely,

Malia H. Wasson
Chair of the Board

David H. Anderson
President and Chief Executive Officer

1 "World's Most Ethical Companies" and "Ethisphere" names and marks are registered trademarks of Ethisphere LLC.

NORTHWEST NATURAL HOLDING COMPANY

250 SW TAYLOR STREET
PORTLAND, OREGON 97204
(503) 226-4211

NOTICE OF 2022 ANNUAL MEETING OF SHAREHOLDERS

Portland, Oregon, April 14, 2022

To our Shareholders:

The 2022 Annual Meeting of Shareholders of Northwest Natural Holding Company (NW Holdings or the Company) will be held on Monday, May 23, 2022 at 2:00 p.m. Pacific Daylight Time, in a virtual meeting format only, conducted via live webcast at **www.virtualshareholdermeeting.com/NWN2022** for the following purposes:

1. to elect four Class II directors for terms of three years;
2. to amend the Company's Employee Stock Purchase Plan to modify the eligibility requirements to participate and to increase the number of shares reserved for issuance;
3. to conduct an advisory vote to approve the named executive officers' compensation;
4. to ratify the appointment of PricewaterhouseCoopers LLP as NW Holdings' independent registered public accountants for the fiscal year 2022; and
5. to transact such other business as may properly come before the meeting or any adjournment thereof.

We are holding the Annual Meeting in an electronic meeting format to do our part to protect the health and well-being of our shareholders, employees, directors and communities from COVID-19. This format will allow you to vote your shares and submit questions electronically during the meeting in accordance with the rules of conduct for the meeting.

If you were a holder of record of NW Holdings common stock at the close of business on April 7, 2022, the record date set for the Annual Meeting, you will be entitled to vote upon all matters properly submitted to shareholder vote at the meeting.

Our Board of Directors is soliciting the proxies of all holders of NW Holdings common stock who may be unable to attend the meeting or who desire to vote by proxy before the meeting. These proxies also will instruct the fiduciary under NW Holdings' Dividend Reinvestment and Direct Stock Purchase Plan to vote any shares held for shareholders' benefit thereunder, as indicated on the proxies. In addition, the trustee of Northwest Natural Gas Company's (NW Natural) Retirement K Savings Plan (401(k) Plan) will vote any shares of NW Holdings common stock that are allocated to participants' 401(k) Plan accounts as directed by the participants. To the extent participants do not provide voting directions, the trustee will vote the undirected shares in the same proportion as the 401(k) Plan shares for which voting directions are received. A proxy and a stamped return envelope are enclosed for your use. No postage is needed if mailed in the United States. Instructions regarding internet and telephone voting also are included in the enclosed proxy card or Voting Instruction Form.

IMPORTANT NOTICE REGARDING THE AVAILABILITY OF PROXY MATERIALS FOR THE SHAREHOLDER MEETING TO BE HELD ON MAY 23, 2022

This Proxy Statement and our 2021 Annual Report are available at **www.nwnaturalholdings.com**.

Your vote is very important to us. We urge you to vote by promptly marking, signing, dating, and returning the enclosed proxy card or Voting Instruction Form, or by granting a proxy by the internet or telephone in accordance with the instructions in the enclosed proxy card or Voting Instruction Form, as soon as possible. Your prompt vote will save us the additional expense of further requests to ensure the presence of a quorum. You may vote electronically at the virtual meeting whether or not you previously have returned your proxy.

By Order of the Board of Directors,

Shawn M. Filippi
Vice President, Chief Compliance Officer and Corporate Secretary

PROXY STATEMENT
OF
NORTHWEST NATURAL HOLDING COMPANY
April 14, 2022

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INFORMATION REGARDING
2022 ANNUAL MEETING OF SHAREHOLDERS
TO BE HELD MAY 23, 2022

Proxy Statement

The Board of Directors of Northwest Natural Holding Company (NW Holdings or the Company) is soliciting the proxies of all holders of NW Holdings common stock who may be unable to attend or who desire to vote by proxy prior to the Annual Meeting of Shareholders to be held on Monday, May 23, 2022, at 2:00 p.m. Pacific Daylight Time, in a virtual meeting format only, conducted via live webcast at **www.virtualshareholdermeeting.com/NWN2022**. We are holding the Annual Meeting in an electronic meeting format to do our part to protect the health and well-being of our shareholders, employees, directors, and communities from COVID-19. This format will allow you to vote your shares and submit questions electronically during the meeting in accordance with the rules of conduct for the meeting. The close of business on April 7, 2022 is the record date for the determination of shareholders entitled to notice of and to vote at the meeting. We request that you sign and return the enclosed proxy card or Voting Instruction Form promptly. Alternatively, you may grant your proxy by the internet or telephone.

NW Holdings' Annual Report for the fiscal year ended December 31, 2021, including audited financial statements, is being sent to all shareholders, together with this Proxy Statement and the accompanying proxy card or Voting Instruction Form, commencing April 14, 2022.

HOW TO VOTE BY PROXY AND REVOKE YOUR PROXY

Voting by Proxy

You may vote your shares either electronically during the meeting or by duly authorized proxy. You may use the proxy card or Voting Instruction Form accompanying this Proxy Statement if you are unable to attend the meeting or you wish to have your shares voted by proxy, even if you do attend the meeting. If you are a registered shareholder, you may vote by internet, telephone, or mail, or you may vote your shares electronically during the meeting. To vote:

By internet (do not return your proxy card)

- Go to **www.proxyvote.com**. Internet voting is available 24 hours a day, 7 days a week, until 11:59 p.m. Eastern Daylight Time on May 22, 2022 or, for participants in the 401(k) Plan, until 11:59 p.m. Eastern Daylight Time on May 18, 2022.
- Have your proxy card available.
- Follow the simple instructions. You will be prompted to enter your **16-digit Control Number located on your proxy card**.

By telephone (do not return your proxy card)

- On a touch-tone telephone, call the toll-free number indicated on your proxy card. Telephone voting is available 24 hours a day, 7 days a week, until 11:59 p.m. Eastern Daylight Time on May 22, 2022 or, for participants in the 401(k) Plan, until 11:59 p.m. Eastern Daylight Time on May 18, 2022.
- Have your proxy card available when you call.
- Follow the simple recorded instructions. You will be prompted to enter your **16-digit Control Number located on your proxy card**.

By mail

- Mark your choice on your proxy card. If you properly execute your proxy card but do not specify your choice, your shares will be voted "FOR" Proposals 1, 2, 3, and 4, as recommended by NW Holdings' Board of Directors.
- Date and sign your proxy card.

- Mail your proxy card in the enclosed postage-paid envelope. If your envelope is misplaced, send your proxy card to Northwest Natural Holding Company, c/o Broadridge Financial Solutions, Inc., 51 Mercedes Way, Edgewood, NY 11717.

Revoking Your Proxy

You may revoke your proxy at any time before the proxy is exercised by: (1) delivering a written notice of revocation; (2) filing with the Corporate Secretary a subsequently dated, properly executed proxy; (3) voting after the date of the proxy by the internet or telephone; or (4) attending the meeting and voting electronically during the meeting. Your attendance at the meeting, by itself, will not constitute a revocation of a proxy. You should address any written notices of proxy revocation to: Northwest Natural Holding Company, 250 SW Taylor Street, Portland, OR 97204, Attention: Corporate Secretary.

Shares Held by Bank or Broker

If your shares are held in nominee or street name by a bank or broker, you should follow the directions on the Voting Instruction Form you receive from your bank or broker as to how to vote, change your vote, or revoke your proxy. Revocation of proxies for shares held through a broker, bank, or other nominee must be made through the appropriate nominee in accordance with its instructions.

Adjournment

If an adjournment of the meeting occurs, it will have no effect on the ability of shareholders of record as of the record date to exercise their voting rights or to revoke any previously delivered proxies.

VOTING YOUR SECURITIES

The 34,255,410 shares of NW Holdings common stock outstanding on April 7, 2022 were held by 4,406 shareholders residing in 50 states, the District of Columbia, and a number of foreign countries.

Each holder of NW Holdings common stock of record at the close of business on April 7, 2022 will be entitled to one vote for each share of NW Holdings common stock so held on all matters properly submitted at the meeting. Such holder will be entitled to cumulative voting for directors; that is, to cast as many votes for one candidate as shall equal the number of shares held of record multiplied by the number of directors to be elected, or to distribute such number of votes among any number of the nominees.

A majority of the shares of NW Holdings common stock outstanding at the close of business on April 7, 2022 must be represented at the meeting, either in attendance at the virtual meeting or by proxy, to constitute a quorum for the transaction of business.

It is important that your shares be represented at the meeting. You are urged, regardless of the number of shares held, to sign and return your proxy. Alternatively, you may grant your proxy by the internet or telephone as described above.

ATTENDING THE ANNUAL MEETING

Due to the ongoing pandemic, NW Holdings is holding the Annual Meeting in a virtual meeting format only, conducted via live webcast and shareholders will not be able to attend the meeting in person. In order to attend and to participate in the virtual meeting, please visit www.virtualshareholdermeeting.com/NWN2022, where you will be prompted to enter the 16-digit control number found on your proxy card or your Voting Instruction Form provided by your broker, bank, or other nominee. If you receive your Annual Meeting materials electronically and wish to attend the virtual meeting, please follow the instructions provided online for attendance. Once you have joined the virtual meeting, you may, just as

you would be able to do so in person, vote your shares or submit a question electronically during the meeting by following the instructions available on the meeting website. To permit as many shareholders as possible to participate, only shareholders or their valid proxy holders may participate in the meeting. If you plan on attending the virtual meeting, we encourage you to allow ample time to log in online and recommend that you do so fifteen minutes before the meeting start time to ensure that you are logged in when the meeting begins. If you have difficulty accessing the Annual Meeting through the meeting website, a phone number will be posted on the meeting website to connect you to technical support.

PROPOSAL 1—ELECTION OF DIRECTORS

NW Holdings' Restated Articles of Incorporation (Restated Articles) provide that the Board of Directors (Board) shall be composed of not less than nine nor more than 13 directors, with the exact number of directors to be determined by the Board. The Board has fixed the number of directors at 11.

The Restated Articles also provide that the Board of Directors be divided into three classes and that the number of directors in each class be as nearly equal in number as possible. Members of each class are elected to serve a three-year term with the terms of office of each class ending in successive years. The term of the Class II directors expires at this year's Annual Meeting. Mmes. McDonough and Peverett and Messrs. Thrasher and Wilhoite are nominees for election to the Board as Class II directors to serve until the 2025 Annual Meeting or until their successors have been duly qualified and elected. Ms. Peverett and Messrs. Thrasher and Wilhoite were last re-elected to the Board of Directors by the shareholders at the 2019 Annual Meeting. Ms. McDonough was appointed to the Board of Directors effective January 1, 2022. In case any of the nominees should become unavailable for election for any reason, the persons named in the proxy will have discretionary authority to vote for a substitute. Management knows of no reason why any of the nominees would be unable to serve if elected.

Vote Required

Under Oregon law, if a quorum of shareholders is present at the Annual Meeting, the four nominees for the Class II director positions who receive the greatest number of votes cast at the meeting shall be elected directors. Abstentions and broker non-votes are counted for purposes of determining whether a quorum exists at the Annual Meeting, but are not counted and have no effect on the results of the vote for directors.

The Corporate Governance Standards adopted by the Board of Directors provide that any nominee for director in an uncontested election who receives a greater number of votes "withheld" than votes "for" is required to tender his or her resignation for consideration by the Governance Committee. The Governance Committee will then determine whether to recommend acceptance of, and the Board of Directors will decide whether to accept, such resignation.

The Board of Directors recommends the election of the four nominees listed below.

INFORMATION CONCERNING NOMINEES AND CONTINUING DIRECTORS

Set forth below is information with respect to the nominees and continuing directors, including their recent employment or principal occupation, a summary of their specific experience, qualifications, attributes or skills that led to the conclusion they are qualified to serve as a director, the names of other public companies for which they currently serve as a director or have served as a director within the past five years, the committees on which they currently serve, and their age. Also listed is the year in which each director was elected to NW Holdings, or NW Natural as predecessor of NW Holdings, Board of Directors, as applicable.

NOMINEES FOR ELECTION TO BOARD OF DIRECTORS
Class II
(For a term ending in 2025)

Sandra McDonough
Former President and Chief Executive Officer, Oregon Business & Industry, Portland, Oregon
Age: 67
Director since: 2022
Board Committees: Audit and Public Affairs and Environmental Policy

Since September 2021, Ms. McDonough has been the owner of Quetzal Consulting, a business consulting firm. From 2018 to 2021, Ms. McDonough served as President and CEO of Oregon Business & Industry (OBI), Oregon's largest statewide general business organization, with members across the state representing a wide variety of industries. Before joining OBI, Ms. McDonough served as President and CEO of the Portland Business Alliance, Greater Portland's Chamber of Commerce for 14 years. Ms. McDonough previously worked in the energy industry for two decades, including as a Vice President, External Affairs, for PG&E National Energy Group and Vice President, Communications and External Affairs, for PG&E Gas Transmission Northwest, both companies being former operating units of San Francisco-based PG&E Corporation. Earlier, Ms. McDonough worked for PacifiCorp, holding positions in Oregon and Washington, D.C. Ms. McDonough currently serves on the boards of NW Natural and the non-profit New Avenues for Youth. She also serves on the Oregon advisory boards for U.S. Bank National Association and Regence and is a senior fellow of the American Leadership Forum/Oregon. She holds two bachelor's degrees from the University of Oregon.

Ms. McDonough brings to the NW Holdings Board extensive experience in governmental and public affairs through her leadership of OBI and the Portland Business Alliance, allowing her to contribute valuable insights on policy development and governmental relations. In addition, her strong community ties and familiarity with the Oregon business landscape position her to provide oversight on matters related to the local economy, business environments, and the communities served by NW Natural and NW Holdings. Her breadth of experience and leadership, including her two decades of experience in the energy industry, positions her to provide insights to the Board and management on a wide variety of matters, including, but not limited to: utility operations, regulatory matters, and business development and strategy, all of which strengthen the Board's collective knowledge, capabilities and experience.

Jane L. Peverett
Former President and Chief Executive Officer, British Columbia Transmission Corporation, Vancouver, British Columbia, Canada
Age: 63
Director since: 2007
Board Committees: Audit (Chair), Governance, and Organization and Executive Compensation

From 2005 to January 2009, Ms. Peverett served as President and Chief Executive Officer of British Columbia Transmission Corporation (BCTC), an electric utility in Vancouver, British Columbia. Between 2003 and 2005, she served as Chief Financial Officer of BCTC. Prior to joining BCTC, from 1988 through 2003, Ms. Peverett held various senior positions with Westcoast Energy Ltd., including serving as President and Chief Executive Officer of Union Gas Limited, a Westcoast Energy company, between 2001 and 2003. Ms. Peverett currently serves on the Boards of Directors of NW Natural, Canadian Imperial Bank of Commerce (CIBC), Capital Power Corporation, and Canadian Pacific Railway Limited. She currently serves as Chair of the Corporate Governance Committee of CIBC and as Chair of the Audit and Finance Committee of Canadian Pacific Railway Limited. Ms. Peverett has also previously served on the Boards of Directors of Hydro One Inc., AEGIS, Encana

Corporation, Postmedia Network Canada Corp., BC Ferry Authority, BC Ferries Services, Inc. (BC Ferries), and the United Way of Lower Mainland, also serving as Chair of BC Ferry Authority, and as Chair of the Audit Committee of Encana Corporation. Ms. Peverett earned a Bachelor of Commerce degree from McMaster University and a Master of Business Administration degree from Queen's University. She is a certified management accountant.

Ms. Peverett's extensive senior management experience at Union Gas Limited of Chatham, Ontario, a natural gas distribution, storage and transmission company, and BCTC, the entity responsible for managing British Columbia's publicly-owned electrical transmission system, Capital Power Corporation, a North American power producer, as well as her board experience at Canadian Pacific Railway Limited and NW Natural, and her prior board experiences at Hydro One Inc., one of North America's largest electricity delivery companies, AEGIS, Encana Corporation, Postmedia Network Canada Corp., and BC Ferries, position her to provide oversight of and advise management on a wide range of natural gas and energy industry-specific strategic and regulatory matters, including large project development and other business matters. In addition, Ms. Peverett's other board experiences, including as Chair of the Audit and Finance Committee of Canadian Pacific Railway Limited, Chair of the Corporate Governance Committee of CIBC, a leading North American financial institution with almost 11 million personal banking and business customers, a former Chair of the Audit Committees of CIBC and Encana Corporation, and a former Audit Committee member of Postmedia Network Canada Corp., enable her to provide effective oversight of management and insight into a wide variety of corporate governance and financial matters. Ms. Peverett's cumulative experience has led the Board to determine that she is an "audit committee financial expert" as defined by the SEC rules. Ms. Peverett also has extensive knowledge of and training in finance and accounting matters, which strengthen the Board's collective knowledge, capabilities and experience.

Kenneth Thrasher
Former Chief Executive Officer, Fred Meyer and Compli, Portland, Oregon
Age: 72
Director since: 2005
Board Committees: Audit, Governance, and Organization and Executive Compensation (Chair)

Mr. Thrasher served as Chair of the Board for Alternative Legal Solutions, Inc. (dba Compli), a software solution provider for management of compliance in employment, regulatory, environmental, health and safety, and corporate governance practices from 2002 to 2018, where he also served as Chair and Chief Executive Officer from 2002 through December 2009. Prior to joining Compli, Mr. Thrasher held executive positions with Fred Meyer Inc., including serving as President and Chief Executive Officer from 1999 to 2001 (as a division of the Kroger Co.), as Executive Vice President and Chief Administrative Officer from 1997 to 1999, as Senior Vice President and Chief Financial Officer from 1987 to 1997, and as Vice President and Treasurer from 1982 to 1987. Mr. Thrasher previously served as a member of Compli's Audit and Compensation Committees. He also currently serves on the Boards of Directors of NW Natural, the Jensen Quality Growth Fund, where he chairs its Audit Committee, and College Possible Oregon where he is Chair of the Board. He serves as Treasurer on the Advisory Board of Children's Public Private Partnership (CP3). He is also on the Oregon State University College of Business Dean's Council of Excellence, and is a Senior Director on the Oregon Business Council. Mr. Thrasher previously served as a member of the Boards of Directors for GSL Solutions Inc., Friends of the Children, the Portland State University Foundation, the Cradle to Career Council of All Hands Raised, Albertina Kerr Centers, the Oregon Coast Aquarium, Education Northwest, and the Children's Institute, is past Chair of Oregon's Quality Education Commission, and currently is an Emeritus Board Member of Albertina Kerr Centers, the Oregon Coast Aquarium, and the Children's Institute. Mr. Thrasher earned a Bachelor of Science degree in business administration from Oregon State University and was awarded an honorary doctorate degree from Portland State University in 2012.

Mr. Thrasher brings to the NW Holdings Board a wide range of leadership experiences in both the public and private sectors, including his services as a Director of NW Natural. Mr. Thrasher's service as an executive at

Fred Meyer, Inc. positions him to provide oversight of management on a wide variety of strategic, financial, and public company matters, including, but not limited to, large project development and acquisitions. Mr. Thrasher's service as an executive, chair, member of the Audit and Compensation Committees of Compli, and member of Finance and Audit committees of Education Northwest enables him to advise management on matters of compliance, regulation, human capital management, executive compensation and corporate governance. Mr. Thrasher's cumulative experience has led the Board to determine that he is an "audit committee financial expert" as defined by the SEC rules. Mr. Thrasher's other professional experiences, particularly his community and government related experience, provide insight with respect to government, community and media relations, all of which strengthen the Board's collective knowledge, capabilities and experience.

Charles A. Wilhoite
Managing Director, Willamette Management Associates, Inc., Portland, Oregon
Age: 57
Director since: 2018
Board Committees: Finance, Governance (Chair), and Public Affairs and Environmental Policy (Chair)

Since 1990, Mr. Wilhoite has worked for, and since 1995 has been a Managing Director of, Willamette Management Associates, Inc., a consulting firm in the fields of business valuation, forensic analysis, and transaction financial advisory services, which firm was acquired by Citizens Financial Group in September 2021. Before his tenure at Willamette Management Associates, Inc., he was a Senior Auditor at KPMG. Mr. Wilhoite currently serves as a member of the Board of Trustees of Meyer Memorial Trust, as well as serves as a board member of NW Natural, Legacy Health, The Nature Conservancy of Oregon, Inc., Portland Business Alliance, Oregon Business Council, 4G Clinical, and the National Association of Corporate Directors Northwest Chapter. He also serves as an advisory board member of Metal Toad Media and Black Business Warehouse and has been appointed by Oregon Governor Kate Brown as a member of a blue-ribbon task force to evaluate state and local debt to the Oregon Public Employees Retirement System (PERS). Mr. Wilhoite has previously served as Commissioner and Chair of the Board of the Portland Development Commission (PDC) and the City Charter Review Commission. He is also a past Chair of the Portland Business Alliance, Oregon Health & Science University, SMART, Urban League of Portland, and Meyer Memorial Trust, past Chair of the Portland Police Bureau Budget Advisory Committee, and immediate past Chair of The Nature Conservancy of Oregon, Inc. and the Federal Reserve Bank of San Francisco-Portland Branch. Mr. Wilhoite also previously served on the Boards of PacificSource Health Plans, U.S. Bank of Oregon, the Oregon State Bar, Jesuit High School Portland, Portland State University Foundation, Oregon Health & Science University Medical Group, the Oregon Housing Stability Council, Oregon Investment Council, and the Federal Reserve Bank of San Francisco-Portland Branch, and served as an Economic Advisory Council Member of the Federal Reserve Bank of San Francisco. Mr. Wilhoite earned a Bachelor of Science degree in accounting and a Bachelor of Science degree in finance, both at Arizona State University. He is a certified public accountant, with accreditations in business valuation and financial forensics. His other accreditations are from various financial governing bodies and include certifications in chartered global management accounting, management accounting, financial management, business valuation and appraisal, and fraud examination.

Mr. Wilhoite brings to the NW Holdings Board extensive experience, as well as financial accreditations, in business valuation, finance, and accounting, developed from over 31 years of experience as a consultant with Willamette Management Associates, his position as a Senior Auditor with KPMG, and current and former service in numerous regional and local economic and business organizations, including the Federal Reserve Bank of San Francisco-Portland Branch, the Portland Business Alliance, the Oregon Business Council, the Oregon Housing Stability Council, the Portland Development Commission, and the Portland Police Bureau Budget Advisory Committee, positioning him to provide oversight and advice to the Company on financial, accounting, and strategy topics including, but not limited to, mergers and acquisitions, growth and diversification, risk and consumer and commercial businesses. Mr. Wilhoite also has served as Managing Director of Willamette

Management Associates, Inc. for over two decades, thereby giving him entrepreneurial and marketing insight valuable to the Board. His experience in highly regulated industries, including his service as a member of the Boards of Directors of Legacy Health and Oregon Health & Science University, and his former service as a member of the Board of Directors of PacificSource, enables him to provide management oversight on subjects including public and government policy and relations, compliance and regulation. Furthermore, Mr. Wilhoite's strong community presence positions him to provide important guidance to the Board on local and regional strategic matters, and provide an important connection between NW Holdings and the communities it serves. Mr. Wilhoite's extensive knowledge and experience of finance, accounting and regulated industry, along with his strong community ties strengthen the Board's collective knowledge, capabilities and experience.

MEMBERS OF THE BOARD OF DIRECTORS CONTINUING IN OFFICE
Class III
(For a term ending in 2023)

David H. Anderson
Director, President and Chief Executive Officer, NW Holdings and NW Natural, Portland, Oregon
Age: 60
Director since: 2016
Board Committees: None

Mr. Anderson is President and Chief Executive Officer and a board member of NW Holdings and NW Natural. He previously served as President and Chief Operating Officer of NW Natural from August 2015 to July 2016, as Executive Vice President and Chief Operating Officer from February 2014 to July 2015, as Executive Vice President of Operations and Regulation from February 2013 to February 2014, and as Senior Vice President and Chief Financial Officer from when he joined NW Natural in 2004 to February 2013. Before joining NW Natural, Mr. Anderson was Senior Vice President and Chief Financial Officer at TXU Gas. He previously held executive positions within TXU Corporation (formerly Texas Utilities) including Senior Vice President and Chief Accounting Officer, and Vice President of Investor Relations and Shareholder Services. Mr. Anderson also serves as President, Chief Executive Officer, and Chair for certain subsidiaries of NW Holdings including Northwest Energy Corporation, as well as serves as Chair of the Board for NW Natural RNG Holding Company, LLC, NW Natural Renewables Holdings, LLC, and NW Natural Water Company, LLC and their subsidiaries.

In addition to serving on the Boards of NW Holdings and NW Natural, Mr. Anderson serves on the Board of Directors of National Fuel Gas Company where he has been appointed to the Audit, Financing, and Compensation Committees. Mr. Anderson also serves as a board member of the American Gas Association (AGA), where he is immediate past Chair of the Board, Chair of the Finance Committee, and a member of the Executive Committee, Compensation Committee, and Safety, Resilience/Reliability, and Security Task Force. He is also a board trustee of the American Gas Foundation, a director of the Oregon Business Council, and a member of SOLVE Founders' Circle. Mr. Anderson has also been appointed by Oregon Governor Kate Brown to serve on Oregon's Global Warming Commission. Mr. Anderson is a past board member of the Northwest Gas Association, Portland Business Alliance, Portland State Foundation, and Greater Portland Inc., and a past President of The Oregon Partnership, Inc. (Lines for Life). Mr. Anderson is also a past Co-Chair of the AGA Clean Energy Task Force, and past Chair of the AGA Audit Committee, the AGA Compensation Committee, the AGA Fiscal and Tax Committee, the Associated Oregon Industries (AOI) Fiscal Policy Committee, and PSU Foundation Investment Committee, and is a past advisory board member for PSU School of Business and Oregon Department of Education Business Advisory Team. Mr. Anderson holds a BBA in Accounting from Texas Tech University and is a CPA (ret.) and Chartered Global Management Accountant.

Mr. Anderson serves a key leadership role on the Board of NW Holdings and provides the Board with in-depth knowledge of each area of NW Holdings' and NW Natural's business, its finance and operations, the energy industry generally, and the Company's challenges and opportunities. He acts as the principal intermediary between management and the independent directors of our Board, and communicates to the Board management's perspective on important matters brought before the Board. Mr. Anderson's 17 years with NW Natural, his over 30 years' experience in the energy industry, and his extensive involvement with the AGA and Northwest Gas Association enable him to bring to the Board a comprehensive understanding of the Company's business operations as well as matters relating to the energy industry generally. Mr. Anderson's service on local business, educational, charitable and public service boards provides an important connection between NW Holdings and the communities it serves. Additionally, his extensive experience in finance and operations provides important perspectives with respect to the Company's business, operations, and financial positioning, as well as with respect to the communities the Company serves. Mr. Anderson's combined professional skills and insights from his position as President and Chief Executive Officer, as well as his other roles and experiences, strengthen the Board's collective knowledge, capabilities and experience.

Karen Lee
Chief Executive Officer, Pioneer Human Services, Seattle, Washington
Age: 57
Director since: 2021
Board Committees: Audit and Public Affairs and Environmental Policy

Since 2010, Karen Lee has served as Chief Executive Officer of Pioneer Human Services, a leading nonprofit social-enterprise business based in Seattle, Washington, which operates several businesses to help fund its social mission to assist individuals with criminal histories lead healthy and productive lives. From 2005 to 2010, Ms. Lee served as the Commissioner of the Washington State Employment Security Department. Prior to her role as Commissioner, she held several leadership roles at Puget Sound Energy, including Director of Gas Operations, from 2002 to 2005. She also previously served as an Associate Attorney at K&L Gates LLP in Seattle, Washington, and spent four years as an Officer in the U.S. Army. Ms. Lee holds a Juris Doctorate from the University of Washington School of Law. She is a graduate of the United States Military Academy at West Point, where she earned a Bachelor of Science degree with a concentration in Russian studies and a minor in engineering. Ms. Lee currently serves as a director of NW Natural, W. Lease Lewis Company, the Federal Reserve Bank of San Francisco, and the University of Washington Foundation. She is a Trustee at Western Washington University and a member of Washington's Statewide Reentry Council and the Regence Blue Shield Community Advisory Board. Ms. Lee also previously served as a member of the U.S. Bank Washington Advisory Board. Ms. Lee has been named a "40 Under 40" honoree and one of "Seattle's Women of Influence" by the *Puget Sound Business Journal*, and more recently, received an "Executive Excellence" award from *Seattle Business Magazine.*

As Chief Executive Officer of Pioneer Human Services, Ms. Lee brings to the NW Holdings Board more than a decade of executive and leadership expertise and is well positioned to provide valuable guidance on a wide variety of matters, including, but not limited to: human capital management and development, business growth and strategy, customer experience, business operations, legislative and public policy development, government relations and regulatory matters. Ms. Lee additionally brings to the Board a comprehensive understanding of the natural gas and utility industry, having served in several leadership roles at Puget Sound Energy, including as Director of Gas Operations, and is able to contribute important insights on: natural gas operations and regulation; and local, state and federal regulatory matters. Ms. Lee also has extensive legal and regulatory experience, having served as Commissioner of the Washington State Employment Security Department. Her deep industry expertise, combined with the breadth of her leadership experience across the private, non-profit and public sectors strengthens the Board's collective knowledge, capabilities and experience.

Nathan I. Partain
Former President and Co-Chief Investment Officer, Duff & Phelps Investment Management Co., League City, Texas
Age: 65
Director since: 2021
Board Committees: Finance (Chair), Governance, and Organization and Executive Compensation

Nathan Partain is the former President and Co-Chief Investment Officer of Duff & Phelps Investment Management Co., a position he held from 2005 until December 2020. Previously, Mr. Partain served as Executive Vice President of Duff & Phelps. Earlier, he was with Duff & Phelps Investment Research Co., where he served as the Director of Utility Research, Director of Equity Research, and Director of Fixed Income Research. Mr. Partain also previously served as President and Chief Executive Officer of DNP Select Income Fund Inc. (DNP), from 2001 to March 2021, and was Chief Investment Officer of DNP from 1998 to 2017. He also served as President and Chief Executive Officer of Duff & Phelps Utility and Corporate Bond Trust Inc. (DUC) and DTF Tax-Free Income Inc. (renamed DTF Tax-Free Income 2028 Term Fund Inc. in 2022) (DTF) from 2004 to March 2021 and President and Chief Executive Officer of Duff & Phelps Utility and Infrastructure Fund Inc. (DPG) from 2011 to March 2021. DNP, DTF and DPG (and formerly DUC until its merger with DNP in 2021) are part of a single “fund complex” of registered investment companies under SEC rules that share a common board of directors (the Duff & Phelps Fund Complex). Mr. Partain previously served as a director of the Duff & Phelps Fund Complex until March 2022, having served as a director of DNP and DTF since 2007 and DPG since 2011 (he also served as a director of DUC from 2007 to 2021). Mr. Partain is currently engaged in limited transition consulting services for Duff & Phelps Investment Management Co. Mr. Partain serves on the Boards of NW Holdings and NW Natural in his individual capacity and not in affiliation with any Duff & Phelps entity. Prior to joining Duff & Phelps, Mr. Partain held financial and regulatory positions with Gulf States Utilities Company. Mr. Partain serves on the Board of NW Natural and has served on the Board of Directors of Otter Tail Corporation since 1993 and as its Chair since 2011. Mr. Partain is a past National Association of Corporate Directors (NACD) Board Leadership Fellow. He earned a BS and MBA from Sam Houston State University. Mr. Partain is a Chartered Financial Analyst (CFA) and a member of the CFA Society of Chicago.

Mr. Partain brings to the NW Holdings Board significant board oversight and executive leadership, financial and governance expertise as a result of his many years of experience at Duff & Phelps. Mr. Partain’s service as Chair of the Board of Otter Tail Corporation enables him to provide important insight and advice to the Board on a wide range of matters related to the utility and energy industry as well as management oversight, corporate governance, strategic and financial matters. He additionally brings to the Board extensive knowledge of the utility industry gained from over 30 years of providing utility investment research and management services to institutional clients of Duff & Phelps and from his roles with Gulf States Utilities Company, and he is well positioned to advise management on matters of business strategy, growth and development, finance and capital markets, human capital management, and executive compensation. Mr. Partain’s deep industry knowledge, as well as his financial, governance and executive experience, strengthen the Board’s collective knowledge, capabilities and experience.

Class I
(For a term ending in 2024)

Timothy P. Boyle
President, Chief Executive Officer and Chair of the Board, Columbia Sportswear Company, Portland, Oregon
Age: 72
Director since: 2003
Board Committees: Public Affairs and Environmental Policy

Mr. Boyle is the President, Chief Executive Officer and Chair of the Board of Columbia Sportswear Company, an active outdoor apparel and footwear company headquartered in Portland, Oregon. He has held the President and Chief Executive Officer positions since 1988, except he relinquished his position as President from February 2015 until June 2017. He was appointed as Chair of the Board of Columbia Sportswear Company in January 2020. Mr. Boyle began working with Columbia Sportswear Company in 1970. Mr. Boyle is also a member of the Board of Directors of NW Natural, serves on the Board of Trustees of University of Oregon, and is an Emeritus Trustee of Reed College and the Freshwater Trust. In addition, Mr. Boyle is a past member of the Board of Directors of Craft Brew Alliance, Inc., as well as a past trustee of the Youth Outdoor Legacy Fund, and University of Oregon Foundation, where he was past Vice Chair of its Capital Campaign Committee. He is also a past member of the Young Presidents' Organization. Mr. Boyle earned a Bachelor of Science degree in journalism from the University of Oregon.

Mr. Boyle's professional experiences, including his service as President and Chief Executive Officer and Chair of the Board of Directors of Columbia Sportswear Company, his service on the NW Natural Board, as well as his prior service as a director of Craft Brew Alliance, Inc., and his current and prior community and public service, enable Mr. Boyle to provide valuable insight to the Board and management regarding public company operations, acquisitions, human capital management, executive compensation, investor and media relations, government relations, and growth and strategic direction, all of which strengthen the Board's collective knowledge, capabilities and experience.

Monica Enand
Founder and Chief Executive Officer, Zapproved, Inc., Portland, Oregon
Age: 50
Director since: 2019
Board Committees: Finance and Public Affairs and Environmental Policy

In 2008, Ms. Enand founded Zapproved, Inc., a cloud-based software provider for corporate legal departments, where she currently serves as Chief Executive Officer. Prior to founding Zapproved, she was the Director of Business Development and Marketing at Avnera Corporation, a fabless semiconductor manufacturer. Ms. Enand has also held sales and marketing positions at IBM and was a program manager in the compiler and architecture group at Intel. Ms. Enand is also a board member of NW Natural. Ms. Enand serves as a Board member of the Oregon Business Council and is a member of the Oregon Investment Council. Ms. Enand has previously served as Chair of Auth0 and Technology Association of Oregon, and as a member of Oregon Growth Board and Oregon Innovation Council. She received the 2018 Sam Blackman Award for Civic Engagement, the 2016 Portland Business Journal Entrepreneur of the Year award and the 2010 Portland Business Journal Orchid Award for achievement for women in business. Ms. Enand earned a bachelor's degree in computer engineering from Carnegie Mellon University and a Masters of Business Administration degree from the University of Portland.

Ms. Enand brings to the NW Holdings Board entrepreneurial and executive expertise from her more than a decade of experience founding and leading Zapproved, as well as substantial technological background from years of working in the technology industry. Ms. Enand's current and previous professional and management experiences in technology, business development, sales, and marketing, allow Ms. Enand to provide oversight of, and contribute important insights on, the Company's strategy and strategic direction, business development, growth and expansion activities, mergers and acquisitions, business diversification, cyber and information security, finance, compliance, human capital management, marketing and sales, and customer experience and support, which strengthens the Board's collective knowledge, capabilities and experience.

Hon. Dave McCurdy
Former President and Chief Executive Officer, American Gas Association, Kamas, Utah
Age: 72
Director since: 2020
Board Committees: Finance and Organization and Executive Compensation

Hon. McCurdy served as President and Chief Executive Officer of the American Gas Association (AGA) from February 2011 to March 2019, representing over 200 natural gas energy and pipeline utilities. From 2007 to January 2011, Hon. McCurdy served as President and Chief Executive Officer of the Alliance of Automobile Manufacturers, an organization of the thirteen largest global auto manufacturers. From 1999 to 2006, Hon. McCurdy served as President and Chief Executive Officer of the Electronic Industries Alliance (EIA) crafting domestic and international policies for EIA's nearly 1,300-member companies. In 2001, he co-founded the Internet Security Alliance between EIA and the Software Engineering Institute of Carnegie Mellon University. From 1995 to 1999, Hon. McCurdy was the President and Chief Executive Officer of the McCurdy Group, a business consulting and investment practice, serving as a strategic advisor for health care, defense manufacturing and other sectors. Hon. McCurdy served seven terms as a United States Congressman in the United States House of Representatives for the 4th District of Oklahoma from 1981 to 1995. Hon. McCurdy's distinguished career in Congress included attaining numerous leadership positions, such as Chair of the House Intelligence Committee and Chair of the subcommittees of the Armed Services Committee and the House Committee on Science, Space, and Technology. Hon. McCurdy also practiced law both as an Assistant Attorney General for the State of Oklahoma and in private practice from 1975 to 1980. Hon. McCurdy is a 1972 graduate of the University of Oklahoma and received his JD in 1975 from Oklahoma Law School. As a Rotary International Graduate Fellow, he studied international economics at the University of Edinburgh. He also held a commission in the United States Air Force Reserve, attaining the rank of major and serving as a judge advocate general. Hon. McCurdy received the 2017 Business-Government Relations Award from the Bryce Harlow Foundation for honesty, integrity, and strategic leadership. Hon. McCurdy is a member of the Board of NW Natural and has served on the Board of Directors of LMI, a private defense consulting company headquartered in McLean, Virginia since 2011 and is a member of its Audit and Finance Committees. He also serves as an industry expert on the TSA Surface Transportation Security Advisory Committee and on the subcommittee for cybersecurity.

Hon. McCurdy brings to the NW Holdings Board extensive experience in governmental and public affairs as well as a comprehensive understanding of the natural gas industry. As the former President and Chief Executive Officer of the AGA, Hon. McCurdy is well positioned to advise management on utility operations and natural gas distribution, pipeline, storage and other energy matters. In addition, his extensive experience in government, including as a seven-term United States Congressman, and as a leader of several industry organizations, including the AGA, the Alliance of Automobile Manufacturers and the EIA, enables him to provide important insights on government relations and policy development at the federal, state and local level. His breadth of leadership experience across industries, including as a director of LMI, positions him to provide valuable guidance to the Board on a wide variety of matters affecting NW Holdings, including, but not limited to: business development, expansion and strategic direction, customer service and support, risk oversight and cyber security matters, all of which strengthen the Board's collective knowledge, capabilities and experience.

Malia H. Wasson
Chair of the Board, NW Holdings and NW Natural, Portland, Oregon
Chief Executive Officer, Sand Creek Advisors LLC, Portland, Oregon
Age: 63
Director since: 2014
Board Committees: Governance

Since March 2015, Ms. Wasson has been the Chief Executive Officer of Sand Creek Advisors LLC, which provides business consulting to chief executive officers of public and private companies. Previously, Ms. Wasson was an Executive Vice President of Commercial Banking at U.S. Bank, N.A., and served as President of U.S. Bank's Oregon and Southwest Washington operations from 2005 to 2015. She also led the U.S. Bank, N.A. Advisory Board in Portland, Oregon. Ms. Wasson is a 33-year veteran of the banking industry. Prior to joining U.S. Bank in 1989, she held various commercial lending positions with the former Oregon Bank and Security Pacific Bank of Oregon. Ms. Wasson was elected as Chair of the Boards of NW Holdings and NW Natural in August 2021. Ms. Wasson currently serves on the Board of Directors of Columbia Sportswear Company, where she is Chair of the Audit Committee. She is also a senior director and past Chair of the Oregon Business Council. Ms. Wasson formerly served on the boards of Oregon Health & Science University Foundation, Inc., OHSU Knight Cancer Institute, Portland Business Alliance, Greater Portland Inc., Portland Mall Management, Inc., SOLVE Founders' Circle and the American Red Cross-Oregon Trail Chapter and was past Chair of the Oregon Business Plan. She also serves as a Senior Fellow at American Leadership Forum. Ms. Wasson holds a Bachelor of Science and Commerce degree in finance from Santa Clara University.

Ms. Wasson brings to the NW Holdings Board extensive experience in commercial banking, finance and accounting and remarkable local and regional experience. Ms. Wasson's management and leadership roles in the banking industry as well as her strong community presence position her to provide insight and advice to the Board on a wide range of financial, accounting, commercial and local and regional strategic matters, including, but not limited to, regulated industry, mergers and acquisitions, consumer and commercial businesses, public and government policy and relations, human capital management and diversity, media relations, marketing, change management and compliance. In addition, Ms. Wasson's service as Chair of the Audit Committee of Columbia Sportswear and prior service as Chair of the Audit Committee of NW Natural and NW Holdings highlights her substantial experience in finance and accounting matters and positions Ms. Wasson to provide important guidance to the Board on matters of accounting, finance, and corporate governance. Ms. Wasson's extensive knowledge and experience of finance, accounting, commercial banking and regulation, and her strong community ties, strengthen the Board's collective knowledge, capabilities and experience.

CORPORATE GOVERNANCE

THE BOARD OF DIRECTORS AND ITS COMMITTEES

Meeting Attendance

The Board of Directors conducts its annual organizational meeting on the same date as the Annual Meeting of Shareholders, which all of the directors are encouraged to attend. In 2021, all of our then-current directors attended the Annual Meeting of Shareholders.

During 2021, there were nine meetings of the Board of Directors, each of which included an executive session of non-management directors. No current director attended fewer than 75% of the aggregate meetings of our Board and Committees on which he or she served.

Independence

The Board of Directors has adopted Director Independence Standards to comply with New York Stock Exchange (NYSE) rules. The Director Independence Standards are available at **www.nwnaturalholdings.com** and are available in print to any shareholder who requests them. No director is deemed independent unless the Board affirmatively determines that the director has no material relationship with NW Holdings either directly or as a partner, shareholder or officer of an organization that has a relationship with NW Holdings. The Board applies NW Holdings' Director Independence Standards as well as additional qualifications prescribed under the listing standards of the NYSE and applicable state and federal statutes. Annually, the Board determines whether each director meets the criteria of independence, including whether the members of the Governance, Audit and Organization and Executive Compensation Committees (OECC) satisfy the independence requirement for service on those committees. As of February 24, 2022, the Board determined that ten of the eleven directors met the independence criteria. They are directors Boyle, Enand, Lee, McCurdy, McDonough, Partain, Peverett, Thrasher, Wasson, and Wilhoite. The Board previously determined that John D. Carter and Tod R. Hamachek, who each retired from the Board effective May 27, 2021, and C. Scott Gibson, who retired from the Board effective December 31, 2021, were independent.

Board Nominations and Refreshment

The Board is responsible for selecting candidates for Board membership and the Governance Committee has been assigned the responsibility of recommending to the Board of Directors nominees for election as directors. The Governance Committee, with recommendations and input from the Chair of the Board, the Chief Executive Officer (CEO) and other directors, evaluates the qualifications of each director candidate in accordance with the Director Selection Criteria established by the Board. Candidates for director nominees are reviewed in the context of the current composition and diversity of the Board, the operating requirements and existing and prospective business environment faced by NW Holdings, NW Holdings' business strategy, and the long-term interests of shareholders. Director candidates must be able to make a significant contribution to the governance of NW Holdings by virtue of their business and financial expertise, educational and professional background, and current or recent experience as a chief executive officer or other senior leader of a public company or other relevant organization. The business discipline that may be sought at any given time will vary depending on the needs and strategic direction of our Company and the disciplines represented by our incumbent directors. In addition, the Governance Committee looks at the overall composition of the Board and how a candidate would contribute to the overall synergy and collaborative process of the Board. In conducting its assessment, the Governance Committee considers a variety of criteria, including, but not limited to, the candidate's integrity, reputation, judgment, knowledge, experience, commitment, skills, diversity, and independence.

In recent years, the Board undertook a comprehensive succession planning and refreshment review in anticipation of the retirements of several long-tenured directors. In line with those plans, the Board has undergone substantial refreshment, with five of the ten current independent directors being added to the Board in the last three years. Our Corporate Governance Standards provide several mechanisms in support of director refreshment, including: annual peer reviews of individual directors, a requirement to offer notice of resignation upon a change in principal position, and a mandatory retirement age of 75.

Shareholder Nominations

Shareholders' recommendations for director-nominees may be submitted to NW Holdings' Corporate Secretary for consideration by the Governance Committee. In evaluating shareholder recommendations for director-nominees, the Governance Committee applies the same Director Selection Criteria discussed above. NW Holdings' Restated Articles of Incorporation provide that no person, except those nominated by the Board, shall be eligible for election as a director at any annual or special meeting of shareholders unless a written request that his or her name be placed in nomination, together with the written consent of the nominee, and received from a shareholder of record entitled to vote at such election by the Corporate Secretary of NW Holdings on or before the later of (a) the thirtieth day prior to the date fixed for the meeting, or (b) the tenth day after the mailing of the notice of that meeting.

Diversity

As indicated above, NW Holdings' Director Selection Criteria includes a consideration of diversity as a factor in evaluating candidates for Board membership. The Board believes that diversity with respect to factors such as background, experience, skills, geographic location, race, gender, ethnicity, culture, veteran status, age, disability, and sexual orientation are important considerations in Board composition. The Governance Committee discusses diversity considerations in connection with each director candidate, as well as on a periodic basis in connection with the composition of the Board as a whole. In addition, the Governance Committee and the Board conduct formal self-evaluations each year that include an assessment of whether the Governance Committee and the Board have adequately considered diversity, among other factors, in identifying and discussing director candidates. Currently, of eleven members of the Board, five directors are women, including the Chair of the Board, and three directors identify as People of Color. The Governance Committee believes that, as a group, the nominees presented for election at the 2022 Annual Meeting of Shareholders effectively contribute to the Board's diverse range of backgrounds, experiences and perspectives.

Board Experience

The NW Holdings Board consists of eleven directors with extensive professional experience and a diverse array of skills. This diversity of experience provides our Board with a collective skill set that is advantageous to the Board's oversight of our business and operations. In addition to the qualifications required of all directors that are set forth in NW Holdings' Director Selection Criteria, our Board members have experience in the following areas among others:

Director Experience*

* Represents the number of current NW Holdings directors with the indicated skill or experience.

For a more detailed description of each director's experiences, please see the director biographies above.

Board Leadership Structure

The current Board leadership structure separates the roles of Chair and CEO. The Board evaluates its leadership structure and role in risk oversight on an ongoing basis. The decision to combine or separate the Chair and CEO roles is determined on the basis of what the Board considers to be best for NW Holdings at any given point in time. Currently, the independent Chair of the Board meets regularly with the CEO and the Corporate Secretary to discuss appropriate business to come before the Board and its committees and actively recommends agenda items for Board meetings. NW Holdings' Board is structured to promote independence. The directors of the Board meet regularly in executive sessions at which the independent Board Chair presides and only the non-management directors are present. Under NW Holdings' Bylaws, the Governance Committee, Audit Committee and Organization and Executive Compensation Committee must be composed entirely of independent directors and the Finance Committee and Public Affairs and Environmental Policy Committee must have a majority of independent directors. All committees have an independent chair that works with the executive officer primarily responsible for work with that committee and the Corporate Secretary to discuss appropriate business to come before the committee, and to recommend agenda items for that committee. The Board of Directors believes its leadership structure provides for appropriate independence between the Board and management.

The Governance Committee and the Board annually review the Corporate Governance Standards, which can be accessed electronically in the "Corporate Governance" section of NW Holdings' website at **www.nwnaturalholdings.com**, and the performance of the Board is reviewed annually by the members of the Board.

Board's Role in Risk Oversight

NW Holdings' management is responsible for the day-to-day management of risks faced by the Company, while the Board of Directors, collectively and through its committees, has responsibility for the oversight of risk management. The Corporate Governance Standards describe the Board's primary responsibilities, which include oversight of NW Holdings' mission, and key programs that enable the Board to assess and manage material risks, including, but not limited to, risks related to business continuity and disaster response, gas supply, distribution and storage operations, strategic planning and business development, environmental and climate change matters, business improvement and information technology, market competition, economic environment, governance, legislative and regulatory risk and compliance, state and federal regulatory process and environment, financial performance, business integrity and compliance, financial reporting and internal controls, financing programs, pensions and retirement plans, reputational risk, human capital management, compensation and employee benefits, succession planning (including the CEO), human risks such as safety and diversity, equity and inclusion matters, and Company culture. Committee oversight authority with respect to risk management is described in more detail below. The Board periodically reviews its committee oversight authority to ensure the Board has adequate visibility and oversight of the Company's key areas of risk. Appropriate members of management serve as liaisons to Board committees, attend Board and committee meetings and regularly discuss with the Board and the committees various risks confronting the Company.

Management reports regularly to the Board on significant risk categories. Additional review or reporting on enterprise risks is conducted as needed or requested by the Board. The Board and management consider enterprise risks and opportunities in their strategic and capital spending decision process.

Committees

There are five standing committees of the Board: Audit, Finance, Governance, OECC, and Public Affairs and Environmental Policy. Each of the standing committees operates according to a formal written charter, all of which are reviewed annually and are available at **www.nwnaturalholdings.com**. Copies of the charters are also available in print to any shareholder upon request. The performance of each committee is reviewed annually. Each committee may obtain advice and assistance from internal or external legal, accounting or other advisors, when appropriate. Each committee has the opportunity to meet in executive session with non-management directors at the end of each committee meeting; the independent chair of the committee presides at these sessions. Each committee regularly reports to the full Board of Directors.

The table below shows the current membership of the Board and each standing committee and the number of meetings held during 2021.

Board and Committees

Director	Board	Audit[1]	Organization and Executive Compensation	Governance	Finance	Public Affairs and Environmental Policy
David H. Anderson	X					
Timothy P. Boyle	X					X
Monica Enand	X				X	X
Karen Lee	X	X				X
Hon. Dave McCurdy	X		X		X	
Sandra McDonough	X	X				X
Nathan I. Partain	X		X	X	Chair	
Jane L. Peverett	X	Chair	X	X		
Kenneth Thrasher	X	X	Chair	X		
Malia H. Wasson	Chair			X		
Charles A. Wilhoite	X			Chair	X	Chair
Number of Total Meetings in 2021	9	7	4	7	4	2

(1) Based on its review of relevant information, the Board has determined that each member of the Audit Committee meets all applicable independence and financial literacy requirements and that each of Ms. Peverett and Mr. Thrasher is an "audit committee financial expert," as that term is defined under applicable Securities and Exchange Commission (SEC) rules.

Audit Committee

NW Holdings' independent Audit Committee, which regularly reports to the full Board, has primary responsibility for oversight and evaluation of the Company's policies with respect to significant risks and exposures faced by the Company and the procedures for assessing, monitoring and managing those risks, and reporting on those matters to the Board. The Audit Committee is responsible for overseeing matters relating to accounting, financial reporting, internal controls, auditing, information technology systems and cybersecurity, the Company's enterprise risk management process, business continuity and disaster planning, capital projects and contingencies, and material litigation. It is also responsible for the appointment, oversight and review of the Director of Internal Audit as well as the independent registered public accounting firm, and reviews the audit findings and other internal accounting control matters with the independent auditor. The Audit Committee also oversees the Company's Business Integrity Program, including the Code of Ethics, and the Company's system for review and treatment of the Company's Business Integrity Hotline complaints regarding accounting or financial irregularities as well as other compliance and integrity concerns. It also periodically reviews transactions with related parties, as discussed below under "Transactions with Related Persons," and policies relating to the delegation of management authority. In fulfilling its risk oversight function, the Audit Committee periodically, and as needed, discusses key risks with NW Holdings' President and Chief Executive Officer, Chief Financial Officer, Chief Accounting Officer, General Counsel, Chief Compliance Officer, legal counsel, internal auditors, and the Company's independent registered public accounting firm. A more detailed description of the Audit Committee's responsibilities is included in the "Report of the Audit Committee," below.

Finance Committee

The Finance Committee is responsible for reviewing strategies and making recommendations to the Board with respect to NW Holdings' financing programs, budgets and forecasts, financial policy matters, including hedging policies and practices, and material regulatory issues, including regulatory policy related to financial strategy and policy, capital structure and dividend policy. It makes quarterly recommendations to the Board regarding payments of dividends, and periodically reviews financial reports by management, benchmarking financial performance against peers. The Finance Committee also oversees risks related to the economic environment, and gas supply and pricing, and provides oversight of the Company's investor relations program

and credit agency and NYSE relationships, as well as the Company's retirement committee. The Finance Committee charter also provides that the Finance Committee will make recommendations to the Board as to the finance aspects of corporate development strategies, such as the acquisition or disposition of business and capital assets.

Governance Committee

The Governance Committee is empowered, during intervals between Board meetings, to exercise all of the authority of the Board in the management of NW Holdings, except as otherwise may be provided by law. The Governance Committee, which serves as the nominating committee, makes recommendations to the Board regarding nominees for election to the Board and committee composition and structure, establishes criteria for Board and committee membership and policies that govern the Board's activities, reviews and recommends to the Board governance policies and structure, including the Corporate Governance Standards discussed below, evaluates Board and individual director performance and oversees director onboarding and continuing director education. It also considers Board succession plans and any questions of possible conflicts of interest of Board members and senior executives, as well as director independence, and, jointly with the OECC, considers CEO succession plans. The Governance Committee is also responsible for oversight of NW Holdings' integrated environmental, social and governance (ESG) matters.

Organization and Executive Compensation Committee

The Organization and Executive Compensation Committee is charged with oversight of the Company's human capital management. It oversees and reviews plans and preparations for talent succession, including, jointly with the Governance Committee, CEO succession; manages risks associated with the transfer of knowledge and expertise of the Company's workforce as aging employees retire; with input from the full Board, reviews the performance of the CEO; considers the performance of other executive officers; makes recommendations to the Board relating to executive compensation programs and benefit plans, as well as monitoring risks related to such plans and programs; and reviews and approves grants under equity incentive plans to eligible employees. The OECC is primarily responsible for ensuring that executive compensation programs and plans are consistent with corporate objectives and the OECC's compensation philosophy. In fulfilling its compensation risk oversight function, the OECC discusses with its outside consultant key compensation design elements of the Company's compensation plans and awards, including, but not limited to, whether those plans and awards properly incentivize executive performance, attract and promote retention of valuable executives, and disincent inappropriate risk-taking. In addition to those matters delegated to the OECC by the Board, the OECC also makes recommendations to the Board regarding Board compensation, and organization and executive succession matters, and annually evaluates executive and director stock ownership guidelines and levels. Each member of the OECC meets the criteria for a "non-employee director" under applicable SEC rules. For additional information regarding the OECC, see "Executive Compensation—Compensation Discussion and Analysis—Detailed Discussion and Analysis—Executive Compensation Roles and Responsibilities—OECC," below.

Public Affairs and Environmental Policy Committee

The Public Affairs and Environmental Policy Committee reviews and monitors NW Holdings' significant legislative and regulatory matters as well as NW Holdings' policies and practices relating to significant public and political issues, including charitable and political contributions and budgets, that may impact our business operations, financial performance or public image. It identifies and brings to the attention of the Board current and emerging political and societal trends. The Public Affairs and Environmental Policy Committee oversees our programs and policies relating to civic, human rights, charitable and community affairs, customer engagement, employee health and well-being, safety, diversity, equity and inclusion, equal employment opportunities, and any other significant corporate social responsibility matters. It also reviews and recommends to the Board appropriate environmental policies and informs the Board concerning our sustainability efforts and the status of our compliance with environmental regulations, as well as oversees our administrative and litigation matters related to our environmental liabilities. It annually reviews the Company's major environmental risks and the Company's plans for managing those risks. In carrying out its functions and responsibilities, the Public Affairs and Environmental Policy Committee considers reports received from NW Natural's Public Affairs and

Environmental Policy Committee regarding its matters of oversight. The Public Affairs and Environmental Policy Committee makes recommendations to the Board in an effort to ensure that we fulfill our objectives in a manner consistent with the responsibilities of good corporate citizenship and any of the Company's applicable environmental, human rights, or similar policies.

CORPORATE GOVERNANCE STANDARDS

The Board of Directors maintains Corporate Governance Standards that provide NW Holdings and its Board of Directors with guidelines designed to ensure business is conducted with the highest level of integrity. The Corporate Governance Standards are reviewed annually by the Governance Committee to determine if changes should be recommended to the Board of Directors. The Corporate Governance Standards are available at **www.nwnaturalholdings.com**, and in print to any shareholder who requests a copy. Among other matters, the Corporate Governance Standards include the following guidelines:

- Any nominee for director in an uncontested election who receives a greater number of votes "withheld" than votes "for" is required to tender his or her resignation for consideration by the Governance Committee. The Governance Committee will then determine whether to recommend acceptance of, and the Board of Directors will decide whether to accept, such resignation.
- Open and complete director access to NW Holdings' senior management, and Board and committee access to independent counsel, accountants or other advisors, as appropriate.
- Director orientation, continuing education and technology proficiency expectations to familiarize and enable directors to develop and maintain skills necessary or appropriate for the performance of their duties.
- The Board and committee structure and function, including expectations for meeting attendance and preparation.
- Annual CEO report to the Board regarding succession planning and talent management development.
- OECC recommendations regarding director compensation. Directors who are also employees of NW Holdings or NW Natural receive no additional compensation for their service as directors.
- Annually, the Board reviews and approves the strategic plan and one-year capital expenditure plans.
- The Board provides an opportunity for an executive session of non-management directors at the end of each Board meeting; the Chair of the Board presides at these executive sessions.

The Code of Ethics is available at **www.nwnaturalholdings.com.** Copies are also available in print to any shareholder who requests a copy. In addition, the Board of Directors has adopted procedures for the receipt, retention and treatment of concerns of our employees, shareholders, customers and other interested parties regarding accounting, financial reporting, internal controls, auditing or other matters. Concerns may be submitted in writing to the non-management directors of NW Holdings, c/o Corporate Secretary, 250 SW Taylor Street, Portland, OR 97204. Employees and other third parties may also submit concerns anonymously pursuant to the Integrity Hotline at 1-866-546-3696 or **www.NWNIntegrity.com** which is available through our external and internal websites. Our Chief Compliance Officer and Director of Internal Audit handle matters reported on the hotline and both regularly report to the Audit Committee regarding hotline activity and the Chief Compliance Officer regularly reports to the Audit Committee regarding the Business Integrity program. All employees are required to annually complete an online education program about our Code of Ethics, to ensure their understanding of our commitments.

The Corporate Secretary and Chief Compliance Officer will refer concerns that come directly before her relating to accounting, financial reporting, internal controls or auditing matters to the Chair of the Audit Committee. The Corporate Secretary also regularly reports to the Governance Committee regarding concerns submitted to the non-management directors of NW Holdings, if any.

COMPENSATION COMMITTEE INTERLOCKS AND INSIDER PARTICIPATION

There are no "Compensation Committee interlocks" or "insider participation," which SEC regulations or NYSE listing standards require to be disclosed in this Proxy Statement.

TRANSACTIONS WITH RELATED PERSONS

The Board adopted a written policy on the review of related person transactions (Related Party Transactions Policy), specifying certain transactions that involve directors, nominees, executive officers, significant shareholders and certain other related persons in which NW Holdings is or will be a participant, and that are of the type required to be reported as a related person transaction under Item 404(a) of SEC Regulation S-K, are subject to prior review by the Audit Committee. Pursuant to its charter, the Audit Committee is responsible for reviewing related person transactions.

Under the Related Party Transactions Policy, the Audit Committee reviews the material facts and circumstances of any transaction that may require reporting under Item 404(a) of SEC Regulation S-K to determine: (i) whether or not the transaction is on terms comparable to those that could be obtained in arm's length dealings with an unrelated third party; and (ii) whether or not the transaction is otherwise inconsistent with the interests of the Company and its shareholders. Upon review of a transaction, the Audit Committee may approve or disapprove entry into the transaction and direct the officers of the Company to take appropriate action. We are not aware of any transactions entered into during the last fiscal year that did not follow the procedures outlined in the policy.

Certain Legal Fees

Ms. Shawn M. Filippi, Vice President, Chief Compliance Officer and Corporate Secretary, is married to a Partner of Stoel Rives LLP. For many years prior to Ms. Filippi's employment at NW Natural, NW Natural engaged the law firm Stoel Rives LLP as outside legal counsel. The Company continues to engage Stoel Rives LLP from time to time, and intends to do so in the future. Total fees paid to Stoel Rives LLP in 2021 were approximately $938,199. Ms. Filippi's husband is not compensated by Stoel Rives LLP based on work performed for the Company and does not routinely work on Company matters. Furthermore, his interest is less than 1% of Stoel Rives LLP's partnership allocation, and the annual fees paid by the Company to Stoel Rives LLP in 2021 represented less than 1% of Stoel Rives LLP's annual gross revenues.

SECURITY OWNERSHIP OF COMMON STOCK OF CERTAIN BENEFICIAL OWNERS

The following table shows ownership of common stock of NW Holdings on December 31, 2021 by each person who, to our knowledge, owned beneficially more than 5% of NW Holdings common stock, as set forth in a Schedule 13G filed with the SEC:

Name and Address of Beneficial Owner	Amount and Nature of Beneficial Ownership	Percent of Class
BlackRock, Inc. 55 East 52nd Street New York, NY 10055	5,291,365[1]	17.20%
The Vanguard Group, Inc. 100 Vanguard Boulevard Malvern, PA 19355	3,600,903[2]	11.75%

(1) Based on information set forth in Schedule 13G/A filed January 27, 2022 with the SEC by BlackRock, Inc., the reporting person has sole dispositive power as to the total amount of beneficial ownership, and sole power to vote or direct the vote of 5,090,689 shares. The filing does not clarify the reporting person's power to vote with respect to the remaining 200,676 shares reported on the Schedule 13G/A.

(2) Based on information set forth in Schedule 13G/A filed February 10, 2022 with the SEC by The Vanguard Group, Inc., the reporting person reports that it has sole power to dispose of or to direct the disposition of 3,537,729 shares, shared power to dispose of or to direct the disposition of 63,174 shares, no sole power to vote or direct the vote of any shares and shared power to vote or direct the vote of 37,569 shares. The filing does not clarify the reporting person's power to vote with respect to the remaining 3,563,334 shares reported on the Schedule 13G/A.

BENEFICIAL OWNERSHIP OF COMMON STOCK BY DIRECTORS AND EXECUTIVE OFFICERS

Set forth below is certain information with respect to beneficial ownership of NW Holdings common stock as of December 31, 2021 by all current directors and nominees, each of the Named Executive Officers (NEOs) included in the Summary Compensation Table below and all directors, NEOs, and executive officers as a group. If a person holds shares in a deferred compensation account and those shares are not scheduled for distribution within 60 days of December 31, 2021 in the event they terminated their service on December 31, 2021, or they hold any other rights to acquire NW Holdings common stock that are not vested and will not vest by 60 days after December 31, 2021, such shares or rights are not included in the table, but are included in the footnotes below.

Name of Beneficial Owners	Number of Shares[1]	Percent of Outstanding Common Stock
Named Executive Officers		
David H. Anderson (also a director)	117,951[2]	*
Frank H. Burkhartsmeyer	16,693[3]	*
MardiLyn Saathoff	18,226[4]	*
Kimberly A. Heiting	12,627[5]	*
Justin B. Palfreyman	6,423[6]	*
Directors		
Timothy P. Boyle	23,989[7]	*
Monica Enand	465[8]	*
Karen Lee	979[9]	*
Hon. Dave McCurdy	1,638[10]	*
Sandra McDonough	—[11]	*
Nathan I. Partain	8,086[12]	*
Jane L. Peverett	23,423[13]	*
Kenneth Thrasher	7,872[14]	*
Malia H. Wasson	11,788[15]	*
Charles A. Wilhoite	1,273[16]	*
All directors and executive officers as a group (22 in number)	287,576[17]	.924%†

* The total for each individual is less than 1.0%.

† Based on the total number of shares beneficially owned on December 31, 2021 (including shares owned as of December 31, 2021, shares underlying the Restricted Stock Units (RSUs) under the Long Term Incentive Plan (LTIP) that vested within 60 days after December 31, 2021, and shares held in deferred compensation accounts that would be received by directors and officers within 60 days of December 31, 2021, if the director or officer ceased service with NW Holdings or NW Natural on that date).

(1) Unless otherwise indicated, beneficial ownership includes both sole voting power and sole investment power. Shares under the Directors Deferred Compensation Plan (DDCP) and the Deferred Compensation Plan for Directors and Executives (DCP) that would be received by directors, NEOs and all directors and executive officers as a group within 60 days of December 31, 2021, if the director, NEO, or all executive officers and directors as a group ceased service with NW Holdings or NW Natural on December 31, 2021 are included in the table. Unvested RSUs and the remaining shares under the DDCP and DCP are not included in the table as they represent under the terms of the plans rights to receive shares that would not be distributed until a date that is later than 60 days after December 31, 2021; such shares are more fully disclosed in the footnotes below with respect to each beneficial owner named in table.

(2) Includes 1,837 shares held directly by Mr. Anderson, 107,083 shares held jointly with Mr. Anderson's spouse, 7,217 shares issuable under RSUs with a performance threshold within 60 days, 710 shares credited to Mr. Anderson's account under the DCP, and 1,104 shares held indirectly under the Retirement K Savings Plan (401(k) Plan). Does not include 12,212 shares issuable under unvested RSUs with a performance threshold, and 15,836 shares credited to Mr. Anderson's account under the DCP.

(3) Includes 14,075 shares held directly by Mr. Burkhartsmeyer, and 2,618 shares issuable under RSUs with a performance threshold within 60 days. Does not include 4,703 shares issuable under unvested RSUs with a performance threshold.

(4) Includes 16,056 shares held directly by Ms. Saathoff, and 2,170 shares issuable under RSUs with a performance threshold within 60 days. Does not include 3,685 shares issuable under unvested RSUs with a performance threshold, and 9,734 shares credited to Ms. Saathoff's account under the DCP.

(5) Includes 9,577 shares held directly by Ms. Heiting, 1,781 shares issuable under RSUs with a performance threshold within 60 days, and 1,269 shares held indirectly under the 401(k) Plan. Does not include 3,165 shares issuable under unvested RSUs with a performance threshold, and 75 shares credited to Ms. Heiting's account under the DCP.
(6) Includes 5,224 shares held directly by Mr. Palfreyman, and 1,199 shares issuable under RSUs with a performance threshold within 60 days. Does not include 2,137 shares issuable under unvested RSUs with a performance threshold.
(7) Includes 1,969 shares held directly by Mr. Boyle as sole trustee and trustor of Mr. Boyle's revocable living trust, 21,512 shares credited to Mr. Boyle's account under the DCP, and 508 shares credited to Mr. Boyle's account under the DDCP. Does not include 4,575 shares credited to Mr. Boyle's account under the DDCP.
(8) Includes 465 shares credited to Ms. Enand's account under the DCP. Does not include 4,191 shares credited to Ms. Enand's account under the DCP.
(9) Includes 979 shares credited to Ms. Lee's account under the DCP. Does not include 801 shares credited to Ms. Lee's account under the DCP.
(10) Includes 376 shares held directly by Hon. McCurdy, and 1,262 shares credited to Hon. McCurdy's account under the DCP.
(11) Ms. McDonough was appointed to the Board on January 1, 2022 and has until January 1, 2027 to acquire at least $400,000 of NW Holdings stock pursuant to the Company's Corporate Governance Standards.
(12) Includes 7,000 shares held directly by Mr. Partain, and 1,086 shares credited to Mr. Partain's account under the DCP.
(13) Includes 523 shares held directly by Ms. Peverett, and 22,900 shares credited to Ms. Peverett's account under the DCP.
(14) Includes 3,500 shares held directly by Mr. Thrasher, 4,000 shares held jointly with Mr. Thrasher's spouse, 105 shares held by Mr. Thrasher's spouse, and 267 shares credited to Mr. Thrasher's account under the DCP. Does not include 1,079 shares credited to Mr. Thrasher's account under the DCP.
(15) Includes 6,877 shares held directly by Ms. Wasson, and 4,911 shares credited to Ms. Wasson's account under the DCP.
(16) Includes 253 shares held directly by Mr. Wilhoite and 1,020 shares credited to Mr. Wilhoite's account under the DCP. Does not include 9,197 shares credited to Mr. Wilhoite's account under the DCP.
(17) Includes 36,143 shares held by executive officers not named above, of which 14,247 shares are held directly by these executive officers, 635 shares are held jointly with spouse, 4,645 issuable under RSUs with a performance threshold within 60 days, 920 shares issuable under time-based RSUs within 60 days, and 15,697 shares which are held indirectly under the 401(k) Plan. Does not include 8,031 shares issuable under unvested RSUs with a performance threshold, 2,056 shares issuable under unvested time-based RSUs, and 14,741 shares credited to accounts of executive officers not named above under the DCP.

TOTAL OWNERSHIP OF COMMON STOCK BY DIRECTORS AND EXECUTIVE OFFICERS

Set forth below is the total number of shares of NW Holdings common stock owned, directly or indirectly, as of December 31, 2021 by all current directors and nominees, each of the NEOs included in the Summary Compensation Table below, and all directors, NEOs, and executive officers as a group. This supplemental table is provided to illustrate each specified individual's total ownership in NW Holdings, subject to unvested RSUs, and credited to deferred compensation plan accounts that are excluded from the above table entitled "Beneficial Ownership of Common Stock by Directors and Executive Officers," as referenced in the footnotes to that table. **Amounts included in this table are a different representation of the amounts included in the above table and footnotes entitled "Beneficial Ownership of Common Stock by Directors and Executive Officers," and are not in addition to amounts included in that table.**

Name of Owner	Total Number of Shares
Named Executive Officers	
David H. Anderson (also a director)	145,999
Frank H. Burkhartsmeyer	21,396
MardiLyn Saathoff	31,645
Kimberly A. Heiting	15,867
Justin B. Palfreyman	8,560
Directors	
Timothy P. Boyle	28,564
Monica Enand	4,656
Karen Lee	1,780
Hon. Dave McCurdy	1,638
Sandra McDonough	—
Nathan I. Partain	8,086
Jane L. Peverett	23,423
Kenneth Thrasher	8,951
Malia H. Wasson	11,788
Charles A. Wilhoite	10,470
All directors and officers as a group (22 in number)	383,793

EXECUTIVE COMPENSATION

REPORT OF ORGANIZATION AND EXECUTIVE COMPENSATION COMMITTEE

The Organization and Executive Compensation Committee (OECC) of the Board of Directors of NW Holdings is responsible for discharging the responsibilities of the Board of Directors relating to the compensation of executives by ensuring that the Chief Executive Officer and other senior executives are compensated appropriately and in a manner consistent with the stated compensation philosophy of NW Holdings and the requirements of the appropriate regulatory authorities.

The OECC is responsible for producing this report and for providing input and guidance to management in the preparation of the Compensation Discussion and Analysis following this report. In fulfilling its responsibilities, the OECC has reviewed and discussed the Compensation Discussion and Analysis with management.

In reliance on the review and discussion referred to above, the OECC recommended to the Board of Directors (and it has approved and directed) that the Compensation Discussion and Analysis be included in this Proxy Statement and incorporated by reference into NW Holdings' Annual Report on Form 10-K for the year ended December 31, 2021.

Respectfully submitted on February 24, 2022 by the Organization and Executive Compensation Committee of the Board of Directors:

Kenneth Thrasher, Chair
Nathan I. Partain
Hon. Dave McCurdy
Jane L. Peverett

COMPENSATION DISCUSSION AND ANALYSIS

This Compensation Discussion and Analysis (CD&A) describes our executive summary, elements and objectives of our executive compensation program for 2021, our pay for performance alignment, executive compensation roles and responsibilities, our compensation philosophy and practices, how executive compensation decisions are made, executive compensation plan components and design, and 2021 compensation results for each Named Executive Officer (NEO).

EXECUTIVE SUMMARY

Our executive compensation and corporate governance policies and programs are designed to closely tie executive pay to company performance, and drive long-term shareholder value without encouraging inappropriate risk-taking. To achieve our objectives, we have adopted the following policies and practices over time:

	WHAT WE DO:		WHAT WE DON'T DO:
✓	Use performance-based and stock-based compensation tools with metrics that correlate to shareholder value and emphasize controllable outcomes	×	No change-in-control severance gross-up payments
✓	Set annual and long-term incentive targets based on clearly disclosed and largely objective performance measures	×	No new participation in supplemental executive retirement plans for officers appointed after 2019
✓	Maintain a high percentage of total target direct executive compensation that is at risk, particularly for the CEO	×	No routine or excessive perquisites for executives
✓	Utilize tally sheets displaying executives' total compensation from all sources and the probability of attaining such compensation biennially to make compensation decisions and periodically to consider plan design changes	×	No encouraging of unnecessary or inappropriate risk-taking in incentive plan design or executive pay practices
✓	Incorporate clawback policy into annual and long-term cash and equity incentive awards for amounts inappropriately received, and preclude payout in cases of termination for cause	×	No routine use of non-change-in-control severance agreements and when used, use for terms not exceeding five years and with provisions for declining benefits over term
✓	Modified supplemental executive retirement plans to reduce benefits and expenses	×	No backdating or repricing of stock options
✓	Require meaningful share ownership by executives and directors, and limit ability of executives and directors to hedge or pledge Company securities	×	No dividends on unearned performance shares or RSUs
✓	Use double-trigger change-of-control severance provisions	×	No excessive incentive payments—incentive payments are capped to discourage inappropriate or unnecessary risk-taking
✓	Conduct annual say-on-pay advisory votes	×	No employment contracts
✓	Require minimum one-year service for vesting in performance shares and RSUs	×	No single-trigger performance share vesting on change in control

Elements and Objectives of our Executive Compensation Program for 2021

The following is a summary of our 2021 executive compensation program:

	Compensation Element	Objective(s)	Key Features
FIXED	Base Salaries	• Competitive compensation foundation • Recognize leadership responsibilities and position value	• Generally targeted at median range of applicable market data with adjustments for experience, relative position, skill marketability, retention concerns, and performance

AT-RISK	Executive Annual Incentive Plan	• Drive achievement of annual performance goals, recognizing that annual goals are essential to long-term performance	• Formula weighted:
			  • 70% Company Performance Factor (71.43% Net Income and 28.57% Operations)
			  • 30% Priority/Individual Goals (including a ROIC component)

	Long-Term Incentive Awards	• Drive key long-term business results that align with shareholder value over the long term • Align executives' interests with shareholders' interests • Reward executives for driving long-term performance • Encourage executive stock ownership	• Target allocation of 35% restricted stock units with performance threshold and 65% 3-year performance share awards • Formula for performance share awards is based on achieving ROIC threshold, 3-Year Cumulative EPS, and a +/- 25% modifier based on Relative Total Shareholder Return (TSR) • RSUs vest over 4 years, if ROE performance threshold is met • Double-trigger change-in-control vesting • 100% of long-term equity awards contingent on financial performance
BENEFITS	Executive Health, Welfare and Retirement Benefits	• Provide executives reasonable and competitive benefits commensurate with those provided to non-union employees • Encourage savings for retirement • Allow for attraction and retention of experienced mid-career hires • Mitigate the impact of limits on qualified plan benefits imposed by the Internal Revenue Code	• 401(k) Plan and non-qualified deferred compensation plans allow for certain matching contributions on deferrals • For executive officers employed prior to 2007, qualified and supplemental non-qualified pension benefits • Executive officers hired after 2006 are eligible for supplemental contributions to 401(k) Plan and non-qualified deferred compensation plan accounts
SEVERANCE	Change-In-Control Arrangements	• Ensure attention and dedication to performance without distraction in the circumstance of a potential change in control • Enables executives to maintain objectivity with respect to merger or acquisition offers	• Double trigger change-in-control severance agreements without any tax gross up

2021 Compensation Programs

Named Executive Officers

Our NEOs for fiscal year 2021 are all employed by NW Natural and are as follows:

Name	Title During 2021(1)
David H. Anderson	President and Chief Executive Officer
Frank H. Burkhartsmeyer	Senior Vice President and Chief Financial Officer
MardiLyn Saathoff	Senior Vice President, Regulation and General Counsel
Kimberly A. Heiting	Senior Vice President, Operations and Chief Marketing Officer
Justin B. Palfreyman	Vice President, Strategy & Business Development

(1) Titles listed are for NW Natural. Messrs. Anderson and Burkhartsmeyer and Ms. Saathoff hold the same respective offices at NW Holdings.

Allocation of Current vs. At-Risk Compensation

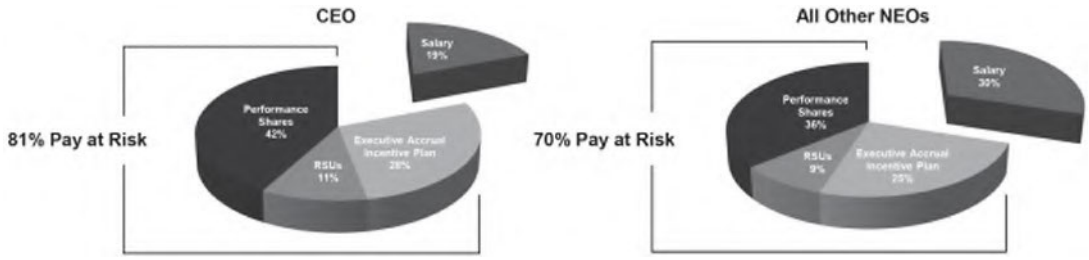
An executive's base salary is intended to reflect the value of the executive's position and provide a competitive compensation foundation. The remainder of total direct compensation is at risk and must be earned by achieving short-term and long-term performance goals, which are designed to drive shareholder value. The portion of total direct compensation designed to be paid in base salary versus pay at risk depends upon the executive's position and the ability of that position to influence outcomes, as well as market factors. The CEO has the largest portion of pay at risk. The following charts show the percentage represented by each of the four components of target total direct compensation in 2021 for the CEO and for the other NEOs, as targeted by the OECC, and show that pay at risk as a percentage of total target direct compensation was 72% for the CEO and an average of 58% for the other NEOs.

Target Total Direct Compensation by Type1

(1) Value of each RSU and Performance Share based on a grant value of $45.00, which was the price per share assumed by the OECC when making the grants.

The following charts show the percentage represented by each of the four components of total direct compensation in 2021 for the CEO and for the other NEOs that could have been achieved if the EAIP had paid out at the maximum of 175% of target and the performance shares had paid out at the maximum of 200%. Based on maximum potential payouts, pay at risk as a percentage of total direct compensation would be 81% for the CEO and an average of 70% for the other NEOs.

Maximum Total Direct Compensation by Type[1]



(1) Value of each RSU and Performance Share based on a grant value of $45.00, which was the price per share assumed by the OECC when making the grants.

Pay for Performance Alignment

The OECC strives to align executive compensation with long-term shareholder value. In reviewing the totality of the circumstances for the short- and long-term award periods ending December 31, 2021, the OECC determined that the Company's compensation programs and payments align NEOs with shareholders and appropriately drive long-term shareholder value, particularly given the challenging circumstances in which the Company was operating.

2021 Annual Incentive Performance

Specifically, the OECC considered the following strong financial performance metrics and advancement of key strategic and growth initiatives in 2021 when making decisions regarding the Executive Annual Incentive Program (EAIP):

- 2021 earnings per share (EPS) of $2.56, an 11% increase from 2020 EPS from continuing operations, and a return on invested capital (ROIC) of 6.16%
- Net income of $78.7 million, which exceeded target by almost $2 million
- One-year total shareholder return (TSR) of 10.31%
- Continued seamless delivery of essential utility services with a focus on safety, reliability and excellent customer service during widespread global, national and local economic and societal disruptions due to the COVID-19 pandemic and severe winter weather events nationally and in our service territory
- The addition of nearly 11,400 natural gas customers for an annual growth rate of 1.5% at December 31, 2021
- Investment of nearly $294 million in natural gas and water utility systems to support growth, enhance reliability and resiliency, and upgrade technology
- Continued assistance of our most vulnerable utility customers during the COVID-19 pandemic
- Scored second in the West among large utilities in the 2021 J.D. Power Gas Utility Residential Customer Satisfaction Study

- Successfully concluded the Washington general rate case providing a revenue requirement increase of $8 million over two years for the gas utility and filed a general rate case in Oregon requesting a revenue requirement to support continued growth and system investment in our gas utility
- Continued to advance our low carbon pathway and 2035 carbon savings goals, with substantial energy efficiency achievements and implementation of an emissions screening tool to prioritize purchases from lower-emitting producers
- Released Vision 2050: Destination Zero, an in-depth scenario analysis illustrating options for NW Natural to achieve carbon neutrality by 2050 for the energy services it provides to its customers
- Signed several agreements under Oregon Senate Bill 98 to purchase environmental credits from renewable natural gas for our utility customers
- Launched NW Natural Renewables, a competitive renewable energy business line and hired the president of this business to pursue opportunities and growth in renewable natural gas
- Continued to engage stakeholders in education of the role the natural gas system plays in supporting an affordable and equitable low carbon future
- Advanced our Journey to Zero safety program to further support and enhance employee safety
- Built on our long-standing commitment to diversity, equity and inclusion with additional initiatives in employee education and support, partner and supplier selection, and customer and community outreach
- Continued to effectively manage cleanup and cost recovery efforts related to NW Natural's legacy environmental liabilities with continued collection of revenues under regulatory mechanisms in Oregon and Washington
- Purchased an ownership stake in Avion Water Company, Inc., the largest investor-owned water utility in Oregon, and closed four other water and wastewater utility transactions in 2021, bringing total connections to approximately 33,000
- Signed an agreement for a water and wastewater utility business in Arizona that, once closed, will nearly double the size of the water utility business
- Published our second annual Environmental, Social and Governance (ESG) Report detailing all of the important work we have been doing in these areas
- Received ESG recognitions, including the Gold Shovel Standard certification for promoting safe excavation practices, designation as one of 31 utilities named as a 2021 Environmental Champion by Escalent, and recognition by the Oregonian as one of 15 "Top Workplaces" in Oregon and Southwest Washington in the large employers category
- Refinanced NW Natural's and NW Holdings' revolving credit facilities into new five-year sustainability-linked facilities with two, one-year extensions and the ability to increase the size of each facility with bankers' consent
- Successfully completed NW Natural's first sustainability mortgage bond offering under its sustainable financing framework, with an amount equivalent to the proceeds of the bond issuance being used to finance or refinance projects related to renewable energy, energy efficiency, green buildings, or our supplier diversity program
- Increased dividends to shareholders for the 66th consecutive year

These annual accomplishments, taken together, were reflected in payouts to the NEOs averaging 130% of target out of a possible 175% payout under the EAIP, due to a 122.65% achievement out of a possible 175% of the Net Income Factor, achievement of 106.04% out of a possible 175% of the Operations Factor, and an average achievement of 157.37% out of a possible 175% on the Priority/Individual Performance Factor for NEOs.

Long-Term Incentive Performance

The OECC considered the strong financial performance and alignment of NEO interests with shareholders when making decisions regarding long-term incentives. Specifically, the OECC noted that:

- Long-term incentives are delivered in Company stock to further align this component of compensation with shareholder interests, with the value of awards tracking Company stock value, and long-term incentives comprising up to 53% of total direct compensation for the CEO and up to an average of 45% of total direct compensation for other NEOs

- NEOs are required to maintain significant Company share ownership as set forth in the Corporate Governance Standards. As of December 31, 2021, the CEO holds Company stock valued in excess of 9x his annual salary, each Senior Vice President holds stock valued at over 2x their annual salaries, and each Vice President holds stock valued at over 1x his annual salary
- Management's accomplishment of a range of significant initiatives important to the long-term success of NW Holdings' business, alongside challenges throughout two years of pandemic conditions, and the extent to which the management team rose to each of those challenges
- The importance of leadership stability and retaining an experienced, engaged and focused executive team, particularly during unique and difficult times such as the pandemic and other challenges, as well as within the context of significant talent competition and the great resignation dynamics

Long-term incentive targets for NEOs are generally allocated 35% of value to RSUs and 65% of value to performance share awards.

RSUs

Incentive RSUs are performance-based and do not vest unless NW Holdings' adjusted return on common equity exceeds the average cost of long-term debt for the preceding five years. NW Holdings' adjusted return on equity for 2021 was 8.63%, which was greater than NW Holdings' average cost of long-term debt for the preceding five years, which was 4.82%, resulting in vesting of outstanding RSUs scheduled to vest in 2022 for 2021 performance.

Performance Share Awards

Performance Share Awards are performance-based and are not paid unless a ROIC threshold is met. Awards are based on achievement of a three-year cumulative EPS target as modified by the Company's three-year TSR relative to a peer group. The three-year average adjusted ROIC for the 2019-2021 performance share cycle was 6.16%, resulting in achievement of the performance threshold. Cumulative adjusted EPS for the three-year cycle was $7.09–$2.19 for 2019, $2.34 for 2020, and $2.56 for 2021—resulting in a 125.97% payout factor. However, the relative TSR modifier operated to reduce this award factor by 25% reflecting relative TSR performance over the three-year cycle.

Several factors contributed to the three-year TSR results. First, the commencement point for this cycle's TSR was a price equal to the average of the closing market prices of the stock for the period from October 1, 2018 to December 31, 2018, a period during which the Company saw historically high stock price levels. Second, while 2019 saw strong annual TSR of 25.45%, the onset of the pandemic in 2020 brought volatile stock markets and a -35.44% TSR. Despite utilities being one of the few sectors to maintain or exceed EPS estimates throughout 2020, they experienced one of the largest price to earnings contractions during that time, contradicting expectations of how the sector would perform during such circumstances. Even though the Company's 2021 annual TSR was 10.31%, the price contraction generally persisted through 2021 as utilities underperformed the broader market amidst rising interest rates, smaller cap utilities underperformed larger cap utilities, and electric utilities out-performed gas utilities. These macro trends coupled with NW Holdings' higher stock price to earnings relative to peers during the baseline period resulted in a lower-than-expected three-year TSR relative to the Company's peer group, despite strong financial and operational performance, EPS and dividend yield.

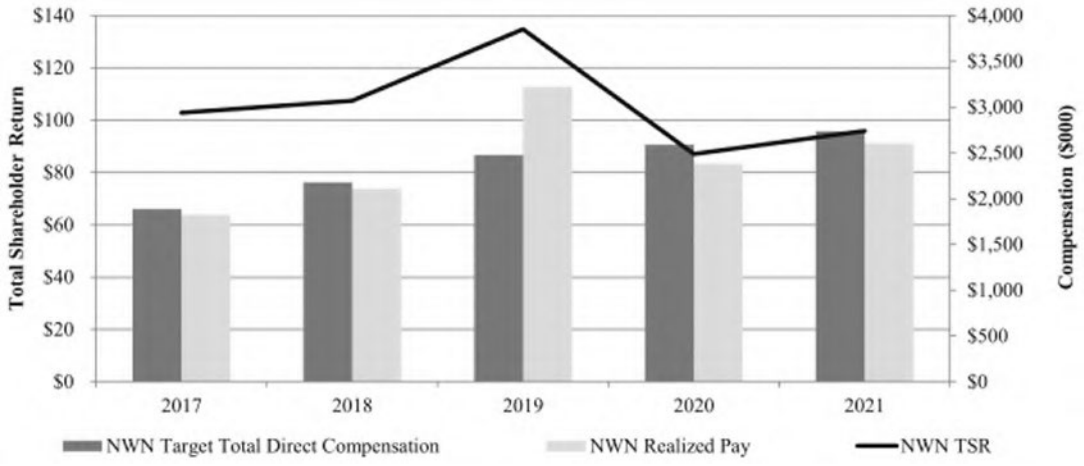
The OECC considered that the negative TSR results occurred in the first year of the pandemic, and that the remaining two years of the TSR cycle saw annual TSR of 25.45% and 10.31% on an annual basis, and considered whether to exercise discretion to adjust the TSR modifier. The OECC declined to make such an adjustment and instead determined that the compensation awarded aligns pay for performance by recognizing a disappointing three-year TSR and holding executives accountable by reducing long-term incentive payments earned by 25%. The OECC determined that the reduced performance share awards appropriately rewarded significant accomplishments, strong financial performance and results, and management's continued execution of long-term

strategic and growth plans, all while navigating difficult and unusual circumstances and while ensuring safe, reliable and efficient operations for the customers and communities we serve.

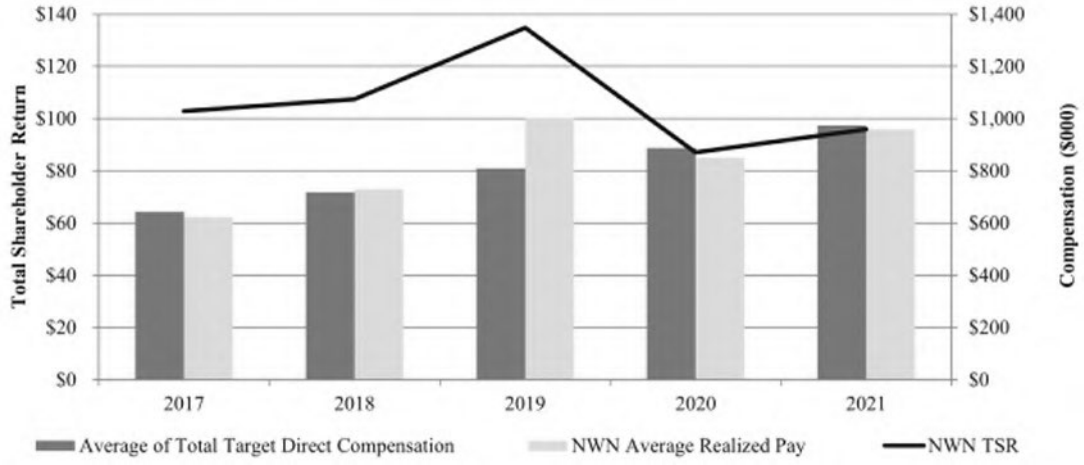
2021 Realized Compensation Relative to TSR

TSR is not the only measure of a company's financial performance and can be affected by stock market dynamics outside of managements' control despite strong company performance. Nevertheless, one metric reviewed by the OECC in aligning executive pay with Company performance is pay targeted and realized by executives' annual and long-term performance as measured by several metrics, including, but not limited to, TSR. The following charts display the target total direct compensation and actual realized compensation for the CEO and as an average for the other NEOs, respectively, for each of the last five years, along with the TSR over the five-year period, assuming investment of $100 at the beginning of 2017. This table is not a required disclosure. It is provided only to demonstrate one way in which the OECC reviews executive compensation, and should not be used as a substitute for required disclosure.

Chief Executive Officer[1,2,4]



Average of All Other Named Executive Officers[1,2,3,4]



(1) Amounts reflected as target total direct compensation in this table include the following amounts paid for the applicable year: (1) salary for the applicable year; (2) EAIP payment target for the applicable year; (3) the target value of the performance share award granted in the applicable year; and (4) the value of RSUs with performance threshold awarded in the particular year. The amounts reflected as target total direct compensation in this table do not include the following amounts for the year indicated: (a) the aggregate change in the actuarial present value of the NEOs' accumulated benefits under all defined benefit pension plans; (b) above-market interest credited to the non-qualified deferred compensation plan accounts of the NEOs, if any; (c) employer matching contributions to qualified defined contribution plan; (d) matching contributions under non-qualified deferred compensation plans, if any; and (e) any additional payments or de minimis amounts.
(2) Amounts reflected as realized compensation are calculated in the same manner as realized compensation amounts set forth in the Realized Compensation Table. See "Realized Compensation Table" below.
(3) For each year, represents the average compensation of persons who were NEOs, other than the CEO, for that year. For 2017, Mr. Brody Wilson served as interim CFO for the period prior to Mr. Burkhartsmeyer's appointment in May 2017. For 2017, reflects a blended amount for Messrs. Burkhartsmeyer's and Wilson's salary, EAIP, RSUs and performance shares for that portion of the year they were CFO.
(4) Reflects total shareholder return for NW Natural for year 2017 and NW Holdings for years 2018-2021.

Results of 2021 Shareholder Advisory Vote on Executive Compensation

At the Annual Meeting of Shareholders held May 27, 2021, approximately 98% of the shareholder votes cast on the resolution approving the compensation of the NEOs, without regard to abstentions as provided under Oregon law, were cast in favor of the resolution. Counting abstentions as a vote against, approximately 97% of the shareholder votes were cast in favor of the resolution. The OECC considered the level of support indicated by that vote as reflecting favorably on our executive compensation system and determined that no changes in response to the vote were needed.

DETAILED DISCUSSION AND ANALYSIS

Executive Compensation Roles and Responsibilities

OECC. The OECC is responsible for, among other matters, reviewing the performance of the CEO, making recommendations to the Board relating to executive compensation programs and benefit plans, and monitoring risk related to such programs and plans. The Board of Directors has delegated to the OECC its full authority to grant equity awards under the terms of the LTIP and to approve all aspects of executive officer compensation other than cash compensation for the CEO.

The OECC strives to utilize best practices in executing its executive compensation responsibilities. Among other practices, the OECC:

- annually conducts a review of all executive compensation plans to ensure they provide the type and form of incentives that align with the OECC's Total Compensation Philosophy centered on pay for performance;
- generally biennially reviews a total remuneration analysis for all executive officers;
- reviews and provides input on goals prior to inclusion in executive compensation plans;
- reviews assessments of accomplishment of goals prior to determining incentive compensation;
- conducts CEO's mid-year and annual review to incorporate full Board feedback in the evaluation process;
- periodically reviews performance of its expert executive compensation consultant and drives compensation consultant selection process approximately every five years; and
- annually considers whether compensation policies and practices create risks that are reasonably likely to have a material adverse effect.

The OECC also reviews, with the CEO and the Vice President, Chief Human Resources and Diversity Officer, organizational structures and recommends to the Board succession planning for executive positions at least annually. The OECC actively engages with management to find, engage and retain the executive talent necessary to drive the future success of our businesses. In addition, the OECC makes recommendations to the Board regarding Board compensation, and annually reviews executive and director stock ownership guidelines and levels.

Use of Management by the OECC. Management provides support to the OECC to facilitate executive compensation decisions, including working with the compensation consultant and legal counsel on plan design changes, preparing reports and materials, communicating with outside advisors, administering plans on a day-to-day basis with oversight by the OECC, and implementing the Board's and OECC's decisions. The Vice President, Chief Human Resources and Diversity Officer is the primary management contact for the OECC. The CEO makes recommendations to the OECC regarding plan design, salary increases, incentive awards and other executive compensation decisions for executives other than himself.

Use of Consultants by the OECC. For 2021 compensation decisions, the OECC engaged Pay Governance, an independent compensation consulting firm (Consultant), to assist in the evaluation of the competitiveness of our executive compensation programs and to provide overall guidance to the OECC in the design and operation of these programs. The Consultant reports directly to the OECC Chair, and the Chair reviews all invoices submitted by the Consultant. The OECC periodically reviews the performance, and assesses the independence, of the Consultant. At the direction and under the guidance of the OECC Chair, the Consultant provides data and analysis that is used by both management and the OECC to develop recommendations for executive compensation programs to submit to the OECC for its consideration. Among other matters, the Consultant provides advice regarding:

- the inclusion of compensation program elements;
- the design and operation of the executive incentive plans;
- policies for allocating between long-term, short-term and currently paid compensation;
- policies for allocating between cash and equity compensation, and among the different forms of equity compensation; and
- the basis for allocating to each of the two primary types of long-term compensation award opportunities.

The OECC reviews the engagement of its Consultant periodically, and as part of that process, reviews a summary of all services provided to NW Holdings by the Consultant, the percentage of the total fees paid by NW Holdings in relation to the total revenues of Consultant, any business or personal relationships the Consultant may have with any member of the OECC or any executive officer of NW Holdings, NW Holdings stock owned by the Consultant or any member of Consultant working on the NW Holdings account, and internal policies and procedures of the Consultant in place to maintain the objectivity, independence and separation between compensation consulting and investment advisory services, including, but not limited to Consultant's code of business conduct requirement that all the Consultant's associates must report any potential conflicts of interest. Pay Governance does not provide any services to NW Holdings other than executive compensation consulting.

OECC Compensation Philosophy and Practices

The OECC uses its Executive Total Remuneration Philosophy and Guiding Principles centered on pay for performance to guide its executive compensation decisions. Each year, the OECC reviews and adjusts, if necessary, its Remuneration Philosophy. The guiding principles of this philosophy are to design executive compensation programs that:

- attract, retain and motivate talented and qualified executives with competitive total remuneration;
- motivate high performance by linking a significant portion of pay directly to relevant company performance;
- align executives' interests with those of NW Holdings' shareholders by: (i) requiring meaningful stock ownership, and (ii) providing a significant component of compensation based on attainment of key financial and stock performance measures;
- pay for the right results by appropriately balancing short- and long-term incentive measures;
- motivate appropriate risk-taking to achieve designated objectives, but disincent inappropriate risk-taking; and
- correctly balance compensation that is attractive to executives, affordable to the relevant company, proportional to the executive's contribution, aligned with shareholder interests and fair to shareholders and employees.

How Compensation Decisions Are Made

Guided by its Remuneration Philosophy and Company performance, the OECC generally targets each component of executive compensation near the applicable market median range for an executive's position. However, the OECC makes compensation decisions by considering a number of other factors, all of which inform, but none of which dictate, the OECC's decisions. Our executive compensation programs are sufficiently flexible to allow pay to vary by individual position if warranted by other factors, including the following:

- the executive's experience, contribution, relative position and level of responsibility;
- the performance of the executive during the prior period;
- marketability of the executive's skills and retention concerns;
- the retention value of long-term incentives before vesting;
- the value of long-term incentives needed to ensure that executives are focused on absolute share price appreciation over the long-term;
- the extent to which the compensation package encourages meaningful stock ownership by each executive to align that executive's interests with that of the shareholders; and
- the extent to which a compensation package could encourage inappropriate or unnecessary risk-taking.

Competitive Market Position

One method the OECC uses to achieve its Compensation Philosophy is to target each component of compensation at or near the median range of the applicable competitive market data provided by the Consultant. The Consultant has identified the appropriate range for the median of each component of compensation as follows:

Compensation Type	Compensation Components Included	Range Above or Below 50th Percentile "Median Range"
Base Salary	Base Salary	+/-10%
Total Cash Compensation	Base Salary and Annual Incentive	+/-15%
Total Direct Compensation	Base Salary, Annual Incentive and Long-Term Incentives	+/-20%
Total Remuneration[1]	Total Direct Compensation and Welfare Benefits, and Deferred Compensation and Supplemental Retirement	+/-20%

(1) This component is reviewed approximately every two years.

Though targeted at the median range of the applicable competitive market, the program contains several variable components that allow compensation to exceed median competitive pay levels when the performance expectations of the OECC are exceeded, and pay less than median competitive compensation when performance results do not meet those expectations.

We are likely to attract candidates for most of our executive positions from the energy service market, specifically from gas, electric, water or combination utility companies in the United States. At times general industry market information may also be considered for certain executive positions that can be found in any industry. In preparing their competitive market assessment each year, the Consultant evaluates the appropriate survey data comparisons. In 2020, the Consultant recommended, and the OECC approved for 2021, a peer group of 18 gas, electric, water and combination utilities with median annual revenues of $1.3 billion (identified in Exhibit A), and the Consultant provided compensation data from the most recent proxy statements of these peer companies. For 2021, the Consultant also presented a blend of two sets of survey data, for companies with less than $1 billion in revenues (identified in Exhibit B) and companies with between $1 billion and $3 billion in revenues (identified in Exhibit C), from the Willis Towers Watson (WTW), Energy Services Executive Compensation Database, 2020, and the WTW, General Industry Executive Compensation Database, 2020 for companies with between $500 million and $1 billion in revenue (identified in Exhibit D). Survey data is

formulated based on functional responsibilities of each NEO's position. The Consultant also used the American Gas Association Compensation Survey, 2020 as a reference (identified in Exhibit E). The Consultant selects the most appropriate market comparisons for each executive position and synthesizes that data to provide to the OECC for its review. At that time, the Consultant provides recommendations as to use of proxy data or relevant survey data, including circumstances when other data may be a more appropriate guide.

Base Salaries

The following table shows the salaries of the NEOs before and after salary adjustments went into effect on March 1, 2021, as well as the percentage increase of such adjustments compared to salary prior to March 1, 2021 and information regarding the median salary shown by market data provided by the Consultant.

				Market Data[1]	
Name	Salary Effective Prior to March 1, 2021	Salary Effective March 1, 2021	Percentage Increase	Median Salary of Market Data	Percent Above or (Below) Median of Market Data
David H. Anderson	$750,000	$775,000	3%	$798,000	(3)%
Frank H. Burkhartsmeyer	458,500	495,500	8%	544,000	(9)%
MardiLyn Saathoff	400,500	413,000	3%	456,000	(9)%
Kimberly A. Heiting	341,000	368,500	8%	410,000	(10)%
Justin B. Palfreyman	316,500	342,000	8%	363,000	(6)%

(1) The OECC determined to use peer proxy data for Messrs. Anderson, Burkhartsmeyer and Ms. Saathoff and energy survey data for Ms. Heiting and Mr. Palfreyman.

The OECC set salaries for the NEOs using peer proxy data, energy service company survey data, and general industry survey data as guides. The OECC considered each NEO's functional position and areas of responsibility and applied adjustments to Mr. Burkhartsmeyer's position comparator for additional responsibilities in information technology, the project management office, and purchasing; an adjustment to Mr. Palfreyman's position for his additional role as President of the Company's water subsidiaries; and an adjustment to Ms. Saathoff's position to reflect additional responsibilities of rates, regulatory affairs and security and facilities. After the application of these adjustments for additional areas of responsibilities, the salaries for all NEO's were set within the median range of the applicable market data.

The following discussion and analysis contains statements regarding individual and corporate performance measures, targets and goals. These measures, targets and goals are used for purposes of executive incentive compensation programs, and in some cases incentive compensation programs that are available to other employees in our businesses. These measures, targets and goals are disclosed in the limited context of our compensation programs and should not be understood to be statements of management's representations of NW Holdings' or NW Natural's financial performance for the periods covered. The results reported with respect to these incentive compensation programs are used specifically for executive incentive compensation programs, and NW Holdings and NW Natural caution investors not to apply these statements to other contexts. Furthermore, these prior results are not intended to be and are not indicative of either NW Holdings' or NW Natural's future financial performance.

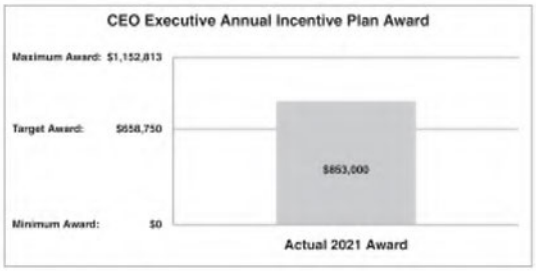
Executive Annual Incentive Plan

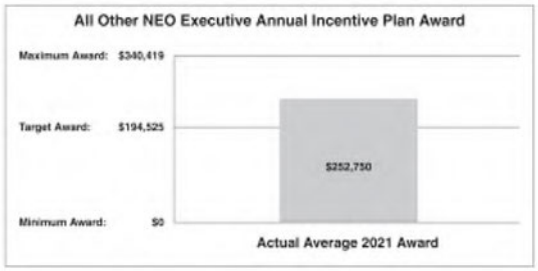
The EAIP ties executive pay to achievement of annual financial, operating and individual performance goals.[2] Participation in the EAIP, as of December 31, 2021, was limited to 12 participants, including the NEOs. Awards approved by the OECC are paid by March 15 of the following year, and are subject to "clawback" in the event of misconduct.

Target and actual awards in dollars and as a percent of base salary in effect on December 31, 2021, for 2021 incentive awards paid in 2022, are set forth in the table below and illustrated in the bar chart immediately following the table for NEOs. The below table also displays median target total cash compensation from market data and the percentage above or below that median of each NEO's total target cash compensation (target EAIP award plus base salary).

					Market Data	
Named Executive Officer	Target Award % of Base Salary[1]	Target Award Amount	Actual Award % of Base Salary	Actual Award Amount	Median Target Total Cash From Market Data	% Target is Above or (Below) Total Cash[2] Median from Market Data
David H. Anderson	85%	$658,750	110%	$853,000	$1,530,000	(6)%
Frank H. Burkhartsmeyer	55%	272,525	71%	352,000	818,000	(6)%
MardiLyn Saathoff	45%	185,850	59%	243,000	684,000	(12)%
Kimberly A. Heiting	45%	165,825	58%	215,000	688,000	(22)%
Justin B. Palfreyman	45%	153,900	59%	201,000	519,000	(4)%

(1) Maximum award amount is 175% of target award amount.
(2) Median target total cash is determined by adding annual incentive amounts to annual base salary amounts in effect on December 31, 2021.



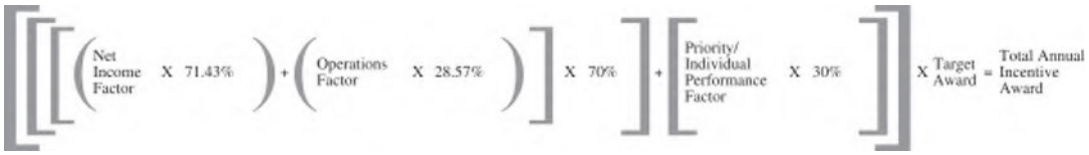


The OECC set the target amount payable under the EAIP to Mr. Anderson at the level that, when combined with base salary, placed his total target cash compensation near the 50th percentile of peer proxy data. The OECC considered each NEO's functional position and areas of responsibility and applied the same adjustments to Messrs. Burkhartsmeyer's and Palfreyman's and Ms. Saathoff's positions for target total cash compensation that were applied for purposes of base salary. After the application of these adjustments for additional areas of responsibilities, the total targeted cash compensation for Mr. Anderson, Mr. Burkhartsmeyer, Ms. Saathoff and Mr. Palfreyman were set within the median range of the applicable market data, and Ms. Heiting was set 7% below the median range of the applicable market data, reflecting her more recent assumption of operations responsibilities.

2 The financial goals and performance measures in our compensation plans are tied to the top-level consolidated enterprise, NW Holdings, the ultimate parent, and publicly traded, company. In recognition that NW Natural is currently NW Holdings' largest operating subsidiary, contributing the majority of NW Holdings' financial results, certain operational metrics in our compensation plans are tied to NW Natural's operational performance.

The OECC gives considerable attention to what performance measures are appropriate for the EAIP. The OECC has authority to authorize adjustments to performance measure calculations to take into account unanticipated circumstances or significant, non-recurring or unplanned impacts as the OECC determines is appropriate. The OECC retains this authority as a compensation plan risk mitigation strategy to avoid circumstances where EAIP goals could incent executive actions that would not be aligned with the best interests of our businesses or shareholders long-term, particularly during challenging times. As an additional safeguard to this ability to make adjustments to performance measure calculations, the OECC has authority to recommend an award increase up to a maximum of 175% of the target when goals are exceeded or to reduce an executive's performance-based award when goals are not achieved. The OECC did not exercise its discretion with respect to the 2021 EAIP.

The formula for the EAIP total incentive award is as follows:



The OECC sets the Net Income and Operations Factor goals, ranges and targets each year taking into account the current economic and regulatory environment, management's annual objectives, and the way in which those annual objectives fit within the larger strategic and growth goals for our businesses. Given the factors considered by the OECC, the ranges and targets may be higher or lower than in prior years.

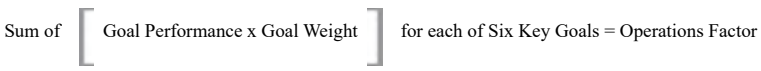
Net Income Factor. The Net Income Factor is used to align executives' interests with shareholders' interests and in recognition of the importance earnings have in influencing our future stock price. Actual adjusted net income results are interpolated to determine the corresponding performance factor, up to a maximum of 175%. For 2021, Net Income Factor levels were set 6.8% higher than 2020 and were:

Minimum (50%)	Target (100%)	Maximum (175%)
$69,334,200	$77,038,000	$82,430,660 or Greater

Amounts less than $69,334,200 result in a 0% payout factor.

NW Holdings net income for 2021, as adjusted, was $78,666,374, resulting in a Net Income Factor equal to 122.65%.

Operations Factor. NW Natural operating goals of significant importance to public and employee safety as well as the enhancement of our overall profitability and productivity were selected by the OECC to comprise the Operations Factor. These operating goals are chosen because they are substantially aligned with the incentive programs for all non-bargaining unit NW Natural employees. While each goal can contribute a goal rating between 0 and 200% multiplied by the assigned goal weight based on actual results, the aggregate of the Operations Factor is limited to a maximum of 175%. Actual results are interpolated to determine the performance factor for each goal. The Operations Factor was determined using the following formula:



A summary of the operating goals for 2021, the weighting of each goal to the overall factor, and the 2021 goal performance rating achieved is set forth in the following table:

Key Goals	Goal Description	Goal Performance Range (0%–200%)	Target (100%) Performance	Goal Weight in Operations Factor	2021 Goal Rating Achieved
Customer Satisfaction—Overall	Customer ratings of 9-10 for overall customer service	67.50% – 75.50%	71.50%	16.667%	200.00%
Customer Satisfaction—Staff Interaction	Customer contact ratings of 9-10 for customer service representative or service technician interactions	81.00% – 89.00%	85.00%	16.667%	200.00%
Market Share and Growth	Total new meter sets	11,179 – 14,204	13,726	16.667%	111.27%
Public Safety—Damages	Percentage of damage calls with response times of less than 45 minutes	92.09% – 94.09%	93.09%	16.667%	—%
Public Safety—Odor Response	Percent of odor calls with response times of less than 45 minutes	82.61% – 86.61%	84.61%	16.667%	—%
Employee Safety (Each factor weighted 50%) *This factor will be 0 in the event of an on the job fatality due to a preventable safety incident.*	DART Rate—Days Away Restricted Time	3.39 – 2.40	2.83		
	PMVC—Number of Preventable Motor Vehicle Collision	40 – 28	34	16.667%	125.00%

The public safety damage and odor response goals were designed to be aggressive in line with industry leadership. The actual percent of damage calls and odor calls with response times of less than 45 minutes for 2021 was 91.07% and 81.92%, respectively. Results fell slightly below each goal's performance range and were affected by several factors including an ice and snowstorm in February 2021 that affected drive times and staffing absences due to COVID-19 illness. Our operating performance in 2021 resulted in an Operations Factor of 106.04%.

Priority/Individual Performance Factor. 30% of each NEO's annual incentive target award is based on the Priority/Individual Performance Factor determined by individual performance goals, which include some "stretch" goals. In the case of the CEO, individual goals are determined by the OECC in consultation with the CEO. Whether the CEO has attained his goals is determined largely based on the OECC's assessment, with input from the full Board, of the CEO's performance. The other NEOs' individual performance goals align with the CEO's goals and support our strategic plans. The 2021 priority goals from which executives derive their Individual Performance Factors included, among other goals:

- successful execution of our core utility strategic plan at NW Natural;
- advancement of our low carbon pathway and 2035 carbon savings goals and assessment of further decarbonization opportunities, including the development of possible scenarios toward carbon neutrality by 2050 for energy services provided to customers;
- educate stakeholders with respect to the important role of natural gas in a low-carbon future;
- execute on NW Natural's RNG strategy to further our efforts to convert what goes through NW Natural's pipes to renewable energy;
- reinforce the Journey to Zero employee safety program and achieve improved results in the metrics of reportable injuries, days away and restricted time, severity rate, preventable collisions, and "good catch"/"near miss" reporting, continuing to tie manager compensation to employee safety results;
- enhance public safety and customer reliability by completing specified distribution system and storage projects, implement damage prevention improvements, and continue to execute on a comprehensive resilience strategy to support our communities;
- advance cleanup and cost recovery activities related to NW Natural's legacy environmental sites;
- effective management, remediation of, and recovery of costs related to certain NW Natural environmental sites;

- successfully optimize real property assets and execute actions to enhance physical security;
- advancement of key information technology initiatives, including an upgrade of NW Natural's enterprise resource planning platform and advancement of cybersecurity posture and maturity;
- implementation of enhancements to disclosures and communications to convey ESG achievements to stakeholders;
- development of plans and policies to attract and retain employees across a diverse spectrum and be the employer of choice;
- achievement of constructive regulatory objectives, including resolution of NW Natural's Washington general rate case that meets overall financial and strategic objectives and preparation of NW Natural's Oregon rate case;
- successfully execute on our water sector growth objectives and other business and strategic development activities;
- complete transition of Gill Ranch gas storage facility following 2020 sale;
- effectively integrate and operate water companies and execute on a long-term regulatory approach for acquired water sector businesses;
- continued improvement of customer service, facilities, and system capacity and reliability;
- continued advancement of strong employee, customer, and system safety, emergency response, and business continuity programs;
- sustained strong employee engagement, and strong and effective succession planning and diversity programs;
- achievement of overall customer satisfaction, profitability, growth and productivity targets;
- enhancement of customer experience to meet evolving customer expectations, and advancement of efficiency and resiliency of customer facing systems; and
- achievement of EPS, ROIC, earnings before interest, taxes, depreciation and amortization (EBITDA) and operations and maintenance and capital budget goals.

In addition to the above shared executive officer goals, Mr. Anderson identified 2021 CEO performance goals which included achieving additional financial performance goals, advancing certain NW Natural utility business opportunities and initiatives, achieving certain strategies related to our non-utility business and other business development activities, advancing the water sector growth strategy, and continued strengthening of alignment, development, and succession planning activities of the executive management team.

The CEO evaluated the 2021 individual performance of each NEO on a scale from 0 to 175%, based on priority/strategic goals specifically identified for each NEO. A rating of 100% indicates goals, including a particular "stretch" goal, were met, while ratings between 100 and 175% indicate extraordinary performance or achievement of multiple "stretch" goals. The OECC, with input from the full Board, uses this same method of assessment to establish the year-end performance rating for the CEO. The OECC determined that executives had met or exceeded their goals and assigned a rating of 156.2% for Mr. Anderson's individual performance. Performance of the other NEOs ranged from 155.2% to 159.6%.

Together with the Net Income Factor of 122.65% and Operations Factor of 106.04%, the priority/individual performance of the NEOs resulted in an overall average payout under the EAIP of 130% of target.

Long-Term Incentives

In 2021, the long-term incentive portion of our executive compensation program consisted of two components: RSUs with performance threshold and performance shares. For purposes of valuing awards, we define the expected value of each RSU and share of performance share awards as the estimated market price of NW Holdings common stock near the grant date. The OECC targeted an allocation of the expected value of long-term incentives for 2021 at approximately 35% RSUs with a performance threshold and 65% performance share awards. The OECC believes the allocation between RSUs with a performance threshold and performance shares provides a balanced performance focus for executives.

The OECC determined that, given the variability in long-term incentive plan design and weighting across industries, and across companies of various size within industries, the most appropriate guide for targeted long-term incentive opportunities was the same market data provided by the Consultant that was selected for salary decisions. The expected value of long-term incentives granted to the NEOs in 2021 are displayed in the below table.

		RSUs with Performance Threshold		Performance Shares		Market Data Long-Term Incentives	
Name	Expected Value of Long-Term Incentives (LTI)	Percent of Total Expected LTI Value	Number of RSUs with Performance Threshold Granted	Percent of Total Expected LTI Value	Target Number of Performance Shares	Median Value of Long-Term Incentives of Market Data	Percent Expected Value Above or (Below) Median of Market Data
David H. Anderson	$1,300,140	35%	10,112	65%	18,780	$1,466,000	(11)%
Frank H. Burkhartsmeyer	500,040	35%	3,892	65%	7,220	500,000	—%
MardiLyn Saathoff	400,140	35%	3,112	65%	5,780	523,000	(23)%
Kimberly A. Heiting	350,055	35%	2,724	65%	5,055	304,000	15%
Justin B. Palfreyman	250,110	35%	1,948	65%	3,610	287,000	(13)%

Performance Shares. The first component of our executives' long-term compensation program is provided through performance shares under our LTIP. All of the NEOs participate in the performance share program. The agreement for performance shares "claws back" inflated payouts due to misconduct.

Performance share awards are determined by multiplying the targeted performance share award by a Performance Share Factor. For the 2021-2023 performance cycle (and 2020-2022 and 2019-2021 performance cycles), Performance Share awards are determined as follows:

ROIC Performance Threshold. A three-year average ROIC threshold was established to focus executives on long-term return on invested capital, given the amount of capital that is deployed in utility operations. ROIC for each year in the performance period is defined as (i) NW Holdings' net income for the year before interest income and expense, as adjusted pursuant to OECC discretion, divided by (ii) NW Holdings' adjusted average long-term capital consisting of the average of NW Holdings' opening and closing shareholders' equity plus long-term debt for the year. The average ROIC is then the average of the adjusted ROICs achieved in each of the three years of the performance cycle. In order for performance share awards to be paid, the ROIC threshold must be satisfied. For performance share awards made in 2021, the threshold is 4.11%. For performance share awards made in 2020, the threshold is 4.40%. For performance share awards made in 2019, the threshold is 4.41%. The Performance Share Factor is determined by the following formula once the ROIC threshold is met:

$$\left[\left[\text{3-Year Cumulative EPS Factor x 100\%}\right] \times \text{Relative 3-Year TSR Modifier +/- 25\%}\right] = \text{Performance Share Factor}$$

3-Year Cumulative EPS Component. Three-Year Cumulative EPS was chosen to align executives' interests with shareholder interests and to drive a focus on earnings over the three-year period. For this purpose, EPS is defined as NW Holdings' diluted earnings per share as adjusted pursuant to OECC discretion. Performance is based on an EPS achievement percentage calculated by dividing NW Holdings' cumulative EPS over the three-year performance period by the sum of the EPS targets set by the OECC during each of the three years in the performance period. The OECC determined to set EPS targets on an annual basis in February of each year of the cycle to take into consideration uncertain timing and investments in water businesses and other business

expansion activities, and thereby better align the EPS component target with the OECC's intentions. The EPS payout factor is based on cumulative EPS achievement percentage as follows:

Cumulative EPS Achievement Percentage	EPS Payout Factor
less than 93%	0%
93%	40%
100%	100%
105% or more	185%

3-Year Relative Total Shareholder Return (TSR) Modifier. Relative TSR was chosen because it aligns executives' interests with shareholders, as this is the amount a shareholder might receive from ownership in NW Holdings. Relative TSR measures the change in share price, assuming dividends are reinvested over the three-year period, using the three-month average daily closing price immediately prior to the start of the performance period and prior to the end of the performance period. The Relative TSR peer group for the 2021-2023 performance cycle consists of a designated peer group of twelve natural gas local distribution companies and gas/electric utilities that continue to have publicly-traded common stock through December 31, 2023, excluding any peer company that is party to a signed acquisition agreement pursuant to which the stock or substantially all of the assets of the peer company will be acquired by a third party. The Relative TSR peer group for the 2021-2023 performance cycle was selected by the OECC in consultation with the Consultant based on their comparable market capitalization, notable gas utility operations and strong trading correlations with NW Holdings, and consists of the companies set forth on Exhibit F. The Relative TSR peer group for the 2020-2022 and 2019-2021 performance cycles consists of all companies that were components of the Russell 2500 Utilities Index on October 1 of the calendar year immediately preceding the performance period and that continue to be through the performance period, excluding any peer company that is party to a signed acquisition agreement pursuant to which the stock or substantially all of the assets of the peer company will be acquired by a third party.

Relative TSR modifier levels are based on the percentile rank of our TSR as compared to the TSR peer group and are as follows:

Relative TSR Percentile Rank	Relative TSR Modifier
less than 25%	75%
25% to 75%	100%
more than 75%	125%

For the same reasons the OECC retained discretion under the EAIP to adjust for certain extraordinary, non-recurring or unplanned impacts as the OECC determines is appropriate, the OECC designed the ROIC performance threshold and EPS component of the performance share awards to permit the OECC to approve adjustments to take into account unanticipated circumstances or significant non-recurring or unplanned events, including but not limited to adjustments to eliminate the impact of changes in accounting principles, gain or loss on the sale of a business, impairments, tax impacts or tax rate changes.

2019-2021 Performance Share Results. The Performance Share Factor for this period resulted in 94.48% of target, or 47.24% of a possible 200% total opportunity. Minimum, target, maximum and actual share awards for the 2019-2021 performance share awards are set forth in the table below.

Named Executive Officer	Minimum Share Award	Target Share Award	Maximum Share Award	Actual Share Award[1]
David H. Anderson	—	13,000	26,000	12,282
Frank H. Burkhartsmeyer	—	4,330	8,660	4,091
MardiLyn Saathoff	—	3,790	7,580	3,581
Kimberly A. Heiting	—	2,980	5,960	2,816
Justin B. Palfreyman	—	1,890	3,780	1,786

(1) Share award amounts do not include cash dividend amounts paid. For actual 2019-2021 award cash value, including cash dividend amounts, see the "Option Exercises and Stock Vested During 2021" table, below.

The value of the minimum, target and maximum awards as targeted by the OECC on the performance share award grant date along with the value of the performance share award at the end of the performance period is illustrated in the following bar chart:

(*) Target and maximum using a stock price of $60.00, which was the stock price assumed by the OECC on the date of grant, and actual award value using a stock price of $48.78, which was the closing price of NW Holdings common stock on December 31, 2021 (the last trading day of the performance period).

For the 2019-2021 performance share cycle, the OECC exercised its authority to authorize adjustments under the performance share awards. Namely, the OECC adjusted the EPS and ROIC components for 2020 to account for lower late fees and reconnections revenues in 2020 due to the COVID-19 moratorium on service disconnections. The OECC determined that management should be held harmless because the late fees were expected to be recovered in a future period under a regulatory deferral order. Combined, these "Performance Share Adjustments" increased cumulative EPS by $0.04 and increased Average ROIC by 0.02%. The OECC also considered and did not make adjustments for other items including an environmental remediation expense write-off associated with the Washington general rate case, incremental expense related to the 2020 wildfire event, expenses associated with the certain cybersecurity measures, customer revenue loss from lower gas usage and customer losses due to COVID-19 and savings achieved by management actions aimed at mitigating the detrimental financial impact of COVID-19.

ROIC Performance Threshold. For the 2019-2021 performance cycle, the three-year average ROIC threshold, which must be satisfied in order for the cycle to pay out, was set at 4.41%. The three-year average ROIC for the performance period was 6.16% after adjustments by the Performance Share Adjustments, on a non-GAAP basis, resulting in achievement of the ROIC performance threshold.

3-Year Cumulative EPS Component. For the 2019-2021 performance cycle, the cumulative EPS Payout Factor was determined based on the following:

Minimum (40%)	Target (100%)	Maximum (185%)
$6.50	$6.98	$7.34

EPS results between any two data points are interpolated. Amounts less than $6.50 result in a 0% payout factor.

3-Year Cumulative EPS for the 2019-2021 performance cycle was $7.05, and as adjusted by the Performance Share Adjustments, on a non-GAAP basis, was $7.09, resulting in a Cumulative EPS factor equal to 125.97%.

3-Year Relative Total Shareholder Return (TSR) Modifier. The Relative TSR peer group for the 2019-2021 performance cycle consisted of all companies that were components of the Russell 2500 Utilities Index on October 1, 2018 and that continue to have publicly-traded common stock through December 31, 2021. For the 2019-2021 performance cycle, several factors contributed to the three-year TSR results. First, the commencement point for this cycle's TSR was a price equal to the average of the closing market prices of the stock for the period from October 1, 2018 to December 31, 2018, a period during which the Company saw historically high stock price levels. Second, while 2019 saw strong annual TSR of 25.45%, the onset of the pandemic in 2020 brought volatile stock markets and a -35.44% TSR. Despite utilities being one of the few sectors to maintain or exceed EPS estimates throughout 2020, they experienced one of the largest price to earnings contractions during that time, contradicting expectations of how the sector would perform during such circumstances. Even though the Company's 2021 annual TSR was 10.31%, the price contraction generally persisted through 2021 as utilities underperformed the broader market amidst rising interest rates, smaller cap utilities underperformed larger cap utilities, and electric utilities out-performed gas utilities. These macro trends coupled with NW Holdings' higher stock price to earnings relative to peers during the baseline period resulted in a lower-than-expected three-year TSR relative to the Company's peer group, despite strong financial and operational performance, EPS and dividend yield. These factors combined resulted in a reduction of awards otherwise earned by 25% such that NEOs received only 75% of the award otherwise earned.

Restricted Stock Units with Performance Threshold. The second component of our executives' long-term compensation program is provided through Restricted Stock Units (RSUs) under our LTIP. At its meeting each February, the OECC grants performance contingent RSUs under the LTIP. This practice gives the OECC the benefit of considering the relative value of all components of each executive's total compensation. Off-cycle grants may occur when new RSUs are granted to attract new employees, to reward extraordinary performance, for retention purposes, or in recognition of promotions. Depending on the circumstances, these off-cycle grants may not include a performance threshold, and may include a vesting schedule that differs from the standard RSU with performance threshold vesting schedule. Mr. Burkhartsmeyer, as part of his initial attraction and retention package, received a grant of 6,016 RSUs without a performance threshold, which vested ratably on March 1 of each of 2018, 2019, 2020 and 2021. Similarly, Ms. Saathoff, in recognition of her promotion to Senior Vice President, Regulation and General Counsel, in July 2016, received a grant of 3,100 RSUs without a performance threshold which vested one-fourth on each of March 1, 2019 and 2020, and the remaining one-half on March 1, 2021. Mr. Palfreyman, as part of his initial attraction and retention package in September 2016, received a grant of 2,580 RSUs without a performance threshold, which vested one-fifth on each of March 1, 2018, 2019 and 2020, and two-fifths on March 1, 2021 subject to continued employment. All RSU agreements "claw back" payments that were achieved due to misconduct. As of December 31, 2021 all off-cycle RSUs awarded to NEOs were fully vested, and no NEO currently has an RSU agreement without a performance threshold.

An RSU obligates NW Holdings upon vesting to issue to the RSU holder one share of common stock plus a cash payment equal to the total amount of dividends paid per share between grant and vesting of the RSU. The performance threshold for the RSUs will be met on each vesting date if NW Holdings' return on common equity (ROE) for the preceding year is greater than NW Holdings' average cost of long-term debt for the preceding five years. No RSUs with a performance threshold will vest in a given year if the performance threshold is not met, and shares subject to vesting in that year will be forfeited. In general, if the performance threshold is met, RSUs

vest for 25% of the awarded shares on March 1 of each of the first four years after the grant date. For purposes of calculating ROE for awards made prior to 2018, earnings are adjusted to eliminate certain unusual items consisting of changes as a result of new accounting principles, any gain or loss on sale of a business, asset impairment charges that exceed $500,000 other than utility plant impairment, and earnings impacts of new taxes or tax rate changes. For purposes of calculating ROE for awards made in 2018 and subsequent years, the OECC may, at any time, approve adjustments to the calculation of ROE to take into account such unanticipated circumstance or significant, non-recurring or unplanned events as the OECC may determine in its sole discretion, and such adjustments may increase or decrease ROE. NW Holdings' return on common equity for 2021 was 8.63%, which was greater than NW Holdings' average cost of long-term debt for the preceding five years, which was 4.82%, resulting in the satisfaction of the performance threshold and vesting of outstanding RSUs scheduled to vest in 2022 for 2021 performance.

Perquisites

The OECC eliminated routine perquisites for executives effective January 1, 2008. The OECC acknowledges that certain benefits incidental to other business-related activities may continue, but the aggregate annual value of such benefits is not expected to regularly exceed $10,000 for any NEO. Examples of when perquisites may exceed $10,000 are when an individual is promoted to a more senior position, or as part of an initial hire package for a senior level executive.

Qualified and Non-Qualified Retirement (Defined Benefit) Plans

Mr. Anderson and Ms. Heiting participate in the NW Natural Retirement Plan for Bargaining Unit and Non-Bargaining Unit Employees (Retirement Plan), a qualified defined benefit pension plan, on the same terms as other salaried employees. Mr. Burkhartsmeyer, Ms. Saathoff and Mr. Palfreyman joined NW Natural after 2006, when the Retirement Plan was closed to new employees. NW Natural also maintains the Supplemental Executive Retirement Plan (SERP), a non-qualified supplemental retirement plan for certain executives participating in the Retirement Plan. This plan is more fully described below under the "Pension Benefits as of December 31, 2021" table and the related narrative discussion. As discussed there, in 2009 the OECC recommended and the Board approved amendments to this plan that moderate the growth in benefits payable under this plan, and the SERP was closed to new participants, effective July 31, 2019.

Qualified and Non-Qualified Deferred Compensation (Defined Contribution) Plans

NW Natural also maintains both tax-qualified and non-tax-qualified defined contribution plans in which the NEOs are eligible to participate. The NW Natural 401(k) Plan is a tax-qualified defined contribution plan and the NW Natural Deferred Compensation Plan for Directors and Executives is a non-tax-qualified deferred compensation plan. For further discussion of NEO participation in non-qualified deferred compensation plans in 2021, see the "Non-Qualified Deferred Compensation in 2021" table, below.

Change in Control/Severance Agreements

The Board of Directors considers an effective, highly-skilled and vital management team to be essential to protect and enhance the shareholder's best interests. As such, it recognizes that the uncertainty and questions a potential change in control could result in the departure or distraction of management personnel, or serve as a disincentive to management pursuing a change in control that is in the best interests of shareholders, to NW Holdings' and NW Natural's detriment. Accordingly, the Board has approved double-trigger severance agreements with all of the NEOs for changes of control of either NW Holdings or NW Natural. None of the agreements with officers of NW Natural include provisions for tax gross-up upon a triggering event. See "Potential Payments Upon Termination or Change in Control," below.

In general, the OECC prefers not to enter into severance agreements other than for change in control purposes. Accordingly, the OECC has established a guideline that severance benefits may only be provided following a termination without cause in the first five years of employment in a particular position or after a change in control. The benefit for termination without cause, absent a change in control, is reduced over the term of the agreement, which cannot exceed five years. The only such agreement outstanding is with Mr. Burkhartsmeyer,

which was entered into upon his appointment to the position of CFO. Mr. Burkhartsmeyer's agreement provides for the payment of a percentage of his annual salary if he is terminated without cause on or prior to May 17, 2022, with such percentage of salary declining in 20% increments annually from 100% if his employment were terminated without cause on or prior to May 17, 2018 to 20% of his salary if his employment is terminated without cause on or prior to May 17, 2022. In late 2016, the OECC approved a similar agreement of this nature with Mr. Anderson as the incoming Chief Executive Officer. This agreement provided that potential non-change-in-control severance payments would decline annually, and expired as of August 1, 2021.

Stock Ownership Guidelines

Our Corporate Governance Standards provide the following ownership guidelines for executive officers of NW Natural or NW Holdings, expressed as a multiple of each executive officer's base salary:

Position	Dollar Value of Stock Owned as Multiple of Base Salary
Chief Executive Officer and President	5x
Executive Vice President or Chief Operating Officer	3x
Senior Vice Presidents or NEOs	2x
Vice Presidents and all other Executive Officers	1x

The OECC annually reviews these guidelines and the progress made by executives against these objectives. Stock ownership for this purpose includes shares owned directly by the executive or immediate family members; shares credited to an executive's 401(k) Plan and non-qualified deferred compensation plan accounts; and unvested restricted stock units, restricted stock, and in the money stock options. The value of stock owned is determined using the closing price for NW Holdings common stock as of the last day of the year. Generally, stock ownership objectives should be attained within five years of appointment as an officer of NW Natural or NW Holdings or from promotion to a higher level ownership requirement. However, the OECC retains discretion to extend the time period within which ownership goals are reached. In February 2022, the OECC reviewed executive stock ownership requirements with the Compensation Consultant and recommended to the Board of Directors amendments to the Company's Corporate Governance Standards to increase the executive stock ownership requirements for the Chief Executive Officer from four times to five times the Chief Executive Officer's annual salary. The OECC also reviewed NEO progress towards stock ownership requirements and concluded all of the NEOs have achieved, or are making appropriate progress toward, stock ownership goals. Neither NW Holdings nor NW Natural have a policy that requires retention of stock acquired from equity compensation plans after vesting of shares, because the OECC and Board have concluded that the stock ownership requirements provide executives with a meaningful stake in the ownership of NW Holdings, and fully align executive officers' ownership interests with shareholders for the duration of the executive officers' service at NW Holdings or NW Natural.

Policy on Hedging and Pledging Company Securities

The Company has adopted a Policy on Hedging and Pledging of Securities which prohibits the directors and executive officers of the Company and its subsidiaries from engaging in any short sales, zero-cost collars, or forward sale contracts with respect to the Company's securities, or purchasing or selling puts, calls, options, or other derivatives securities based on the Company's securities. In addition, the Policy restricts the ability of directors and executive officers to pledge their ownership of Company securities in a non-recourse loan, failing to meet a margin call with respect to a margin account resulting in the sale of Company stock, or buying Company securities on non-recourse margin.

Regulatory, Tax and Accounting Considerations

Regulatory Treatment

The Company fully assesses the accounting and tax treatment of each form of compensation paid to the NEOs for both NW Holdings and the individual executive. This is particularly important in a regulated business where

NW Holdings' subsidiary, NW Natural, is allowed to recover costs of service in rates (salaries, qualified pensions and health and welfare benefit costs), while the majority of other elements of executive compensation, such as annual incentive awards, long-term equity awards and non-qualified retirement benefits, are typically shareholder expenses because the public utility commissions that regulate NW Natural view these expenses as more closely tied to shareholder objectives. However, our incentive compensation programs benefit customers by including performance incentives that:

- encourage efficient, safe and reliable service;
- encourage management of capital, operating, and maintenance costs, which help mitigate the need for future rate increases; and
- focus on customer satisfaction.

See "Executive Annual Incentive Plan—Operations Factor" above.

Actual amounts currently recovered in rates are based on amounts determined in our general rate cases approved by the OPUC in 2020 and by the Washington Utilities and Transportation Commission in 2021. The following table shows the current rate recovery treatment for categories of compensation expenses for various elements of our executive compensation program:

Executive Expenses Generally Recovered in Rates	Executive Expenses Generally Not Recovered in Rates
Salaries	Stock Options
Qualified pension plan benefits	Executive Annual Incentive Plan
Contributions related to Qualified Retirement K Savings Plan (401(k) Plan)	Interest accruals and make-up contributions related to Deferred Compensation Plan for Directors and Executives
Health and welfare benefits	Supplemental Executive Retirement Plan
	Change-in-control severance benefits
	Non-change-in-control severance benefits
	Long Term Incentive Plan
	Restricted Stock Units
	Performance Shares

Tax Considerations

Section 162(m) of the U.S. Internal Revenue Code of 1986, as amended, limits deductibility of compensation in excess of $1 million paid to our covered employees. Prior to the Tax Cut and Jobs Act, signed into law on December 22, 2017, certain exceptions to this limitation applied to performance-based compensation. The Tax Cut and Jobs Act eliminated this performance-based compensation exception going forward, but provided limited transition relief for compensation paid pursuant to a contract in effect as of November 2, 2017 that is not materially modified after such date. The Tax Cut and Jobs Act also expanded who a covered employee is under Section 162(m). Beginning with calendar year 2018, a covered employee under Section 162(m) is anyone who has ever been the Company's chief executive officer, chief financial officer or one of the three highest compensated officers in any calendar year after 2016. The American Rescue Plan Act of 2021 (ARPA), signed into law on March 11, 2021, expands the Section 162(m) limitation, on an annual basis beginning with calendar year 2027, to include an additional five of the highest-paid employees, other than the Company's chief executive officer, chief financial officer, or one of the three highest compensated officers currently covered by Section 162(m).

Although this tax deduction for performance-based compensation has been eliminated for awards after November 2, 2017, the OECC continues to believe that a strong link between pay and performance is critical to align executive and shareholder interests. The OECC will continue to ensure that a significant portion of pay for our executives is at risk and subject to the attainment of performance goals.

REALIZED COMPENSATION TABLE

The SEC's calculation of total compensation, as shown in the Summary Compensation Table set forth on page 48, includes several items that are driven by accounting and actuarial assumptions, which are not necessarily reflective of compensation actually realized by the NEOs in a particular year. To supplement the SEC-required disclosure, we have included the additional table below, which shows compensation actually realized by each NEO for each of the years shown.

Realized Compensation Table[1]

Name and Principal Position	Year	Realized Compensation[2]
David H. Anderson	2021	$2,603,816
President and Chief	2020	2,381,575
Executive Officer	2019	3,219,020[3]
Frank H. Burkhartsmeyer	2021	1,254,197
Senior Vice President and	2020	1,080,224
Chief Financial Officer	2019	1,202,779
MardiLyn Saathoff	2021	1,031,627
Senior Vice President,	2020	957,179
Regulation and General Counsel	2019	1,278,649[3]
Kimberly A. Heiting	2021	802,724[3]
Senior Vice President,	2020	704,990
Operations and Chief Marketing Officer	2019	778,063[3]
Justin B. Palfreyman	2021	745,405
Vice President, Strategy &	2020	656,453
Business Development	2019	752,681

(1) Amounts reported as realized compensation differ substantially from the amounts determined under SEC rules and reported as total compensation in the Summary Compensation Table. Realized compensation is not a substitute for total compensation. For more information on total compensation as calculated under SEC rules, refer to the narrative and notes accompanying the Summary Compensation Table set forth on page 48.

(2) Amounts reflected as realized compensation in this table include the following amounts paid for the applicable year: (1) salary earned in the applicable year; (2) EAIP payments earned in the applicable year; (3) the value of the performance share award for the performance period ending in the applicable year; (4) the value of RSUs (with a performance threshold or time-based) vested and paid during the applicable year; and (5) the value realized on exercise of stock options during the applicable year, if any. The amounts reflected as realized compensation in this table do not include the following amounts for the year indicated: (a) the value of performance share awards, RSUs or stock options granted but not yet vested and paid or exercised for service in the applicable year; (b) the aggregate change in the actuarial present value of the NEOs' accumulated benefits under all defined benefit pension plans; (c) above-market interest credited to the non-qualified deferred compensation plan accounts of the NEOs, if any; (d) employer matching contributions to qualified defined contribution plan; (e) matching contributions under non-qualified deferred compensation plans, if any; and (f) any additional payments or de minimis amounts.

(3) Amount includes compensation realized on the exercise of stock options that were granted in prior years of $376,631 for Mr. Anderson, $140,039 for Ms. Saathoff, and $3,881 in 2021 and $78,992 in 2019, respectively, for Ms. Heiting.

SUMMARY COMPENSATION TABLE

The following is a summary of our NEOs' compensation in 2019, 2020 and 2021. Only a portion of the executive compensation shown in this Summary Compensation Table is included for purposes of establishing regulatory rates charged to customers. Although most of our compensation programs are designed to promote shareholder objectives, our customers also directly benefit because many of the programs include performance incentives designed to improve service to our customers. For discussion regarding amounts excluded from rate recovery, see "Compensation Discussion and Analysis—Regulatory, Tax and Accounting Considerations—Regulatory Treatment," above.

Name and Principal Position	Year	Salary ($)	Bonus1 ($)	Stock Awards2 ($)	Non-Equity Incentive Plan Compen-sation1 ($)	Change in Pension Value and Non-Qualified Deferred Compensation Earnings3 ($)	All Other Compen-sation4 ($)	Total ($)
(a)	(b)	(c)	(d)	(e)	(g)	(h)	(i)	(j)
David H. Anderson	2021	$770,833	$309,288	$1,360,798	$543,712	$676,266	$98,457	$3,759,354
President and Chief Executive	2020	743,333	282,062	1,211,009	445,938	1,046,831	95,255	3,824,428
Officer	2019	705,833	241,267	1,235,800	514,733	1,474,910	83,234	4,255,777
Frank H. Burkhartsmeyer	2021	489,333	127,066	523,379	224,934	582	68,871	1,434,165
Senior Vice President and	2020	453,500	99,637	504,403	160,363	435	60,227	1,278,565
Chief Financial Officer	2019	425,917	82,258	411,903	174,742	107	51,932	1,146,859
MardiLyn Saathoff	2021	410,917	89,605	418,808	153,395	3,567	65,542	1,141,834
Senior Vice President, Regulation	2020	397,250	88,931	353,450	126,069	4,089	57,129	1,026,918
and General Counsel	2019	379,000	73,629	360,491	155,371	2,198	55,807	1,026,496
Kimberly A. Heiting	2021	363,917	78,133	366,391	136,867	143,314	17,367	1,105,989
Senior Vice President, Operations	2020	335,833	67,660	302,642	107,340	605,575	16,365	1,435,415
and Chief Marketing Officer	2019	308,333	60,582	283,501	126,418	497,487	25,688	1,302,009
Justin B. Palfreyman	2021	337,750	73,976	261,788	127,024	290	50,751	851,579
Vice President, Strategy &	2020	313,000	68,372	176,725	99,628	232	41,880	699,837
Business Development	2019	293,583	51,885	180,072	107,115	68	38,272	670,995

Column (f) was deleted as it is not applicable.

(1) The total bonus paid to each NEO under our EAIP for performance in 2021 is split between columns (d) and (g). Amounts constituting the discretionary portion of bonuses under the plan are the amounts listed as bonuses in column (d). Amounts constituting the performance-based, non-discretionary portion of bonuses under the plan are the amounts listed as non-equity incentive plan compensation in column (g).

(2) Amounts shown in column (e) represent the grant date fair value of performance share awards and RSUs granted in each year disregarding estimated forfeitures, determined under share-based compensation accounting guidance. The amount shown for RSUs is equal to the number of RSUs awarded multiplied by the closing market price of the common stock on the date of grant. The issuance of the shares under these awards is contingent upon meeting certain performance criteria, so the shares may or may not be earned. The performance shares are subject to an EPS target and a ROIC performance threshold, with the total payout subject to modification based on total shareholder return (TSR) performance which is a market modifier under share-based compensation accounting guidance. The performance shares contain a provision in which the EPS target will not be determined until the first quarter of each year during the award period and as such, there is not a mutual understanding of the key terms and the grant date will not occur until the final EPS target has been communicated with the participants in the first quarter of the final year of the performance period. Amounts included for the performance share awards represent the service inception date fair value per share multiplied by the target number of shares, which is the number of shares assumed to be issued based on the EPS performance condition. If the maximum number of shares issuable under the payout conditions had been used as the estimated number of shares, the total amounts in column (e) for 2020 and 2021 would have been $1,042,916 and $1,832,177 for Mr. Anderson; $434,142 and $704,383 for Mr. Burkhartsmeyer; $304,387 and $563,897 for Ms. Saathoff; $260,485 and $493,166 for Ms. Heiting; and $152,194 and $352,192 for Mr. Palfreyman.

(3) The amounts included in column (h) as the aggregate change in the actuarial present value of the NEOs' accumulated benefits under all defined benefit pension plans during 2021 were: an increase of $667,306 for Mr. Anderson and $141,931 for Ms. Heiting and $0 for each of Mr. Burkhartsmeyer, Ms. Saathoff and Mr. Palfreyman, who do not participate in a defined benefit plan. The 2021 amounts were calculated using a discount rate of 2.53%, which is 45 basis points higher than the discount rate used for 2020. The 2020 amounts were calculated using a discount rate of 2.08%, which is 90 basis points lower than the discount rate used for 2019. Amounts of above-market interest included in column (h) that were credited to the non-qualified deferred compensation plan accounts of the NEOs during 2021 were: $8,960 for Mr. Anderson, $582 for Mr. Burkhartsmeyer, $3,567 for Ms. Saathoff, $1,383 for Ms. Heiting, and $290 for

Mr. Palfreyman. For this purpose, interest credited is considered above-market to the extent such interest exceeds 120% of the average of the applicable long-term federal rates for the twelve months corresponding to the period for which market yield information is obtained to calculate interest crediting rates under the non-qualified deferred compensation plans.

(4) The amounts included in column (i) as matching contributions under the 401(k) Plan during 2021 were: $11,700 for each of Messrs. Anderson, Burkhartsmeyer and Palfreyman and Mses. Saathoff and Heiting. The amounts recorded as matching contributions under non-qualified deferred compensation plans during 2021 were: $60,194 for Mr. Anderson, $0 for each of Mr. Burkhartsmeyer, Ms. Saathoff, Ms. Heiting, and Mr. Palfreyman. The amounts recorded for dividend equivalents for restricted stock units with performance threshold that vested during 2021 were: $26,563 for Mr. Anderson, $19,412 for Mr. Burkhartsmeyer, $22,203 for Ms. Saathoff, $5,297 for Ms. Heiting, and $13,446 for Mr. Palfreyman. The amounts recorded for enhanced 401(k) contributions during 2021 were: $0 for Mr. Anderson and Ms. Heiting and $14,500 for each of Mr. Burkhartsmeyer, Ms. Saathoff and Mr. Palfreyman. The amounts recorded as enhanced contributions under non-qualified deferred compensation plans during 2021 were: $22,890 for Mr. Burkhartsmeyer, $16,770 for Ms. Saathoff and $10,734 for Mr. Palfreyman. Amounts in column (i) also include a $250 gift card plus $120 gross up expense for each of Messrs. Burkhartsmeyer and Palfreyman and Mses. Saathoff and Heiting.

CEO COMPENSATION AND EMPLOYEE COMPENSATION

As a result of rules under the Dodd-Frank Wall Street Reform and Consumer Protection Act, beginning with our 2018 proxy statement, the SEC requires disclosure of the ratio of CEO compensation, as calculated in the Summary Compensation Table, to the median compensation of all of the Company's employees other than the CEO. Mr. Anderson's 2021 compensation calculated for purposes of the Summary Compensation Table was $3,759,354. We estimate that the median annual compensation for all other employees of NW Holdings' subsidiaries, excluding Mr. Anderson, was $113,241 for 2021, calculated as though it were to be presented in the Summary Compensation Table. As a result, we estimate that Mr. Anderson's compensation was approximately 33 times that of the median annual compensation for all employees in 2021.

Our CEO to median employee pay ratio is a reasonable estimate calculated in a manner consistent with SEC requirements. We identified the median employee by examining the 2021 compensation for all individuals, excluding our CEO, who were employed by NW Holdings' subsidiaries on December 31, 2021. We included all employees, whether employed on a full-time, part-time, or seasonal basis. Pay elements that were included in 2021 compensation for each employee for purposes of identifying the median employee included salary or wages received in 2021; cash incentive bonuses received during 2021; the value of the performance share awards actually paid in 2021; and the value of RSUs vested and paid during 2021. Wages and salaries were annualized for employees who were not employed for the full year.

GRANTS OF PLAN-BASED AWARDS DURING 2021

The following table includes grants of annual incentive awards, performance share awards, and RSUs granted to our NEOs during 2021:

Name	Grant Date	Estimated Future Payouts Under Non-Equity Incentive Plan Awards[1]			Estimated Future Payouts Under Equity Incentive Plan Awards			Grant Date Fair Value of Equity Awards[4]
		Threshold ($)	Target ($)	Maximum ($)	Threshold (#)	Target (#)	Maximum (#)	($)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(l)
David H. Anderson		$—	$461,125	$806,969	—	—	—	$—
		—	—	—	5,634[2]	18,780[2]	37,560[2]	863,692
	2/24/2021	—	—	—	—	10,112[3]	—	497,106
Frank H. Burkhartsmeyer		—	190,768	333,843	—	—	—	—
		—	—	—	2,166[2]	7,220[2]	14,440[2]	332,048
	2/24/2021	—	—	—	—	3,892[3]	—	191,331
MardiLyn Saathoff		—	130,095	227,666	—	—	—	—
		—	—	—	1,734[2]	5,780[2]	11,560[2]	265,822
	2/24/2021	—	—	—	—	3,112[3]	—	152,986
Kimberly A. Heiting		—	116,078	203,136	—	—	—	—
		—	—	—	1,517[2]	5,055[2]	10,110[2]	232,479
	2/24/2021	—	—	—	—	2,724[3]	—	133,912
Justin B. Palfreyman		—	107,730	188,528	—	—	—	—
		—	—	—	1,083[2]	3,610[2]	7,220[2]	166,024
	2/24/2021	—	—	—	—	1,948[3]	—	95,764

Column (i), (j) and (k) were deleted as they are not applicable.

(1) Threshold level estimated payouts cannot be determined because the minimum performance level for payout under each component of the formula in the EAIP is interpolated down to a zero payout. See "Compensation Discussion and Analysis—2021 Compensation Programs—Executive Annual Incentive Plan," above, for a complete discussion of the terms of the awards. Amounts above include only the portion of the award subject to performance metrics, constituting 70% of the annual incentive opportunity. The remaining 30% of the annual incentive opportunity is awarded based on discretionary criteria and is reflected as a bonus in column (d) of the Summary Compensation Table. The actual non-equity incentive plan portion of the awards earned in 2021 and paid in 2022 are reflected in column (g) of the Summary Compensation Table.

(2) Share amounts represent potential performance share awards granted pursuant to the terms of the LTIP. See "Compensation Discussion and Analysis—2021 Compensation Programs—Long-Term Incentives—Performance Shares," above, for a complete discussion of the terms of the awards. Share amounts do not include an estimate of an additional $6.2850 per share dividend equivalent also payable pursuant to the terms of the awards. Threshold level estimated future payouts assume the minimum award payable other than no payout.

(3) Share amounts represent RSU awards with a performance threshold granted pursuant to the terms of the LTIP. See "Compensation Discussion and Analysis—2021 Compensation Programs—Long-Term Incentives—Restricted Stock Units with Performance Threshold," above, for a complete discussion of the terms of the awards. Share amounts do not include an estimate of an additional dividend equivalent, which is based on a tiered calculation and also payable pursuant to the terms of the awards. RSU awards do not have threshold or maximum payout levels as there is only one payout level if the performance threshold is satisfied.

(4) Amounts shown in column (l) for RSU awards represent the grant date fair value of the RSUs, which was based on a value of $49.16 per share for RSUs granted on February 24, 2021, which was the closing market price of the common stock on the grant date. The values used for RSUs are the same as those used under share-based compensation accounting guidance. The 2021 performance shares are subject to an EPS target and a ROIC performance threshold, with the total payout subject to modification based on relative TSR performance which is a market modifier under share-based compensation accounting guidance. The 2021 performance shares contain a provision in which the EPS target will not be determined until the first quarter of each year during the award period and as such, there is not a mutual understanding of the key terms and the grant date will not occur until the final EPS target has been communicated with the participants in the first quarter of 2023. Accordingly, the grant date fair value will be calculated using a Monte Carlo method to take into account the TSR market modifier in 2023. Amounts shown in column (l) for performance share awards represent the service inception date fair value of the performance shares awarded on February 24, 2021, which was based on a value of $45.99 per share which was the closing market price of the common stock on the last business day prior to the service inception date of January 1, 2021. The values used for performance share awards are not the same as those used under share-based compensation accounting guidance, and are used solely to represent the OECC's decisions with respect to the awards.

OUTSTANDING EQUITY AWARDS AT DECEMBER 31, 2021

The following table includes all of the outstanding equity awards held by our NEOs at December 31, 2021:

	Stock Awards			
Name	Number of Shares That Have Not Vested (#)	Market Value of Shares That Have Not Vested ($)[1]	Equity Incentive Plan Awards: Number of Unearned Shares That Have Not Vested (#)	Equity Incentive Plan Awards: Market or Payout Value of Unearned Shares That Have Not Vested ($)[1]
(a)	(g)	(h)	(i)	(j)
David H. Anderson	1,500[3]	$73,170	58,940[2]	$2,875,093
	1,750[3]	85,365	1,750[4]	85,365
	1,439[3]	70,194	2,878[5]	140,389
	2,528[3]	123,316	7,584[6]	369,948
Frank H. Burkhartsmeyer	461[3]	22,488	23,340[2]	1,138,525
	584[3]	28,488	584[4]	28,488
	600[3]	29,268	1,200[5]	58,536
	973[3]	47,463	2,919[6]	142,389
MardiLyn Saathoff	461[3]	22,488	17,800[2]	868,284
	511[3]	24,927	511[4]	24,927
	420[3]	20,488	840[5]	40,975
	778[3]	37,951	2,334[6]	113,853
Kimberly A. Heiting	338[3]	16,488	15,450[2]	753,651
	402[3]	19,610	402[4]	19,610
	360[3]	17,561	720[5]	35,122
	681[3]	33,219	2,043[6]	99,658
Justin B. Palfreyman	246[3]	12,000	10,340[2]	504,385
	256[3]	12,488	256[4]	12,488
	210[3]	10,244	420[5]	20,488
	487[3]	23,756	1,461[6]	71,268

Columns (b)-(f) were omitted as they are not applicable.

(1) Amounts are calculated based on the price of $48.78, the closing market price for the Company's common stock on December 31, 2021.

(2) For both the 2020-2022 and 2021-2023 performance share awards, the share amounts include the maximum level of the awards. The actual number of performance shares issuable will be determined by the OECC at the end of the three-year performance cycles ending December 31, 2022 and 2023, respectively. Does not include an estimate for the accumulated cash dividends also payable pursuant to the terms of the awards. For a complete description of the performance objectives, see "Compensation Discussion and Analysis—2021 Compensation Programs—Long-Term Incentives—Performance Shares," above.

(3) Share amounts represent RSU awards with performance thresholds that were met as of December 31, 2021, and that are scheduled to vest based on continued service through March 1, 2022. The achievement of the performance threshold is reviewed and approved by the OECC after the end of each year. This amount does not include an estimate for the accumulated cash dividends also payable pursuant to the terms of the awards. For a complete description of the performance threshold, see "Compensation Discussion and Analysis—2021 Compensation Programs—Long-Term Incentives—Restricted Stock Units with Performance Threshold," above.

(4) Share amounts represent the remaining balance of RSUs with performance threshold awards. The remaining shares covered by each of these RSUs with a performance threshold will vest on March 1, 2023 subject in each case to achievement of the performance threshold for the immediately preceding year. This amount does not include an estimate for the accumulated cash dividends also payable pursuant to the terms of the awards.

(5) Share amounts represent the remaining balance of RSUs with performance threshold awards. One-half of the remaining shares covered by each of these RSUs with performance threshold will vest on each of March 1, 2023 and 2024 subject in each case to achievement of the performance threshold for the immediately preceding year. This amount does not include an estimate for the accumulated cash dividends also payable pursuant to the terms of the awards.

(6) Share amounts represent the remaining balance of RSUs with performance threshold awards. One-third of the remaining shares covered by each of these RSUs with performance threshold will vest on each of March 1, 2023, 2024 and 2025 subject in each case to achievement of the performance threshold for the immediately preceding year. This amount does not include an estimate for the accumulated cash dividends also payable pursuant to the terms of the awards.

OPTION EXERCISES AND STOCK VESTED DURING 2021

	Option Awards		Stock Awards	
Name	Number of Shares Acquired on Exercise (#)	Value Realized on Exercise ($)	Number of Shares Acquired on Vesting[1] (#)	Value Realized on Vesting[1] ($)
(a)	(b)	(c)	(d)	(e)
David H. Anderson	—	$—	18,096	$979,982
Frank H. Burkhartsmeyer	—	—	7,615	412,864
MardiLyn Saathoff	—	—	6,898	377,710
Kimberly A. Heiting	1,500	3,881	4,066	219,927
Justin B. Palfreyman	—	—	3,773	206,655

(1) Amounts represent performance share awards and RSUs that vested during 2021. The performance shares are related to the three-year award cycle 2019-2021 and were earned but unpaid as of the fiscal year-end; the value realized is based on a price of $48.78, the closing market price for the Company's common stock on December 31, 2021, plus dividend equivalents. The performance share award paid at 94.48% of the target level incentive based upon Company performance and strategic results. See "Compensation Discussion and Analysis—2021 Compensation Programs—Long-Term Incentives—Performance Shares," above. The number of shares actually paid was determined by the NW Holdings OECC on February 23, 2022. The value realized includes cash for dividend equivalents of $6.2200 per share based on dividends per share paid by NW Holdings during the performance period as follows: Mr. Anderson, $76,394; Mr. Burkhartsmeyer, $25,446; Ms. Saathoff, $22,274; Ms. Heiting, $17,516; and Mr. Palfreyman, $11,109. RSUs are related to the units that vested on March 1, 2021 and the value realized is based on the closing stock price on the date preceding the payment date, March 2, 2021, or $47.80 per share, plus cash dividend equivalents which were as follows: Mr. Anderson, $26,563; Mr. Burkhartsmeyer, $19,412; Ms. Saathoff, $22,203; Ms. Heiting, $5,297; and Mr. Palfreyman, $13,446. The following RSUs included in the table above do not have a performance threshold: Mr. Burkhartsmeyer, 1,504 shares; Ms. Saathoff, 1,550 shares; and Mr. Palfreyman, 1,032 shares. Receipt of the following amounts under performance share awards and RSUs were deferred pursuant to elections under our Deferred Compensation Plan for Directors and Executives: Ms. Saathoff, 1,037 shares valued at $51,469 and $0 of dividend equivalents; and Ms. Heiting, 8 shares valued at $382 and $57 of dividend equivalents. See "Non-Qualified Deferred Compensation in 2021," below for a discussion of the terms of this plan.

PENSION BENEFITS AS OF DECEMBER 31, 2021

Name	Age	Plan Name	Number of Years Credited Service	Present Value of Accumulated Benefit[1]
David H. Anderson[2]	60	Retirement Plan for Bargaining Unit and Non-Bargaining Unit Employees	17.25	$965,734
		Supplemental Executive Retirement Plan—Tier 1	17.25	6,956,512
Frank H. Burkhartsmeyer	57	N/A	—	N/A
MardiLyn Saathoff	65	N/A	—	N/A
Kimberly A. Heiting	52	Retirement Plan for Bargaining Unit and Non-Bargaining Unit Employees	23.17	1,341,222
		Supplemental Executive Retirement Plan—Tier 2	23.17	789,666
Justin B. Palfreyman	43	N/A	—	N/A

(1) The Present Value of Accumulated Benefit in the above table represents the actuarial present value as of December 31, 2021 of the pension benefits of the NEOs under the respective pension plans calculated based on years of service and final average compensation as of that date, but assuming retirement at the earliest age at which benefits were unreduced under the respective plans. The actuarial present value was calculated using the Pri-2012 Mortality Table and projected generationally using Scale MP-2021 and a discount rate of 2.53%, the same assumptions used in the pension benefit calculations reflected in our audited balance sheet as of December 31, 2021.

(2) Mr. Anderson is eligible for early retirement benefits under the Retirement Plan.

Retirement Plan for Bargaining Unit and Non-Bargaining Unit Employees

The NW Natural Retirement Plan for Bargaining Unit and Non-Bargaining Unit Employees (Retirement Plan) is our subsidiary's qualified pension plan covering certain NW Natural employees covered by a labor agreement and hired prior to January 1, 2010 as well as all regular, full-time employees not covered under a labor agreement whose employment commenced prior to January 1, 2007 (when the non-bargaining unit portion of the Retirement Plan was closed to new participants). Eligible non-bargaining unit employees commenced participation in the Retirement Plan after one year of service, and if their service continued past December 31, 2007 became 100% vested after three years of service (eligible employees whose service all occurred prior to January 1, 2008 needed five years of service to fully vest). Final average earnings for purposes of calculating benefits consist of the participant's highest average total annual compensation for any five consecutive years in the last 10 years of employment, with total annual compensation for this purpose generally consisting of salary and annual incentive, excluding long-term incentives, amounts deferred under our non-qualified deferred compensation plans and, commencing in 2010 as provided in a Retirement Plan amendment approved in 2009, annual incentive payments in excess of target. In addition, as of December 31, 2021, the Internal Revenue Code limited the amount of annual compensation considered for purposes of calculating benefits under the Retirement Plan to $290,000.

A normal retirement benefit is payable upon retirement at or after age 62 and consists of (a) an annuity benefit equal to 1.8% of final average earnings for each of the participant's first 10 years of service, and (b) a lump sum benefit equal to 7.5% of final average earnings for each year of service in excess of 10 years. In addition, for participants hired before January 1, 2000 and under age 60 on that date, a supplemental annuity is provided under the Retirement Plan equal to the participant's total years of service multiplied by the sum of (x) a varying percentage (based on the participant's hire age and age on January 1, 2000) of total final average earnings, and (y) 0.425% of the excess of final average earnings over an amount referred to as Covered Compensation, which generally consists of the average of the Social Security maximum taxable wage bases over the 35 years preceding the participant's retirement.

Employees who have attained age 55, if age plus accredited years of service totals 70 or more, are eligible for early retirement benefits. Annuity benefits are reduced by 0.333% per month (4% per year) for each month that the benefit commencement date precedes age 62, with such benefit reduction increased to 0.5% per month (6% per year) for each month the benefit commencement date precedes age 60. The lump sum benefit is not subject to reduction on early retirement. At December 31, 2021, Mr. Anderson was eligible for early retirement benefits under the Retirement Plan.

The basic benefit form for annuity benefits is a monthly single life annuity. The participant may choose among different annuity forms that are the actuarial equivalent of the basic benefit.

Supplemental Executive Retirement Plan

The Supplemental Executive Retirement Plan (SERP) is a non-qualified pension plan providing supplemental retirement benefits to persons who become eligible executive officers after September 1, 2004, including Mr. Anderson and Ms. Heiting. The SERP is divided into two tiers, with persons who became eligible executive officers between September 1, 2004 and December 1, 2006 (Mr. Anderson) being participants in SERP Tier 1, and persons who are eligible for the Retirement Plan and who became eligible executive officers after December 1, 2006 (Ms. Heiting) being participants in SERP Tier 2. Participants must complete five years of service before becoming 100% vested in SERP benefits. The SERP was closed to new participants effective July 31, 2019.

SERP Tier 1

Under SERP Tier 1, a target lump sum retirement benefit is determined for each participant, which is then reduced by the lump sum actuarial equivalent of the participant's Retirement Plan benefit and Social Security benefit, in each case valued as of and assuming commencement at age 65. Final average pay for purposes of calculating SERP Tier 1 benefits generally consists of the participant's highest average salary and annual incentive for any five consecutive compensation years in the last 10 years of employment. To help control the cost of future benefits under the SERP, the Board authorized SERP amendments in 2009 to provide that,

commencing with annual incentives paid for 2010 performance, annual incentive compensation in excess of 125% of target is excluded from the calculation of final average pay.

The target lump sum retirement benefit is equal to 40% of final average pay for each of the participant's first 15 years of service, resulting in a maximum target benefit of six times final average pay after 15 years of service. A normal retirement benefit equal to the target benefit reduced by the lump sum actuarial equivalents of Retirement Plan and Social Security benefits, as discussed above, is payable as a lump sum upon retirement at or after age 60. Upon termination of employment at any time after becoming vested, a participant will receive a termination benefit equal to the SERP Tier 1 normal retirement benefit reduced by 0.4166% per month (5% per year) for each month that termination of employment precedes age 60, up to a maximum reduction of 25% for termination at age 55 or below. Participants may choose among different annuity forms that are the actuarial equivalent of the basic lump sum benefit.

SERP Tier 2

As discussed above, final average earnings for purposes of calculating benefits under the Retirement Plan excludes amounts of compensation over a limit ($290,000 in 2021) imposed by the Internal Revenue Code. SERP Tier 2 provides a make-up benefit calculated using the Retirement Plan formula (see "Retirement Plan for Bargaining Unit and Non-Bargaining Unit Employees," above) without applying this limit. Accordingly, benefits under SERP Tier 2 are equal to (a) the benefits that would be calculated under the Retirement Plan if compensation taken into account when determining final average earnings was not limited by the Internal Revenue Code and did not exclude amounts deferred under the DCP, minus (b) the actual Retirement Plan benefits. SERP Tier 2 benefits are generally payable in the same form and for the same period of time as the annuity payable under the Retirement Plan, subject to certain requirements for the timing of commencement of benefits.

NON-QUALIFIED DEFERRED COMPENSATION IN 2021

Name	Plan Name	Executive Contributions in 2021[1]	NW Natural Contributions in 2021[1]	Aggregate Earnings (Losses) in 2021[1]	Aggregate Withdrawals/ Distributions in 2021	Aggregate Balance at 12/31/2021[1]
David H. Anderson	DCP	$188,269	$60,194	$100,740	$243,057	$1,819,348
Frank H. Burkhartsmeyer	DCP	—	22,890	1,696	—	80,378
MardiLyn Saathoff	DCP	46,758	16,770	52,419	—	844,372
Kimberly A. Heiting	DCP	437	—	4,352	—	140,415
Justin B. Palfreyman	DCP	—	10,734	844	—	39,359

(1) All amounts reported in the Executive Contributions and NW Natural Contributions columns are also included in amounts reported in the Summary Compensation Table above for either 2020 or 2021. The portion of the amounts reported in the Aggregate Earnings column that represents above-market earnings is included in column (h) of the Summary Compensation Table, and the amount of above-market earnings for each NEO is set forth in footnote 3 to that table. Of the amounts reported in the Aggregate Balance column, the following amounts have been reported in the Summary Compensation Tables in this Proxy Statement or in prior year proxy statements: Mr. Anderson, $1,819,348; Mr. Burkhartsmeyer, $78,154; Ms. Saathoff, $577,838; Ms. Heiting, $60,084 and Mr. Palfreyman, $29,306. Amounts not previously reported consist of market-rate earnings on amounts deferred and amounts deferred before designation as a NEO. Amounts previously reported as described in this footnote have been reduced by amounts distributed such that no amount in this footnote will exceed the amount in the Aggregate Balance column.

Non-Qualified Deferred Compensation Plans in 2021

Our subsidiary, NW Natural, currently maintains the DCP, under which all deferred contributions in 2021 were made.

Participants in the DCP may elect in advance to defer up to 50% of their salaries, up to 100% of their annual incentives, and up to 100% of performance share and restricted stock unit awards under our LTIP. NW Natural

makes matching contributions each year equal to: (a) 60% of the lesser of the participant's salary and annual incentive deferred during the year under both the DCP and our 401(k) Plan or 8% of the participant's total salary and annual incentive for the year, reduced by (b) the maximum matching contribution we would have made under our 401(k) Plan if the participant had fully participated in that plan. For participants hired after December 31, 2006, we make enhanced contributions each year equal to 5% of the greater of: (a) the participant's salary and annual incentive deferred during the year under the DCP, or (b) the excess of the participant's total salary and annual incentive received during the year over the limit ($290,000 in 2021) imposed by the Internal Revenue Code on compensation that may be considered in calculating the corresponding enhanced contributions under our 401(k) Plan.

All amounts deferred under the DCP have been or will be credited to either a "stock account" or a "cash account." Deferrals of compensation payable in cash are made to cash accounts and deferrals of compensation payable in our common stock are made to stock accounts. Transfers from a cash account to a stock account are permitted, but not vice-versa. Stock accounts represent a right to receive shares of our common stock on a deferred basis, and are credited with additional shares based on the deemed reinvestment of dividends. The average annual rate of earnings on stock accounts over the five years ending December 31, 2021 was approximately -0.84% and in 2021 was approximately 10.31%, in each case representing the total shareholder return of our common stock annualized, assuming dividend reinvestment. Cash accounts under the DCP are credited quarterly with interest at a rate equal to Moody's Average Corporate Bond Yield. The average quarterly interest rate paid on cash accounts in 2021 was 3.00%.

Participants make elections regarding distributions of their accounts at the time they elect to defer compensation, and have limited rights to change these payment elections. Distributions may commence on a predetermined date while still employed or upon termination of employment, and may be made in a lump sum or in annual installments over five, ten or fifteen years. Hardship withdrawals are permitted under the DCP.

POTENTIAL PAYMENTS UPON TERMINATION OR CHANGE IN CONTROL

Change in Control Compensation

Our subsidiary, NW Natural, has agreed to provide certain benefits to the NEOs upon a "change in control" of NW Natural or NW Holdings, although certain of the benefits are only payable if the NEO's employment is terminated without "cause" or by the officer for "good reason" within 24 months after the change in control. In NW Natural's and NW Holdings' plans and agreements, "change in control" is generally defined to include:

- the acquisition by any person of 20% or more of NW Holdings common stock outstanding;
- the nomination (and subsequent election) of a majority of NW Holdings' directors by persons other than the incumbent directors; and
- the consummation of a sale of all or substantially all of NW Holdings' or NW Natural's assets, an acquisition of NW Holdings through a merger or share exchange, or an acquisition of more than 50% of the voting securities of NW Natural through a merger, share exchange, or other transaction.

In our plans and agreements, "cause" generally includes willful and continued failure to substantially perform assigned duties or willfully engaging in illegal conduct injurious to NW Natural, and "good reason" generally includes a change in position or responsibilities (that does not represent a promotion), a decrease in compensation, or a home office relocation of over 30 miles.

The following table shows the estimated change in control benefits that would have been payable to the NEOs if (i) a change in control had occurred on December 31, 2021, and (ii) each officer's employment was terminated on that date either by us without "cause" or by the officer with "good reason."

Name	Cash Severance Benefit[1]	Insurance Continuation[2]	Restricted Stock Unit Acceleration[3]	Performance Share Acceleration[4]	Present Value of SERP Enhancements[5]	Total[6]
David H. Anderson	$3,716,667	$43,490	$957,829	$692,722	$—	$5,410,708
Frank H. Burkhartsmeyer	1,492,333	57,760	360,350	150,041	—	2,060,484
MardiLyn Saathoff	1,265,333	21,477	288,628	111,580	—	1,687,018
Kimberly A. Heiting	1,083,000	34,425	243,560	96,596	161,781	1,619,362
Justin B. Palfreyman	1,001,333	55,877	164,294	62,416	—	1,283,920

(1) *Cash Severance Benefit.* Each NEO has entered into a change in control agreement providing for, among other things, cash severance benefits payable if the NEO's employment is terminated by us without "cause" or by the officer for "good reason" within 24 months after a change in control. The cash severance benefit for each NEO is equal to two times (two and a half times for Mr. Anderson) the sum of final annual salary plus average annual incentive for the last three years (annualized for annual incentives paid for partial years). These amounts are payable in a lump sum within five days after termination. Under the severance agreements, if any payments to a NEO in connection with a change in control would be subject to the 20% excise tax on "excess parachute payments" as defined in Section 280G of the Internal Revenue Code, then, if it would result in a greater net after-tax benefit for the officer to have the payments that would otherwise be made reduced by the amount necessary to prevent them from being "parachute payments," then the officer will be paid such reduced benefits. No amounts in the above table under Cash Severance Benefit have been reduced in accordance with this provision.

(2) *Insurance Continuation.* If cash severance benefits are triggered, the severance agreements also provide for the continuation of life and health insurance benefits for two years following termination of employment, but not to the extent similar benefits are provided by a subsequent employer. The amounts in the table above represent the present value of two years' of monthly life and health insurance benefit payments at the rates paid by us for each NEO as of December 31, 2021. Under the severance agreements, if any payments to a NEO in connection with a change in control would be subject to the 20% excise tax on "excess parachute payments" as defined in Section 280G of the Internal Revenue Code, then, if it would result in a greater net after-tax benefit for the officer to have the payments that would otherwise be made reduced by the amount necessary to prevent them from being "parachute payments," then the officer will be paid such reduced benefits. No amounts in the above table under Insurance Continuation have been reduced in accordance with this provision.

(3) *Restricted Stock Unit Acceleration.* As of December 31, 2021, each NEO held outstanding unvested RSUs as listed in the "Outstanding Equity Awards" table above. The RSU award agreements state that if cash severance benefits are triggered under the severance agreements, all outstanding unvested RSUs will immediately vest. The amounts in the table above represent the number of unvested RSUs as of December 31, 2021 multiplied by a stock price of $48.78 per share, which was the closing price of our common stock on the last trading day of 2021, plus an amount for each RSU equal to the dividends paid per share during the period the RSU was outstanding.

(4) *Performance Share Acceleration.* As described above under the "Grants of Plan-Based Awards During 2021" table and "Compensation Discussion and Analysis—2021 Compensation Programs—Long-Term Incentives—Performance Shares," we granted performance share awards to the NEOs in 2021 under which shares of our common stock (plus accumulated cash dividends) will be issued to them based on our performance over the years 2021 to 2023. We made similar awards to the NEOs in 2020 for performance over the years 2020 to 2022. The agreements for the performance share awards granted in 2020 and 2021 state that if cash severance benefits are triggered under the severance agreements, we must immediately issue a pro-rata portion of the target award amount based on the portion of the award period completed prior to termination of employment. The amounts in the table above represent the number of shares that would have been issued under the awards, multiplied by a stock price of $48.78 per share, which was the closing price of our common stock on the last trading day of 2021, plus an amount equal to the dividends paid per share during the applicable award periods through December 31, 2021.

(5) *Present Value of SERP Enhancements.* As discussed above in the text accompanying the "Pension Benefits" table, Mr. Anderson is a participant in the SERP Tier 1, which generally provides for a lump sum benefit payable six months after termination of employment. If a SERP Tier 1 participant's employment is terminated by us without "cause" or by the participant for "good reason" within 24 months after a change in control, the SERP Tier 1 participant will receive three additional years of service for purposes of calculating their SERP Tier 1 benefit. Mr. Anderson has already accrued over 15 years of service, the number of years of service at which benefits for SERP Tier I participants under this plan are no longer subject to proration at termination. As a result, there is no excess for the SERP benefit he would receive following a change in control over the SERP benefit he would have received if employment had terminated absent a change in control on December 31, 2021. As discussed above in the text accompanying the "Pension Benefits" table, Ms. Heiting is a participant in the SERP Tier 2, which generally provides for a lifetime supplemental pension benefit payable by us following retirement. If the employment of any SERP Tier 2 participant is terminated by us without "cause" or by the participant for "good reason" within 24 months after a change in control, the SERP Tier 2 participant will receive three additional years of service for purposes of calculating his or her SERP Tier 2 benefit. The amount for Ms. Heiting in the table above represents the excess of the present value of annual SERP Tier 2 benefit she would receive on termination following a change in control over the present value annual SERP Tier 2 benefit she would have received if her employment had terminated absent a change in control on December 31, 2021.

(6) *Total.* Amounts in this column equal the sum of the amounts in the five columns to its left.

Other Benefits Triggered on Certain Employment Terminations

When Mr. Burkhartsmeyer was hired, effective May 17, 2017, NW Natural entered into a severance agreement with him that provides the following severance benefits if his employment is terminated without cause: 100% of his base salary for a termination without cause during the year ending May 17, 2018, decreasing to 80% of base salary for a termination in the year ending May 17, 2019, 60% for a termination in the year ending May 17, 2020, 40% for a termination in the year ending May 17, 2021, 20% for a termination in the year ending May 17, 2022, and 0% thereafter. If Mr. Burkhartsmeyer's employment had been terminated without cause on December 31, 2021, he would have been entitled to a payment of $99,100 under this agreement. In late 2016, the OECC approved a similar agreement of this nature with Mr. Anderson as the incoming Chief Executive Officer. This agreement provided that potential non-change-in-control severance payments would decline annually, and expired as of August 1, 2021.

As of December 31, 2021, each NEO held outstanding unvested RSUs with performance threshold as listed in the "Outstanding Equity Awards at December 31, 2021" table above. The RSU award agreements generally require the officer to be employed by us on the applicable vesting dates to receive RSU payouts, but the agreements also provide that if employment terminates earlier as a result of death or disability, or when the officer is eligible for normal or early retirement under our Retirement Plan and at least one year has elapsed since the grant date of the RSU, the officer will nevertheless receive 100% of each scheduled RSU payout if the performance threshold is satisfied for the applicable year. Assuming achievement of the performance threshold for all years, the estimated value of the RSU payouts, based on a stock price of $48.78 per share (which was the closing price of our common stock on the last trading day of 2021) and continuation of quarterly dividends on our common stock at the current rate, each NEO would be entitled to receive on death or disability, as of December 31, 2021 would be: Mr. Anderson, $973,253; Mr. Burkhartsmeyer, $365,402; Ms. Saathoff, $293,187; Ms. Heiting, $247,087; and Mr. Palfreyman, $166,615. As of December 31, 2021, Mr. Anderson was, and Ms. Saathoff would have been if she were a participant in the Retirement Plan, eligible for normal or early retirement under the Retirement Plan. Based on the same assumptions, the estimated value of the RSU payouts that Mr. Anderson and Ms. Saathoff would be entitled to receive on retirement as of December 31, 2021 would be: Mr. Anderson, $479,990 and Ms. Saathoff, $141,384.

As described above under "Grants of Plan-Based Awards During 2021" table and "Compensation Discussion and Analysis—2021 Compensation Programs—Long-Term Incentives—Performance Shares," we granted performance share awards to the NEOs in February 2021 under which shares of our common stock (plus accumulated cash dividends) will be issued to them based on our performance over the years 2021-2023. We made similar awards to the NEOs in February 2020 for performance over the years 2020-2022. The award agreements generally require the officer to be employed by NW Natural on the last day of the performance period to receive an award payout, but the award agreements for these awards provide that if employment terminates earlier as a result of death, disability, or retirement after reaching age 60 the officer will be entitled to a pro-rated award payout. For awards granted in 2020 and 2021, the pro-rated payout on retirement only applies if at least one year has elapsed since the grant date of the award. Accordingly, if any NEO had terminated employment on December 31, 2021 as a result of death or disability, his or her target award for the 2020-2022 performance period would have been reduced to two-thirds of the original target award reflecting employment for two years of the three-year performance period, his or her target award for the 2021-2023 performance period would have been reduced to one-third the original target reflecting employment for one year of the three-year performance period, and then he or she would receive payouts under these adjusted awards at the end of the applicable performance periods based on our actual performance against the performance goals. Assuming achievement of target performance levels, the estimated value of the pro-rated award payouts, based on a stock price of $48.78 per share (which was the closing price of our common stock on the last trading day of 2021) and continuation of quarterly dividends for the remainder of the performance period on our common stock at the current rate, for each NEO would be: Mr. Anderson, $730,607; Mr. Burkhartsmeyer, $293,264; Ms. Saathoff, $218,672; Ms. Heiting, $189,109; and Mr. Palfreyman, $122,431. As of December 31, 2021, Mr. Anderson and Ms. Saathoff were over age 60 and eligible for retirement. Based on the same assumptions, the estimated value of the award payouts for the 2020-2022 performance period that Mr. Anderson and Ms. Saathoff would be entitled to receive if retired as of December 31, 2021 would be $389,037 and $113,545, respectively.

NON-EMPLOYEE DIRECTOR COMPENSATION IN 2021

Name	Fees Earned or Paid in Cash ($)[1]	Change in Pension Value and Non-Qualified Deferred Compensation Earnings ($)[2]	Total ($)
(a)	(b)	(f)	(h)
Timothy P. Boyle	$169,650[3]	$—	$169,650
John D. Carter	89,750[4]	—	89,750
Monica Enand	175,650[5]	1,444	177,094
C. Scott Gibson	238,125[6]	1,725	239,850
Tod R. Hamachek	87,750[7]	48,857	136,607
Karen Lee	181,000[8]	275	181,275
Hon. Dave McCurdy	180,150[9]	56	180,206
Nathan I. Partain	180,150[10]	62	180,212
Jane L. Peverett	201,700[11]	—	201,700
Kenneth Thrasher	217,150[12]	—	217,150
Malia H. Wasson	245,219[13]	58	245,277
Charles A. Wilhoite	197,650[14]	235	197,885

Columns(c), (d), (e) and (g) were deleted as they are not applicable in 2021. See “Director Fees and Arrangements,” below.

(1) Amounts in column (b) represent cash compensation earned in 2021 for service as a director of NW Holdings and NW Natural, including any amounts deferred at the director’s election pursuant to the terms of the Deferred Compensation Plan for Directors and Executives.

(2) Amounts in column (f) represent above-market interest credited to the directors’ accounts under the Directors Deferred Compensation Plan and the DCP during 2021. For this purpose, interest credited is considered above-market to the extent such interest exceeds 120% of the average of the applicable long-term federal rates for the twelve months corresponding to the period for which market yield information is obtained to calculate interest crediting rates under the non-qualified deferred compensation plans.

(3) Represents fees of $152,550 and $17,100 for fees earned for service as a director of NW Natural and NW Holdings, respectively.

(4) Represents fees of $80,775 and $8,975 for service as a director of NW Natural and NW Holdings, respectively. Mr. Carter retired from the Board effective May 27, 2021.

(5) Represents fees of $157,950 and $17,700 earned for service as a director of NW Natural and NW Holdings, respectively.

(6) Represents fees of $214,313 and $23,812 earned for service as a director of NW Natural and NW Holdings, respectively. Mr. Gibson retired from the Board effective December 31, 2021.

(7) Represents fees of $78,975 and $8,775 earned for service as a director of NW Natural and NW Holdings, respectively. Mr. Hamachek retired from the Board effective May 27, 2021.

(8) Represents fees of $162,900 and $18,100 earned for service as a director of NW Natural and NW Holdings, respectively.

(9) Represents fees of $162,000 and $18,150 earned for service as a director of NW Natural and NW Holdings, respectively.

(10) Represents fees of $162,000 and $18,150 earned for service as a director of NW Natural and NW Holdings, respectively.

(11) Represents fees of $181,125 and $20,575 earned for service as a director of NW Natural and NW Holdings, respectively.

(12) Represents fees of $195,300 and $21,850 earned for service as a director of NW Natural and NW Holdings, respectively.

(13) Represents fees of $220,562 and $24,657 earned for service as a director of NW Natural and NW Holdings, respectively.

(14) Represents fees of $177,750 and $19,900 earned for service as a director of NW Natural and NW Holdings, respectively.

Non-Employee Director Compensation Philosophy

Each member of the Board of Directors of NW Holdings also serves as a member of the Board of Directors of NW Natural. Compensation is paid separately by NW Holdings and NW Natural for service on each respective board of directors, commensurate with the relative obligations and responsibilities associated with each entity, but compensation is considered together for purposes of determining the overall compensation appropriate for the members of both boards of directors.

The OECC's compensation philosophy for non-employee members of the Board is designed to attract and retain high performing directors who will perform in the best interest of shareholders. The OECC targets the compensation of Board members, when considered on an aggregate basis for service on the Board of Directors of NW Holdings and NW Natural, to be aligned near the middle of the market (50th percentile) for 18 peer companies. The OECC reviews Board compensation annually and recommends adjustments to compensation as necessary. The Consultant who assists the OECC with executive compensation also provides competitive market data for Board compensation.

While the components of compensation have evolved over the years, the pay components for 2021 consisted of a cash retainer, a separate cash retainer for each committee on which a director serves, a separate cash retainer for serving as Chair or Vice-Chair of the Board or Chair of a committee of the Board, and cash meeting fees for those meetings exceeding regularly scheduled meetings, beginning with the second unscheduled meeting.

The Board has adopted stock ownership guidelines that require directors to own NW Holdings shares valued at least $400,000 within five years of joining the Board, including amounts deferred pursuant to the plans described below. The OECC last reviewed the progress of the directors in achieving these stock ownership objectives in February 2022 and concluded that all of the directors have achieved, or are making adequate progress toward achieving, the stock ownership goals.

Director Fees and Arrangements

Fees Earned in 2021

The compensation terms for non-employee members of the Board of Directors of NW Holdings for the period from January 1, 2021 to December 31, 2021 are described below:

NW Holdings

Annual Cash Retainer	$16,500[1]
Extra Annual Cash Retainer for Audit Committee Chair	1,500[2]
Extra Annual Cash Retainer for OECC Chair	1,250[3]
Extra Annual Cash Retainer for Finance Committee Chair	1,000[4]
Extra Annual Cash Retainer for Governance Committee Chair	1,000[5]
Extra Annual Cash Retainer for Public Affairs and Environmental Policy Committee Chair	750[6]
Extra Annual Cash Retainer for Chair of the Board	9,000[7]
Extra Annual Cash Retainer for Vice Chair of the Board	5,000
Extra Annual Cash Retainer for Audit Committee Members	1,000
Extra Annual Cash Retainer for OECC Members	750[8]
Extra Annual Cash Retainer for Finance Committee Members	450[9]
Extra Annual Cash Retainer for Governance Committee Members	750
Extra Annual Retainer for Public Affairs and Environmental Policy Committee Members	300[10]
Extra Board/Committee Meeting Fees	1,500[11]

(1) Effective January 1, 2022, the annual cash retainer increased to $18,000.
(2) Effective January 1, 2022, the annual cash retainer for the Audit Committee Chair increased to $1,600.
(3) Effective January 1, 2022, the annual cash retainer for the OECC Chair increased to $1,600.
(4) Effective January 1, 2022, the annual cash retainer for the Finance Committee Chair increased to $1,400.

(5) Effective January 1, 2022, the annual cash retainer for the Governance Committee Chair increased to $1,400.
(6) Effective January 1, 2022, the annual cash retainer for the Public Affairs and Environmental Policy Committee Chair increased to $1,400.
(7) Effective January 1, 2022, the annual cash retainer for the Chair of the Board increased to $10,000.
(8) Effective January 1, 2022, the annual cash retainer for OECC members increased to $1,000.
(9) Effective January 1, 2022, the annual cash retainer for Finance Committee members increased to $750.
(10) Effective January 1, 2022, the annual cash retainer for Public Affairs and Environmental Policy Committee members increased to $750.
(11) Meeting fees will be paid for those meetings exceeding regularly scheduled meetings beginning with the second unscheduled meeting.

NW Natural

Annual Cash Retainer	$148,500[1]
Extra Annual Cash Retainer for Audit Committee Chair	13,500[2]
Extra Annual Cash Retainer for OECC Chair	11,250[3]
Extra Annual Cash Retainer for Finance Committee Chair	9,000[4]
Extra Annual Cash Retainer for Governance Committee Chair	9,000[5]
Extra Annual Cash Retainer for Public Affairs and Environmental Policy Committee Chair	6,750[6]
Extra Annual Cash Retainer for Chair of the Board	81,000[7]
Extra Annual Cash Retainer for Vice Chair of the Board	45,000
Extra Annual Cash Retainer for Audit Committee Members	9,000
Extra Annual Cash Retainer for OECC Members	6,750[8]
Extra Annual Cash Retainer for Finance Committee Members	4,050[9]
Extra Annual Cash Retainer for Governance Committee Members	6,750
Extra Annual Retainer for Public Affairs and Environmental Policy Committee Members	2,700[10]
Extra Board/Committee Meeting Fees	1,350[11]

(1) Effective January 1, 2022, the annual cash retainer increased to $162,000.
(2) Effective January 1, 2022, the annual cash retainer for the Audit Committee Chair increased to $14,400.
(3) Effective January 1, 2022, the annual cash retainer for the OECC Chair increased to $14,400.
(4) Effective January 1, 2022, the annual cash retainer for the Finance Committee Chair increased to $12,600.
(5) Effective January 1, 2022, the annual cash retainer for the Governance Committee Chair increased to $12,600.
(6) Effective January 1, 2022, the annual cash retainer for the Public Affairs and Environmental Policy Committee Chair increased to $12,600.
(7) Effective January 1, 2022, the annual cash retainer for the Chair of the Board increased to $90,000.
(8) Effective January 1, 2022, the annual cash retainer for OECC members increased to $9,000.
(9) Effective January 1, 2022, the annual cash retainer for Finance Committee members increased to $6,750.
(10) Effective January 1, 2022, the annual cash retainer for Public Affairs and Environmental Policy Committee members increased to $6,750.
(11) Meeting fees will be paid for those meetings exceeding regularly scheduled meetings beginning with the second unscheduled meeting.

Deferred Compensation Plans

Directors Deferred Compensation Plan

Prior to January 1, 2005, directors could elect to defer the receipt of all or a part of their directors' compensation (cash or stock retainers and meeting fees) under NW Natural's non-qualified Directors Deferred Compensation Plan (DDCP). At the director's election, deferred amounts were credited to either a "cash account" or a "stock account." If deferred amounts were credited to stock accounts, such accounts were credited with a number of shares based on the purchase price of our common stock on the next purchase date under our Dividend Reinvestment and Direct Stock Purchase Plan, and such accounts were credited with additional shares based on the deemed reinvestment of dividends. Cash accounts are credited quarterly with interest at a rate equal to Moody's Average Corporate Bond Yield. The rate is adjusted quarterly. At the election of the participant, deferred balances in the stock and/or cash accounts are payable after termination of Board service in a lump sum, in installments over a period not to exceed 10 years, or in a combination of lump sum and installments.

In November 2004, the Board approved an amendment to the DDCP partially terminating the plan so that no deferrals would be made to the plan after December 31, 2004. All amounts deferred into the plan prior to December 31, 2004 remained in the plan and all other provisions of the DDCP remain in effect.

Deferred Compensation Plan for Directors and Executives

In January 2005, the Deferred Compensation Plan for Directors and Executives (DCP) replaced the existing DDCP as the vehicle for non-qualified deferral of compensation by directors. See "Non-Qualified Deferred Compensation Plans in 2021," above. The obligation of NW Natural to pay deferred compensation in accordance with the terms of the DCP will generally become due on a predetermined date during a participant's service if elected by such participant or on retirement, death, or other termination of service, and will be paid in a lump sum or in installments of five, ten or fifteen years as elected by the participant in accordance with the terms of the DCP. The right of each participant in the DCP is that of one of NW Natural's general, unsecured creditors. Directors and executives of NW Holdings or NW Natural are eligible to participate in the DCP.

Director Perquisites and Other Compensation

We do not provide perquisites to our directors other than nominal value and no director received perquisites at or exceeding a total value of $10,000 in 2021.

2021 AND 2020 AUDIT FIRM FEES

The following table shows the consolidated fees and expenses NW Holdings and subsidiaries paid or accrued for the integrated audits of its consolidated financial statements and other services provided by our independent registered public accounting firm, PricewaterhouseCoopers LLP, for fiscal years 2021 and 2020:

	2021	2020
Audit Fees	$ 1,693,000	$ 1,390,550
Audit-Related Fees	219,763	44,250
Tax Fees	27,500	28,000
All Other Fees	4,150	2,700
Total	$ 1,944,413	$ 1,465,500

Audit Fees

This category includes fees and expenses for services rendered for the integrated audit of the consolidated financial statements included in the Annual Report on Form 10-K and the review of the quarterly financial statements included in the Quarterly Reports on Form 10-Q for NW Holdings and its subsidiaries. The integrated audit includes the review of our internal control over financial reporting in compliance with Section 404 of the Sarbanes-Oxley Act of 2002 (Sarbanes-Oxley Act). In addition, amounts include fees for services routinely provided by the auditor in connection with regulatory filings, including issuance of consents and comfort letters relating to the registration of securities and assistance with the review of documents filed with the SEC.

Audit-Related Fees

This category includes fees for assurance and related services that are reasonably related to the performance of the audit or review of our financial statements and internal control over financial reporting, including fees and expenses related to consultations for financial accounting and reporting fees for U.S. Environmental Protection Agency assurance letters, and fees for system pre-implementation assessments.

Tax Fees

This category includes fees for tax compliance, and review services rendered for NW Holdings' or its subsidiaries' income tax returns.

All Other Fees

This category relates to services other than those described above. The amount reflects payments for accounting research tools in each of 2021 and 2020.

Pre-Approval Policy for Audit and Non-Audit Services

The Audit Committee of NW Holdings approved or ratified 100% of 2021 and 2020 services for audit, audit-related, tax services and all other fees, including audit services relating to compliance with Section 404 of the Sarbanes-Oxley Act. The Chair of the Audit Committee is authorized to pre-approve non-audit services between meetings of the Audit Committee and must report such approvals at the next Audit Committee meeting. See "Report of the Audit Committee," below.

REPORT OF THE AUDIT COMMITTEE

The Audit Committee of the Board of Directors (Committee) is responsible for providing independent, objective oversight of NW Holdings' accounting and auditing functions, financial reporting and internal control over financial reporting. The Committee is solely responsible for the engagement of the independent registered public accounting firm on behalf of NW Holdings, and the independent registered public accounting firm reports to the Committee. The Committee acts under a written charter to ensure compliance with applicable laws and regulations. The charter is reviewed annually by the Committee and is available on NW Holdings' website at **www.nwnaturalholdings.com**. Each of the members of the Committee is independent as defined by current New York Stock Exchange listing standards and NW Holdings' Director Independence Standards. The Board of Directors has designated each of Ms. Peverett and Mr. Thrasher as an "audit committee financial expert".

The Committee, in accordance with its written charter, oversees the quality and integrity of NW Holdings' accounting, auditing and financial reporting practices. During fiscal 2021, the Committee discussed the interim financial information in each of the quarterly reports of NW Holdings to the Securities and Exchange Commission (SEC) in meetings with the President and Chief Executive Officer, the Senior Vice President and Chief Financial Officer, the Vice President, Controller, Treasurer and Chief Accounting Officer, and PricewaterhouseCoopers LLP, the independent registered public accounting firm for NW Holdings, prior to filing them with the SEC. In addition, the Chair of the Committee and available Committee members review each quarterly earnings press release of NW Holdings before its dissemination.

During 2021, the Committee reviewed disclosure controls and procedures designed to ensure the continuing integrity of the financial reports and executive compensation disclosure of NW Holdings. The Committee provided regular oversight of the assessment of internal control over financial reporting in compliance with Section 404 of the Sarbanes-Oxley Act of 2002.

In fulfilling its responsibilities, the Committee has reviewed and discussed the audited financial statements contained in NW Holdings' Annual Report on Form 10-K for the year ended December 31, 2021 with NW Holdings' management and the independent auditor. As part of its review, the Committee discussed NW Holdings' critical accounting policies and matters of judgment and estimates used in the preparation of the financial statements included in NW Holdings' 2021 Annual Report on Form 10-K. In addition, the Committee discussed with the independent auditor those matters required to be discussed by Statement on Auditing Standard No. 1301, Communications with Audit Committees, including critical audit matters.

In discharging its oversight responsibility as to the audit process, the Committee obtained from the independent auditor written disclosures and the letters required by applicable requirements of the Public Company Accounting Oversight Board (PCAOB) regarding the independent auditor's communications with the Committee concerning independence, and has discussed with the independent auditor its independence. In this regard, the Committee considered whether or not the provision of non-audit services by the independent audit firm for the year ended December 31, 2021 is compatible with maintaining the independence of the firm and determined that none of the services provided to NW Holdings or its subsidiaries impacted a finding of independence. In addition, for the year ended December 31, 2021, the Committee reviewed the performance of its independent auditor, PricewaterhouseCoopers LLP. Based upon the Committee's assessment and satisfaction with the services provided, the Committee determined it was in NW Holdings' best interest to continue its engagement of PricewaterhouseCoopers LLP.

In February 2021, the Audit Committee of NW Holdings pre-approved certain non-audit services performed by NW Holdings' independent auditor and affirmed its procedure for the pre-approval of any future non-audit services performed by its independent auditor. On February 24, 2022, the Audit Committee of NW Holdings pre-approved specific services to be performed by the independent auditor in 2022, including audit, audit-related

and tax services, and established its procedure for pre-approval of all other services to be performed by the independent auditor in 2022. The Committee determined that:

- for proposed non-audit services, management will submit to the Committee a list of non-audit services that it recommends the Committee engage the independent auditor to provide;
- the Committee will review and consider for approval the list of permissible non-audit services and the budget for such services;
- management will routinely inform the Committee regarding the non-audit services actually provided by the independent auditor pursuant to this pre-approval process; and
- the Director of Internal Auditing will be responsible for reporting at least annually to the Committee all independent auditor fees and the pre-approved budget for such services.

The Chair of the Committee is authorized to pre-approve non-audit services between meetings of the Committee and must report such approvals at the next Committee meeting.

The Committee also discussed with the independent auditor any relationships that may impact its objectivity and independence and satisfied itself as to the auditor's independence. The Committee also completed its annual assessment of the independent auditor's and internal auditors' performance. The Committee discussed with management and the internal auditors the quality, adequacy and effectiveness of NW Holdings' internal control over financial reporting, and the organization, responsibilities, budget and staffing of the internal audit function. The Committee reviewed with the independent auditor any significant matters regarding NW Holdings' internal control over financial reporting that had come to their attention during the conduct of their audit. The Committee reviewed with both the independent auditor and the internal auditors their respective audit plans, audit scopes and identification of audit risks.

The Committee, in reliance on the reviews and discussions referred to above, recommended to the Board of Directors (and the Board has approved and directed) that the audited consolidated financial statements be included in Northwest Natural Holding Company's Annual Report on Form 10-K for the year ended December 31, 2021, for filing with the SEC.

Respectfully submitted to the Board of Directors on February 24, 2022 by the Audit Committee:

Jane L. Peverett, Chair
Karen Lee
Sandra McDonough
Kenneth Thrasher

PROPOSAL 2—PROPOSED AMENDMENTS TO EMPLOYEE STOCK PURCHASE PLAN

In 1967, the Board of Directors of NW Natural, as predecessor of NW Holdings, adopted and the shareholders approved the NW Natural Employee Stock Purchase Plan. NW Holdings subsequently adopted and assumed the NW Natural Employee Stock Purchase Plan, as amended and restated into the NW Holdings Employee Stock Purchase Plan (the ESPP), in connection with reorganizing into a holding company structure in October 2018. A total of 1,200,000 shares of the Company's common stock, including shares of NW Natural's common stock issued under the ESPP prior to its assumption by the Company, have been reserved for issuance under the ESPP since inception. Taking into account subscriptions for 2022, at December 31, 2021, only 118,747 shares were available for future issuance under the ESPP.

On February 24, 2022, the Board of Directors adopted, subject to shareholder approval, amendments to the ESPP that would (i) increase the number of shares authorized to be issued under the ESPP by 200,000 shares, from 1,200,000 to 1,400,000 shares; and (ii) remove the six-month waiting period before an employee is eligible to participate in the ESPP.

The purposes of the ESPP are to encourage employees to become shareholders in the Company, to stimulate increased interest on their part in the affairs of the Company, to afford them the opportunity to share in the earnings and growth of the Company and to promote systematic savings by them. The Board believes that additional shares are needed to ensure that sufficient shares are authorized to further these purposes and to continue to attract and retain the talent necessary to continue to drive the Company forward. In addition, the amendments to eligibility requirements are intended to provide additional flexibility to give proper incentives to employees and to further the purposes of the ESPP. The material terms of the ESPP, as proposed to be amended, are described below, and a complete copy of the ESPP, marked to show the proposed amendments, is attached to this Proxy Statement as Exhibit G. The following description is qualified in its entirety by reference to Exhibit G.

Summary of the ESPP

The ESPP provides for offerings of the Company's common stock to eligible employees at the times and in the amounts as determined by the Board of Directors. The Company typically makes an offering on an annual basis with a new offering period commencing on a date in October or November of each year, as specified by the Company's Board of Directors, and ending on November 30 of the following year. The Board of Directors intends to continue its practice of making annual offerings under the ESPP. The price of each offering will equal 85% of the fair market value of the common stock on the date of that offering, rounded up to a full penny.

All active employees employed by the Company for at least 6 months prior to the offering date (or, if the amendments are approved, all active employees employed by the Company on the offering date) and whose customary employment is at least 20 hours per week and 5 months per year (including officers and directors who are employees and active employees employed by a designated parent or subsidiary of NW Holdings) are eligible to participate in the ESPP. However, no employee may participate if he or she owns, or through any subscription will acquire, sufficient common stock to give him or her 5% or more of the total combined voting power or value of all classes of stock of the Company. At March 1, 2022, approximately 1,235 employees were eligible to participate in the ESPP, as proposed to be amended.

An eligible employee may participate by subscribing for shares within a prescribed period after each offering. In each offering, a participant may subscribe for up to the lesser of 900 shares or an amount of shares with a maximum purchase price of $21,250 (85% of $25,000 fair market value). If any offering is oversubscribed, the shares offered will be allocated among the participants.

Payment for shares purchased under the ESPP is made through payroll deductions. The Board of Directors typically limits the offering periods consistent with its practice of allowing employees to make payroll deductions over a 12-month period, though the period can differ. A participant may terminate participation in an

offering at any time before the twentieth day preceding the end of the offering period. Upon termination of participation, all amounts are refunded to the participant, without interest.

Shares subscribed for in any offering will be purchased at the end of the offering period. Prior to that time, contributions are held by the Company for the participant.

None of the participants' rights under the ESPP are assignable or transferable. The right to participate in, and any subscription under, the ESPP, terminates upon the termination of employment.

The Board of Directors, without shareholder approval, may amend, modify, suspend or terminate the ESPP at any time without notice, but it may not, without the affected employee's written consent, adversely affect any existing subscription or offering, and it may not amend the ESPP, without shareholder approval, to change the number of shares authorized to be offered (otherwise than to reflect a change in capitalization, such as a stock dividend or stock split), decrease the offering price below 85% of fair market value or change the eligibility requirements.

Tax Consequences

The ESPP is an "employee stock purchase plan" under Section 423 of the Code. In the event of a disposition within one year after acquisition by the participant of the shares or within two years after they were offered under the ESPP, the participant would recognize ordinary income at the time of disposition in an amount equal to the excess of the fair market value of the shares at the time of their purchase by the participant over the price at which such shares were offered under the ESPP. This ordinary income would be added to the participant's cost basis in determining gain or loss on a sale, which would generally be capital gain or loss. If held for a period in excess of these limitations, gain or loss upon a sale of shares purchased under the ESPP generally would be treated as capital gain or loss, except that any gain would be treated as ordinary income to the extent of the excess of the fair market value of the shares at the time of offering over the offering price.

Purchases Under the ESPP

The following table indicates shares purchased under the ESPP during the last fiscal year by the Named Executive Officers, by all executive officers as a group and by all employees (excluding executive officers) as a group. These shares were issued on November 30, 2021 at a purchase price of $37.78 per share pursuant to an offering dated November 2, 2020.

Name	Number of Shares Purchased in 2021	Dollar Value[1]
David H. Anderson	562	$3,743
Frank H. Burkhartsmeyer	—	—
MardiLyn Saathoff	—	—
Kimberly A. Heiting	—	—
Justin B. Palfreyman	508	3,383
All Executive Officers (12 persons)	1,690	11,255
All employees, excluding Executive Officers	46,126	307,199

(1) "Dollar Value" equals the difference between the price paid for the shares purchased under the ESPP and the fair market value of the shares on the offering date.

Vote Required

Approval of the ESPP amendments by the shareholders will require that the votes cast in favor of the proposal at the Annual Meeting exceed the votes cast against the proposal. Accordingly, abstentions and broker non-votes will have no effect on the results of the vote on this proposal.

The Board of Directors recommends a vote FOR this proposal.

PROPOSAL 3—ADVISORY VOTE ON EXECUTIVE COMPENSATION

This Proxy Statement includes extensive disclosure regarding the compensation of our Named Executive Officers under the heading "Executive Compensation" on pages 24 to 61 above. Pursuant to Section 14A of the Securities Exchange Act of 1934, we submit to our shareholders a nonbinding advisory resolution to approve the compensation of the Named Executive Officers disclosed in this Proxy Statement. The Board of Directors has approved the submission of the following resolution to the shareholders for approval at the Annual Meeting:

> "RESOLVED, that the compensation of the Company's Named Executive Officers, as disclosed pursuant to Item 402 of Regulation S-K under the heading "Executive Compensation" in the Proxy Statement for the Company's 2022 Annual Meeting of Shareholders, is approved."

This proposal gives you the opportunity to endorse or not endorse our executive compensation program for our Named Executive Officers by voting for or against the above resolution. As discussed under "Executive Compensation—Compensation Discussion and Analysis" above, our executive compensation programs have been carefully designed and implemented to attract, retain and motivate talented and qualified executives, to emphasize pay for performance, to link compensation to achievement of annual and long-term performance goals, to align executives' interests with shareholders' interests, and to achieve a correct balance between compensation that is attractive to executives, affordable to the Company and fair to shareholders and employees.

Substantial components of executive compensation are tied to the Company's annual and long-term performance. For example, the Executive Annual Incentive Plan, which is designed to encourage and reward executive officer's contributions in achieving NW Natural's annual goals, provides for cash payments that are based on a formula that includes meeting proposed annual targets such as net income, performance relative to other operational goals and individual performance. Similarly, NW Holdings' performance share awards under the Long Term Incentive Plan (LTIP) were designed to align executives' interests with shareholder interests: NW Holdings' performance share awards focus executives on achievement of pre-defined levels of EPS, with positive or negative award modification for TSR performance relative to the Company's peer group over a three-year period, and subject to achievement of specified ROIC thresholds. Restricted stock units with performance threshold are also tied to the Company's performance, by vesting only if a pre-defined performance threshold is met for the relevant performance period. No RSUs with a performance threshold will vest in a given year if the Company's performance threshold is not met, and shares subject to vesting in that year will be forfeited. Additionally, NW Holdings' pay practices work to align executives' interests with shareholders' interests by emphasizing stock ownership through stock ownership guidelines and performance-based compensation under the LTIP.

NW Holdings has also adopted a number of pay practices that emphasize fairness to shareholders and good governance. Among other practices, executive change in control severance agreements are double-trigger and contain no gross-up provisions. The OECC has also eliminated routine or excessive perquisites for executives, limited the use and duration of severance agreements (other than in the context of change-in-control), reduced the interest crediting rate on compensation deferred after 2004 to a variable market rate, modified the SERP to reduce benefits and expenses, including limiting the amount of an executive's annual bonus that is included in final average compensation for purposes of that plan, closed new participation in the SERP, and maintained a high percentage of total targeted direct compensation that is at risk, particularly for the Chief Executive Officer. Moreover, annual and long-term incentive awards contain provisions that "clawback" from executives certain benefits under those awards in the event of misconduct.

Overall, NW Holdings' compensation practices are driven by our total compensation philosophy which is designed to provide total remuneration in a manner that motivates high levels of performance, creates shareholder value, and emphasizes our commitment to tie a significant portion of executive compensation to the Company's performance.

Vote Required

Approval of this proposal by the shareholders will require that the votes cast in favor of the proposal at the Annual Meeting exceed the votes cast against the proposal. Accordingly, abstentions and broker non-votes will have no effect on the results of the vote on this proposal.

The Board of Directors recommends a vote FOR this proposal.

PROPOSAL 4—RATIFICATION OF APPOINTMENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTANTS

At a meeting held February 24, 2022, the Audit Committee of the Board of Directors of NW Holdings appointed PricewaterhouseCoopers LLP, independent registered public accounting firm, to audit the books, records and accounts of NW Holdings for fiscal year 2022. The Audit Committee and the Board of Directors recommend that the shareholders ratify this appointment.

Representatives of PricewaterhouseCoopers LLP will attend the Annual Meeting with the opportunity to make a statement if they desire to do so, and will be available to respond to appropriate questions.

See “2021 and 2020 Audit Firm Fees,” above.

Vote Required

The ratification of the appointment of PricewaterhouseCoopers LLP as independent registered public accountants for 2022 will require the affirmative vote of the holders of a majority of the shares of common stock of NW Holdings present, or represented by proxy, and entitled to vote on the matter at the Annual Meeting. Broker non-votes are counted for purposes of determining whether a quorum exists at the Annual Meeting, but are not counted and have no effect on the results of the vote.

The Audit Committee and the Board of Directors recommend a vote FOR this proposal.

OTHER MATTERS

Management does not know of any other matters to be presented at the Annual Meeting. If other matters should be properly presented at the meeting, the persons named in the accompanying proxy will vote the shares represented by such proxy with respect to such matters in accordance with their best judgment.

Consolidation Services Provided

The consolidation of an individual's multiple proxy cards into one envelope is a service NW Holdings provides based on Social Security Number or Tax ID Number match.

If you received a consolidated mailing this year and you would like to receive a separate annual report or proxy statement for each account with the same Social Security Number, please submit your request to Shareholder Services, Northwest Natural Holding Company, 250 SW Taylor Street, Portland, OR 97204 or call (800) 422-4012, ext. 2402. NW Holdings will promptly send additional copies of the annual report and/or proxy statement upon receipt of such request.

Delivery of Proxy Materials to Households

Only one copy of our annual report and Proxy Statement will be delivered to an address where two or more shareholders reside unless we have received contrary instructions from a shareholder at the address. A separate proxy card will be delivered to each shareholder at the shared address.

If you are a shareholder who lives at a shared address and you would like additional copies of the annual report, this Proxy Statement, or any future annual reports or proxy statements, contact Shareholder Services, Northwest Natural Holding Company, 250 SW Taylor Street, Portland, OR 97204 or call (800) 422-4012, ext. 2402. NW Holdings will promptly send additional copies of the annual report and/or proxy statement upon receipt of such request.

If you share the same address with another NW Holdings shareholder and you currently receive multiple copies of annual reports or proxy statements, you may request delivery of a single copy of future annual reports or proxy statements at any time by calling Broadridge Financial Solutions, Inc. at (866) 540-7095, or by writing to Broadridge Financial Solutions, Inc., Attn: Householding Election, 51 Mercedes Way, Edgewood, NY 11717.

Many brokerage firms and other shareholders of record have procedures for the delivery of single copies of company documents to households with multiple beneficial shareholders. If your family has one or more "street name" accounts under which you beneficially own shares of NW Holdings common stock, please contact your broker, financial institution, or other shareholder of record directly if you require additional copies of this Proxy Statement or NW Holdings' annual report, or if you have other questions or directions concerning your "street name" account.

Electronic Delivery of Annual Meeting Materials

If you would like to reduce the costs incurred by NW Holdings in mailing proxy materials, you can consent to receive all future proxy statements, proxy cards and annual reports electronically via e-mail or the internet. To sign up for electronic delivery, please follow the instructions above under "How to Vote By Proxy and Revoke Your Proxy" to vote using the internet and, when prompted, indicate that you agree to receive proxy materials electronically.

2023 ANNUAL MEETING OF SHAREHOLDERS

The SEC's proxy rules require that any shareholder proposal to be considered for inclusion in NW Holdings' proxy statement for the 2023 Annual Meeting of Shareholders must be received at NW Holdings' principal executive office no later than December 15, 2022.

NW Holdings' Bylaws require shareholders to give NW Holdings advance notice of any proposal to be submitted at any meeting of shareholders. The Bylaws prescribe the information to be contained in any such notice, and a copy of the relevant provisions of the Bylaws will be provided to any shareholder upon written request to the Corporate Secretary of NW Holdings. For any shareholder proposal to be considered at the 2023 Annual Meeting of Shareholders, the shareholder's notice must be received by NW Holdings' Corporate Secretary no later than February 22, 2023. The SEC's proxy rules allow NW Holdings to use discretionary voting authority to vote on a matter coming before an annual meeting of shareholders, which is not included in NW Holdings' proxy statement, if NW Holdings does not have notice of the matter before the deadline established in its Bylaws. In addition, discretionary voting authority may generally also be used if NW Holdings receives timely notice of such matter (as described above), and if, in the proxy statement, NW Holdings describes the nature of such matter and how NW Holdings intends to exercise its discretion to vote on such matter.

COMPANY INFORMATION

NW Holdings makes available at **www.nwnaturalholdings.com** among other things, its:

- Corporate Governance Standards;
- Director Independence Standards;
- Director Selection Criteria;
- Charters of the Governance, Audit, Organization and Executive Compensation, Finance, and Public Affairs and Environmental Policy Committees; and
- Code of Ethics.

You may request a copy of these documents, at no cost to you, by contacting Shareholder Services at Northwest Natural Holding Company, 250 SW Taylor Street, Portland, OR 97204, or by calling (800) 422-4012, ext. 2402.

Shareholders and other interested parties may communicate with the Chair of the Board or the non-management directors of the Board by mailing correspondence to Northwest Natural Holding Company, 250 SW Taylor Street, Portland, OR 97204, Attn: Corporate Secretary.

Websites

The information contained on the websites referenced in this Proxy Statement are not incorporated by reference into this filing. Further, references to website URLs are intended to be inactive textual references only.

SOLICITATION OF PROXIES

Proxies may be solicited on behalf of the Board of Directors by regular employees in person or by mail, telephone, the internet or facsimile transmission. NW Holdings will reimburse brokers or other persons holding stock in their names or in the names of their nominees for their reasonable expenses incurred in forwarding proxies and proxy materials to the beneficial owners of such shares. All solicitation costs will be borne by NW Holdings. NW Holdings has retained D.F. King & Co., Inc. to assist in the solicitation of proxies from banks, brokers and nominees at a fee of $7,500 plus reasonable out-of-pocket expenses. Shareholders may assist NW Holdings in avoiding expenses in this connection by voting their proxies promptly.

If you are unable to attend the Annual Meeting, please mark, date, sign and mail the enclosed proxy, or, alternatively, grant your proxy by telephone or the internet, so that the business of the meeting can be transacted.

By Order of the Board of Directors,

Portland, Oregon
April 14, 2022

Shawn M. Filippi
Vice President, Chief Compliance Officer
and Corporate Secretary

EXHIBIT A

Approved Compensation Peer Group

American States Water Company
Atmos Energy Corporation
Avista Corporation
California Water Service Group
Chesapeake Utilities Corporation
Essential Utilities, Inc.
IDACORP, Inc.
MGE Energy, Inc.
NorthWestern Corporation
ONE Gas, Inc.
Otter Tail Corporation
PNM Resources, Inc.
Portland General Electric Company
SJW Group
South Jersey Industries, Inc.
Southwest Gas Holdings, Inc.
Spire Inc.
Unitil Corporation

EXHIBIT B

WTW Energy Services Industry Executive Compensation Survey Report—2020
(Revenue less than $1B)

ACES Power Marketing
American Transmission
California Independent System Operator Corporation
Chesapeake Utilities Corporation
CLEAResult
Colorado Springs Utilities
Core Laboratories
El Paso Electric
ElectriCities of North Carolina
Energy Northwest
Energy Solutions
ERCOT
Essential Utilities Inc.
Framatome
Great River Energy
IHI Power Services
Institute of Nuclear Power Operations
ISO New England
Knoxville Utilities Board
Midcontinent Independent System Operator, Inc.
Old Dominion Electric Cooperative
Orlando Utilities Commission
Orsted Offshore
Orsted Onshore
Pedernales Electric Cooperative
PJM Interconnection
Snohomish County PUD
SouthWest Water
Summit Midstream
URENCO

EXHIBIT C

WTW Energy Services Industry Executive Compensation Survey Report—2020
(Revenue $1B to $3B)

Atmos Energy
Avista Corporation
Boardwalk Pipeline Partners, LP
BWX Technologies, Inc.
Cleco
Colonial Pipeline Company
CPS Energy
Duquesne Light
EDF Renewable Energy
Enable Midstream Partners
Energy Harbor
Genesis Energy
Hawaiian Electric Industries
Helmerich & Payne
Idaho Power
IGS Energy
ITC Holdings Corp.
JEA Energy LLC
Lower Colorado River Authority
Nebraska Public Power District
New Jersey Resources
New York Power Authority
NorthWestern Energy, LLC
NuStar Energy
Oak Ridge National Laboratory
OGE Energy Corp.
Oglethorpe Power Corporation
Omaha Public Power District
ONE Gas, Inc.
PNM Resources, Inc.
Portland General Electric Company
Precision Drilling
Renewable Energy Systems
RWE Renewables
Santee Cooper
South Jersey Industries, Inc.
Spire Inc.
Talen Energy
UNS Energy Corporation

EXHIBIT D

WTW General Industry Executive Compensation Survey Report—2020
(Revenue $500M to $1B)

ADTRAN
American Cancer Society
American Heart Association
American University
Ariens Company
Auburn University
Bush Brothers & Company
California Institute of Technology
Chicago Transit Authority
City of Greensboro
Compassion International
DePaul University
Dorman Products
Driscoll Children's Hospital
Duke Realty
Elementis
Environmental Chemical Corp
EXL Service
Gerson Lehrman Group
Glatfelter
GOJO Industries
Grande Cheese
Grupo Cementos de Chihuahua
HarbisonWalker International
High Company
Hirose Electric
Infirmary Health System
Inmar Inc.
Innophos
Institute of Electrical & Electronic Engineers (IEEE)
International Data Group
Ixom
Jack in the Box
Judicial Council of California
Kapsch Partner Solutions
KI, Inc
Kodak Alaris
Lutron Electronics
Mary Washington HealthCare
Memorial Medical Center
Mercy Iowa City
Minneapolis School District
MTS Systems
Myers Industries
NIBCO Inc.
Northern Arizona University
Northwest Permanente PC
Perdoceo Education Corporation
Persistent
Port of Seattle
Public Broadcasting Service
Rayonier
Reiter Affiliated Companies
Rice University
Rivian Automotive
S&C Electric
Salem Health
San Antonio Water System
Signant Health
SWIFT
TaylorMade Golf
TomTom
University Health Care System
University of Phoenix
Valley Health System
Valleywise Health
Virginia Commonwealth University
Winpak Portion Packaging
Wyoming Medical Center
Yuma Regional Medical Center

EXHIBIT E

American Gas Association Executive Compensation Survey—2020

Atmos Energy Corporation
Avista Corporation
CenterPoint Energy, Inc.
Chesapeake Utilities Corporation
Citizens Energy Group
CPS Energy
Dominion Energy
Dominion Energy Southeast Energy Group
DTE Energy
Entergy Corporation
Equitrans Midstream Corporation
Eversource Energy
Hawaii Gas
Knoxville Utilities Board
LG&E and KU Energy LLC
MDU Resources
Memphis Light, Gas & Water
Metropolitan Utilities District
Mountaineer Gas Company
National Fuel Gas Company
National Gas & Oil Cooperative
New Jersey Resources Corporation
NiSource Inc.
NorthWestern Energy, LLC
ONE Gas, Inc.
Peoples Natural Gas
Philadelphia Gas Works
Puget Sound Energy, Inc.
SEMCO Energy, Inc.
Sempra Energy
South Jersey Industries
Southern Company Gas
Southern Star Central Gas Pipeline
Southwest Gas Corporation
Spire Inc.
Summit Utilities
TC Energy (TECO Energy)
UGI Utilities
Valley Energy
Vermont Gas Systems
Washington Gas
Xcel Energy Inc.

EXHIBIT F

Relative TSR Peer Group for 2021-2023 Performance Share Cycle

Atmos Energy Corporation
Avista Corporation
Black Hills Corporation
MGE Energy, Inc.
New Jersey Resources Corporation
NiSource, Inc.
NorthWestern Corporation
ONE Gas, Inc.
South Jersey Industries, Inc.
Southwest Gas Holdings, Inc.
Spire, Inc.
Unitil Corporation

EXHIBIT G

NORTHWEST NATURAL HOLDING COMPANY

EMPLOYEE STOCK PURCHASE PLAN
(as amended as of October 1, 2018 and February 24, 2022)[1]

1. Purposes of the Plan

The purposes of this Employee Stock Purchase Plan (the "Plan") are to encourage employees to become stockholders in Northwest Natural Holding Company (the "Company"), to stimulate increased interest on their part in the affairs of the Company, to afford them an opportunity to share in the profits and growth of the Company, and to promote systematic savings by them. Effective October 1, 2018, Northwest Natural Gas Company ("Northwest Natural") became a wholly owned subsidiary of the Company and holders of Northwest Natural common stock became holders of Company common stock ("Common Stock"), and in connection with that transaction the Plan has been adopted and assumed by the Company and outstanding awards under the Plan have been assumed by the Company. The Plan purposes are sought to be accomplished under the Plan by enabling employees to subscribe for and purchase directly from the Company a limited number of the authorized and unissued shares of its Common Stock at a discount from the market price at the time offerings are made, with an opportunity to pay the purchase price in installments, by payroll deductions (including bonus deductions) over a period of not more than 27 months from the offering date. The Plan has been found desirable by the Board of Directors and is believed by management to be advantageous to employees desiring to become holders of Common Stock and in the best interests of the Company. Participation in the Plan is entirely voluntary. Each employee must decide whether it is in his or her best interests to purchase shares of Common Stock under the Plan.

2. Administration

The Plan shall be administered for the Company by the Employee Stock Purchase Plan Committee (the "Committee"), the membership of which shall be designated from time to time by the Chief Executive Officer of the Company. The Secretary or an Assistant Secretary of the Company shall serve as a member of the Committee and shall be responsible for recording and maintaining the Committee's records. The Company will pay all expenses incident to operation of the Plan, including costs of recordkeeping, accounting fees and legal fees.

3. Employees Eligible to Participate

Regular ~~full-time~~ employees of the Company and of any parent or subsidiary of the Company permitted to offer participation in an employee stock purchase plan under federal tax laws and designated by the Board of Directors (each, a "Participating Company") are eligible to participate in the Plan, including officers but excluding directors not otherwise employed by the Company or a Participating Company, and also excluding any employee who, after an offering under the Plan, would own or be deemed (under Section 424(d) of the Internal Revenue Code) to own stock (including stock which may be purchased under outstanding options, if any, or offerings and subscriptions under the Plan) possessing 5% or more of the total combined voting power or value of all classes of stock of the Company or any parent or subsidiary of the Company.

A regular ~~full-time~~ employee is one who ~~has been~~*is currently* in the employ ~~of the Company or a Participating Company for at least six months and who is in the active service~~ of the Company or a Participating Company on the date an offering is made under the Plan, excluding, however, any employee whose customary employment is less than 20 hours per week or whose customary employment is for not more than five months per calendar year.

1 Text stricken through indicates deletions, and text underscored in italics indicates additions.

4. Method of Participation

Until the number of shares authorized under the Plan is exhausted, there may be an offering or offerings under the Plan each year on a date or dates to be determined beforehand by the Board of Directors. An eligible employee may participate in the Plan by completing a subscription and payroll deduction authorization pursuant to instructions provided by the Company within a number of days after the offering date, not to exceed 90, prescribed by the Board of Directors. The payroll deduction authorization will authorize the Company, or a Participating Company, to deduct a specific amount from the participating employee's regular paychecks during the period specified by the Board of Directors and/or a specific amount from any bonus paid to the employee during such period. The participating employee may not specify a regular payroll deduction amount that is less than $20 per month, and the aggregate of the regular deductions and the bonus deduction in any 12-month period must be no more than $21,250. The amount specified by the participating employee will only be deducted from a particular pay or bonus check if the employee has sufficient earnings available. All deductions from regular pay or bonus pay for a participating employee will be credited to the employee's account under the Plan. An employee may terminate participation in an offering as provided in Section 8, but may not otherwise change or modify the payroll or bonus deduction amount previously specified except in circumstances specified by the Committee. No interest will be paid on the amounts accumulated by the Company or the amounts held in the employee's account under the Plan.

No employee may purchase more than 900 shares in any offering. No employee will be allowed to subscribe for any shares under the Plan that would permit the employee's rights to purchase shares under all stock purchase plans (described in Internal Revenue Code Section 423) of the Company and its parent or subsidiaries, to accrue at a rate that exceeds $25,000 of fair market value of the shares (determined at the time such shares are offered) for each calendar year in which the right to subscribe or a subscription is outstanding.

Correspondence relating to the Plan should be forwarded by regular or Company mail to Employee Stock Purchase Plan Committee, Northwest Natural Holding Company, 250 SW Taylor Street, Portland, Oregon 97204.

5. Purchase Price

The purchase price of shares of Common Stock offered to employees under the Plan shall be 85% (rounded up to a full penny) of the fair market value of the Company's shares of such Common Stock on the date the offering is made. The fair market value of the shares will be the closing price quoted for the Common Stock on the exchange on the trading day immediately before the offering date.

6. Source of Stock and Allocation in Event of Oversubscription

All Common Stock issued under the Plan will come from authorized but unissued shares of Common Stock. A total of ~~1,200,000~~*1,400,000* shares of Common Stock, including shares of Northwest Natural common stock issued under the Plan prior to its assumption by the Company, has been reserved for this purpose (or such number of shares of the ~~1,200,000~~*1,400,000* shares or any unissued portion thereof into which such reserved shares may be changed as a result of any stock split, combination of shares, recapitalization or reclassifications of the Common Stock). If any offering is oversubscribed, each employee will be allotted the lesser of (a) the number of shares purchasable by the employee or (b) the number of shares obtained by multiplying the total number of shares available under the Plan by a fraction, the numerator of which is the employee's account balance and the denominator of which is the sum of all participating employee's account balances.

7. Purchase of Stock and Delivery

Unless a participant withdraws from an offering under the Plan as provided in Section 8 or unless limited by the second paragraph of Section 4, shares of Common Stock will be purchased automatically with the employee's contributed payroll and bonus deductions on the last day of the offering period. A transaction statement confirming the issuance in uncertificated form of the shares purchased by the participant shall be delivered to the

participant as promptly as practicable after the purchase date. No fractional shares will be issued. Any payroll and bonus deductions accumulated in a participant's account that are not applied toward the purchase of shares on the purchase date shall be returned to the employee without interest.

8. Termination of Participation

(a) **Voluntary Termination of Participation**. After an employee has begun participating in an offering under the Plan by initiating payroll deductions, the employee may terminate participation in the offering by delivering written notice to the Company in the form specified by the Company any time before the twentieth day before the end of the offering period. If the employee terminates participation in an offering, accumulated cash contributions in the employee's account will be returned to the employee without interest. An employee may not reinstate participation in the Plan with respect to a particular offering after terminating participation in the Plan with respect to that offering.

(b) **Termination of Employment**. If an employee's employment with the Company and the Participating Companies is terminated for any reason including death, retirement or disability, accumulated cash contributions in the employee's account will be returned to the employee without interest.

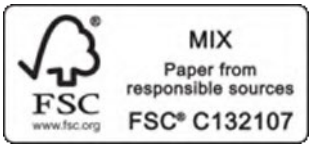
9. Rights Not Transferable

The right to purchase shares under the Plan is not assignable or transferable to any person.

10. Termination or Amendment of Plan

No subscription application will be accepted after all of the shares reserved for purposes of the Plan have been purchased. The Company reserves the right to reject any subscription application not meeting the requirements of this Plan, and the right to abandon, amend, modify, or suspend the Plan at any time without notice, and to revoke or terminate it at any time; provided, however, that no such amendment, revocation, or termination shall, without the employee's written consent, adversely affect any existing subscription or offering; and provided further that no such amendment of the Plan by the Board of Directors shall change the number of shares authorized to be offered under the Plan as stated in Section 6 hereof (other than a change merely reflecting a change in capitalization such as a stock dividend or stock split), change the price at which the shares shall be offered under the Plan to a price below that specified in Section 5 hereof, or change or modify the eligibility requirements contained in Section 3 hereof.

No shares may be purchased hereunder if such purchase would constitute a violation of the Securities Act of 1933, as amended, or the regulations promulgated thereunder, or of any other applicable law or regulation. The Company reserves the right to amend any offer made hereunder in any manner which may be necessary to cause the offer to conform with any law applicable thereto or any valid regulation promulgated under any such law, and any such required amendments may be made effective either before or after subscriptions have been received by the Company hereunder. If the terms of the offer shall be amended, however, after a subscription has been received, any employee who does not agree to the amendment may, if so desired, cancel the subscription and the Company thereupon will refund any payment made by the employee thereunder.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NW Natural HOLDINGS™

C/O AMERICAN STOCK TRANSFER & TRUST COMPANY, LLC
6201 15TH AVENUE
BROOKLYN, NY 11219

SCAN TO VIEW MATERIALS & VOTE

~How to Vote~
Please Choose One of the Following Voting Methods

VOTE BY INTERNET
Before the Meeting - Go to **www.proxyvote.com or scan the QR Barcode above**

Use the Internet to transmit your voting instructions and for electronic delivery of information up until 11:59 p.m. Eastern Daylight Time on May 22, 2022 or, for participants in the NW Natural 401(k) Plan, up until 11:59 p.m. Eastern Daylight Time on May 18, 2022. Have your proxy card in hand when you access the web site and follow the instructions to obtain your records and to create an electronic voting instruction form.

During The Meeting - Go to **www.virtualshareholdermeeting.com/NWN2022**

You may attend the 2022 Annual Meeting of Shareholders via the Internet and vote during the meeting. Have the information that is printed in the box marked by the arrow available and follow the instructions.

VOTE BY PHONE - 1-800-690-6903
Use any touch-tone telephone to transmit your voting instructions up until 11:59 p.m. Eastern Daylight Time on May 22, 2022 or, for participants in the NW Natural 401(k) Plan, up until 11:59 p.m. Eastern Daylight Time on May 18, 2022. Have your proxy card in hand when you call and then follow the instructions.

VOTE BY MAIL
Mark, sign and date your proxy card and return it in the postage-paid envelope we have provided or return it to Northwest Natural Holding Company, c/o Broadridge, 51 Mercedes Way, Edgewood, NY 11717.

TO VOTE, MARK BLOCKS BELOW IN BLUE OR BLACK INK AS FOLLOWS:

D74805-P68324

KEEP THIS PORTION FOR YOUR RECORDS
DETACH AND RETURN THIS PORTION ONLY

THIS PROXY CARD IS VALID ONLY WHEN SIGNED AND DATED.

NORTHWEST NATURAL HOLDING COMPANY

The Board of Directors recommends you vote FOR the following:

	For All	Withhold All	For All Except
Proposal 1.	☐	☐	☐

1. The election of four Class II directors for terms of three years.

Nominees:

01) Sandra McDonough
02) Jane L. Peverett
03) Kenneth Thrasher
04) Charles A. Wilhoite

To withhold authority to vote for any individual nominee(s), mark "For All Except" and write the number(s) of the nominee(s) on the line below.

_____

The Board of Directors recommends you vote FOR proposals 2, 3 and 4.

	For	Against	Abstain
Proposal 2.			
2. Amend the Company's Employee Stock Purchase Plan to modify eligibility requirements and increase shares reserved for issuance.	☐	☐	☐
Proposal 3.			
3. Advisory vote to approve Named Executive Officer Compensation.	☐	☐	☐

	For	Against	Abstain
Proposal 4.			
4. The ratification of the appointment of PricewaterhouseCoopers LLP as Northwest Natural Holding Company's independent registered public accountants for the fiscal year 2022.	☐	☐	☐

NOTE: Such other business as may properly come before the meeting or any adjournment thereof.

This proxy when properly executed will be voted in the manner directed herein by the shareholder whose signature appears below. **If no direction is made, the proxy will be voted FOR Proposals 1, 2, 3 and 4.**

Please sign exactly as your name(s) appear(s) hereon. When signing as attorney, executor, administrator, or other fiduciary, please give full title as such. Joint owners should each sign personally. All holders must sign. If a corporation or partnership, please sign in full corporate or partnership name by authorized officer.

PLEASE SIGN, DATE AND RETURN PROMPTLY IN THE ENCLOSED ENVELOPE.

Signature [PLEASE SIGN WITHIN BOX] Date

Signature (Joint Owners) Date

Important Notice Regarding the Availability of Proxy Materials for the Annual Meeting:
The Annual Report and Notice and Proxy Statement are available at www.proxyvote.com.

D74806-P68324

REVOCABLE PROXY

NORTHWEST NATURAL HOLDING COMPANY
Proxy for 2022 Annual Meeting of Shareholders
May 23, 2022 2:00 p.m. Pacific Daylight Time
This proxy is solicited on behalf of the Board of Directors

The undersigned hereby appoints MardiLyn Saathoff, Frank H. Burkhartsmeyer, and Shawn M. Filippi, and each or any of them, the proxy or proxies, with power of substitution and with authorization to vote all of the common shares of the undersigned at the Annual Meeting of Shareholders of Northwest Natural Holding Company to be held virtually on Monday, May 23, 2022 at www.virtualshareholdermeeting.com/NWN2022, and at all adjournments thereof: (i) as designated on the reverse side of this card; and (ii) at their discretion, upon any and all other matters, which properly may be brought before such meeting or any adjournment thereof.

If shares of the Company's common stock are held for the account of the undersigned under the Northwest Natural Holding Company Dividend Reinvestment and Direct Stock Purchase Plan or Northwest Natural Gas Company Retirement K Savings Plan, then the undersigned hereby directs the respective fiduciary or trustee of each applicable plan to vote all shares of Northwest Natural Holding Company common stock in the undersigned's name and/or account under such plan, in accordance with the instructions given herein, at the 2022 Annual Meeting and at any adjournments or postponements thereof, on all matters properly brought before such meeting or any adjournment thereof, including, but not limited to, the matters set forth on the reverse side.

Continued and to be signed on reverse side

CUB Exhibit 204 is Confidential and has been served upon the Commission and each party designated to receive confidential information pursuant to Order 21-461.

NW Natural

Rates & Regulatory Affairs
UG 435
Request for a General Rate Revision
Data Request Response

Request No.: UG 435 CUB DR 55

55. Refer to UG 435 / NWN / 1200 / Davilla / Page 18 / Lines 8-9, the Company states "Stock expense: 1.9 million expense – This expense includes the employee stock purchase plan, as well as employee stock expense compensation."

a. Please provide a workpaper detailing how this expense was calculated.
b. How do customers benefit from an employee stock purchase plan?

Response:

a. Please reference the response to UG 435 OPUC DR 360.

b. The Employee Stock Purchase Plan, which allows employees to purchase stock at a discounted rate has successfully allowed NW Natural to attract and retain talent. Participating in an ESPP encourages employees to see their connection to the company success, encouraging employees to align their work focus and career with the company. This stake in the company can increase employee engagement and reduce turnover. Engaged employees would seek to reduce expenses, thereby increasing the value of their stock ownership which would benefit the customers. Customers of NW Natural benefit when employee turnover is low as more experienced workers are available to support their needs.

NW Natural

Rates & Regulatory Affairs
UG 435
Request for a General Rate Revision
Data Request Response

Request No.: UG 435 CUB DR 40

40. Refer to UG 435 NWN Response to CUB DR 38.
a. Please provide the 2021 cost per employee enrolled in the Universal Annual Pass Program.
b. Why does NW Natural offer Trimet Monthly Pass Program service to two employees, given the lower cost of the Trimet Universal Annual Pass Program.

Response:

a. The 2021 cost per employee enrolled in the Universal Annual Pass Program is $170.94.

b. These two passes are for bargaining unit employees who formerly worked at NW Natural's One Pacific Square office building and now work in other NW Natural facilities in the Portland metro area. To qualify for the universal annual pass program, TriMet requires all employees at a location to be enrolled in the program. A total of 51 employees are currently assigned to two locations. The two employees on Trimet Monthly Pass Program are not located at the two locations as the 51 employees on the universal annual pass program.

Rates & Regulatory Affairs
UG 435
Request for a General Rate Revision
Data Request Response

Request No.: UG 435 CUB DR 41

41. Refer to NWN Response to CUB DR 38 (b) (iv) regarding C-Tran. Please provide the average number of annual public transportation trips per employee receiving the C-Tran benefit from the last three calendar years (2019-2022).

Response:

NW Natural does not track the average number of annual public transportation trips per employee receiving the C-Tran benefit from the last three calendar years (2019-2022).

CUB/208
Gehrke/1

TRIMET

EMPLOYEE COMMUTE OPTIONS - Eigth Follow-up Survey Results
NW Natural - Downtown
220 NW 2nd Avenue
Portland, OR. 97209

Employee population (Eco-affected)	**529**
Questionnaires returned (Out of 529)	**438**
Response rate	**83%**

Survey	Date	Auto Trip Rate
Baseline	**Oct-95**	**85%**
First Follow-up	**Jul-97**	**82%**
Second Follow-up	**Jul-98**	**80%**
Third Follow-up	**Aug-00**	**74%**
Fourth Follow-up	**Jun-02**	**76%**
Fifth Follow-up	**Sep-12**	**65%**
Sixth Follow-up	**Jun-13**	**68%**
Seventh Follow-up	**Jul-16**	**65%**
Eigth Follow-up	**Jun-18**	**63%**

Three year ECO goal (10% reduction in Baseline auto trip rate)

Auto trip rate goal	**76%**
Weekly auto trips to reduce	**0**

This report summarizes your employees' responses to the Employee Commute Options survey. The results identify the modes of transportation your employees use to commute to your worksite and the number of weekly auto trips their choices generate. This report assumes that your company will need to comply with the Department of Environmental Quality's Employee Commute Options (ECO) Rule that targets a 10% reduction in auto trips taken to the worksite.

Weekly Employee Trips

The table below shows the number of employee trips TO this worksite during the week prior to the survey.

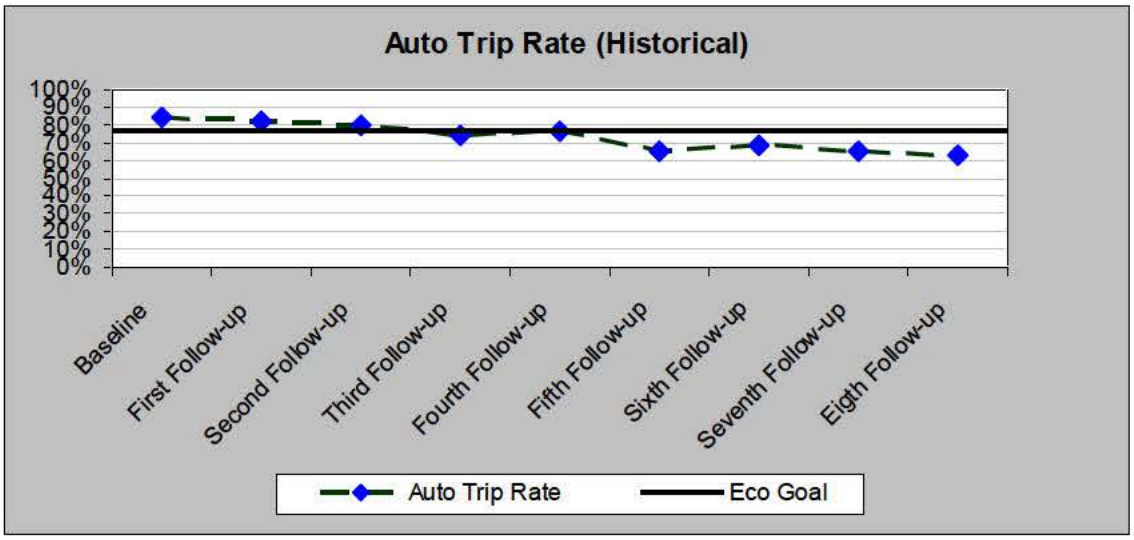
Number of trips	Total Weekly Trips	Drove alone	Carpool/Vanpool (by # of people in Carpool)						Bus/ Max	Bike	Walk	Bike+ Walk	Tele-Commute	Com-pressed Work Wk.
			2	3	4	5	6+	Total						
Reported	2107	1233	175	2	5	0	0	182	**467**	104	33	137	59	29
Total*	2545	1489	211	2	6	0	0	220	**564**	126	40	165	71	35
Total Auto Trips*	1597	1489	106	1	2	0	0	108	**0**	0	0	0	0	0
Percentage of Total Trips														
Baseline		78%	13%	0%	0%	0%	0%	13%	**8.1%**	--	--	1%	0%	0%
First Follow-up		76%	11%	2%	0%	0%	0%	13%	**9.3%**	1%	0%	1%	0%	0%
Second Follow-up		72%	15%	1%	0%	0%	0%	16%	**9.8%**	1%	0%	1%	0%	1%
Third Follow-up		69%	10%	1%	0%	0%	0%	11%	**19.1%**	--	--	1%	0%	0%
Fourth Follow-up		72%	8%	0%	0%	0%	0%	8%	**16.5%**	--	--	2%	1%	0%
Fifth Follow-up		60%	10%	1%	1%	0%	0%	12%	**18.9%**	6%	1%	7%	1%	1%
Sixth Follow-up		63%	11%	0%	0%	0%	0%	11%	**19.2%**	3%	1%	4%	1%	1%
Seventh Follow-up		60%	9%	1%	0%	0%	0%	10%	**20.6%**	5%	2%	6%	1%	2%
Eigth Follow-up		59%	8%	0%	0%	0%	0%	9%	**22.2%**	5%	2%	7%	3%	1%
Change from baseline**		-19%	-5%	0%	0%	0%	0%	-5%	**14.1%**	5%	2%	6%	3%	1%

*Adjusted to ECO-affected employees, N= 529.

**In percentage points, (Current Survey - Baseline). Figures may not add up due to rounding.

Auto Trip Rate

The chart below tracks the auto trip rate for your company. The ECO Goal indicates the auto trip rate needed to achieve ECO compliance.



Number of Employees Riding Bus/Max

The table below shows the number of employees* who commuted using Bus/MAX and the number of days they commuted on bus/MAX during the week prior to the survey.

Employees Riding Bus/Max, (N=170)	Number of Days							Total
	One	Two	Three	Four	Five	Six	Seven	
Number	29	28	23	31	52	4	4	170
Percent	17%	16%	13%	18%	30%	2%	2%	100%

*Adjusted to ECO-affected employees, N= 529.

Reasons for Alternative Commute Choices

The table below gives reasons why employees* bus, MAX, carpool, vanpool, walk, or telecommute to work.

Reasons	Percentage
Better use of my time	34%
Saves Money	25%
Employer pays all or part of the cost of a TriMet pass	8%
Less stress than driving alone	7%
Saves time	5%
Have more flexibility	4%
Special parking available for carpools	3%
Reduces air pollution	2%
Enjoy commuting with other people	1%
Reduces traffic congestion	0%
Parking is costly	0%
My employer offers incentives	0%
Bus or MAX stops near my work	0%
Do not have a car to use	0%
Exercise	0%
Parking is hard to find	0%
Other	1%

*Only those employees who used an alternative commute option are captured in this table. N=225

"Other" Responses

The list below contains the survey numbers for all respondents giving an "Other" response when asked why they commute by bus, MAX, carpool, vanpool, bike, walking, or telecommuting. The verbatim responses for each respondent can be found on the surveys.

187
223
259
316
380

CUB/208
Gehrke/4

Technical Notes

Definitions

1. "Trips" are generated by people in their movement from one point to another. The trips that are recorded in this survey are trips people take to work (one way). For example, an employee working five days per week generates 5 trips. Any of those 5 trips that consist of auto usage are the trips that are targeted for a 10-percent reduction by the ECO Rule.

2. "Carpool or vanpool" - Two or more persons in a car or van traveling to work.

3. "Telecommute" - Work done at home during regular work hours, rather than at the usual worksite. (Represents a trip not taken to the workplace.)

4. "Compressed work week" - A day off work because a full-time schedule is worked in less than 5 days per week, e.g., four 10-hour days. (Represents a trip not taken to the work place.)

Assumption

The trip-reduction calculations in this report assume employees who did not complete the survey have the same commuting patterns as those who did complete the survey.

Fluctuations between Baseline and current survey

Change in number of employees:	
Change in ECO eligible employees	84
Change in number of respondents	117
Percentage point change in rate of return	11%

Calculations

1. "Baseline auto trip rate" was calculated your baseline year's data:

Total auto trips	/ Total trips	= Auto trip rate
1817	*/ 2149*	*= 85%*

2. "Three year goal" (10% reduction in autotrip rate):

Baseline auto trip rate	* 90%	= Target auto trip rate
85%	** 0.90*	*= 76%*

3. "Weekly auto trips to reduce":

Current auto trips	- (Target auto trip rate	* Current total trips)	= Weekly auto trips to reduce
1597	*- (76%*	** 2545)*	*= None, ECO goal exceeded*

INVESTING IN GAS SYSTEM

Customer growth
- New construction & conversions
- Main extensions

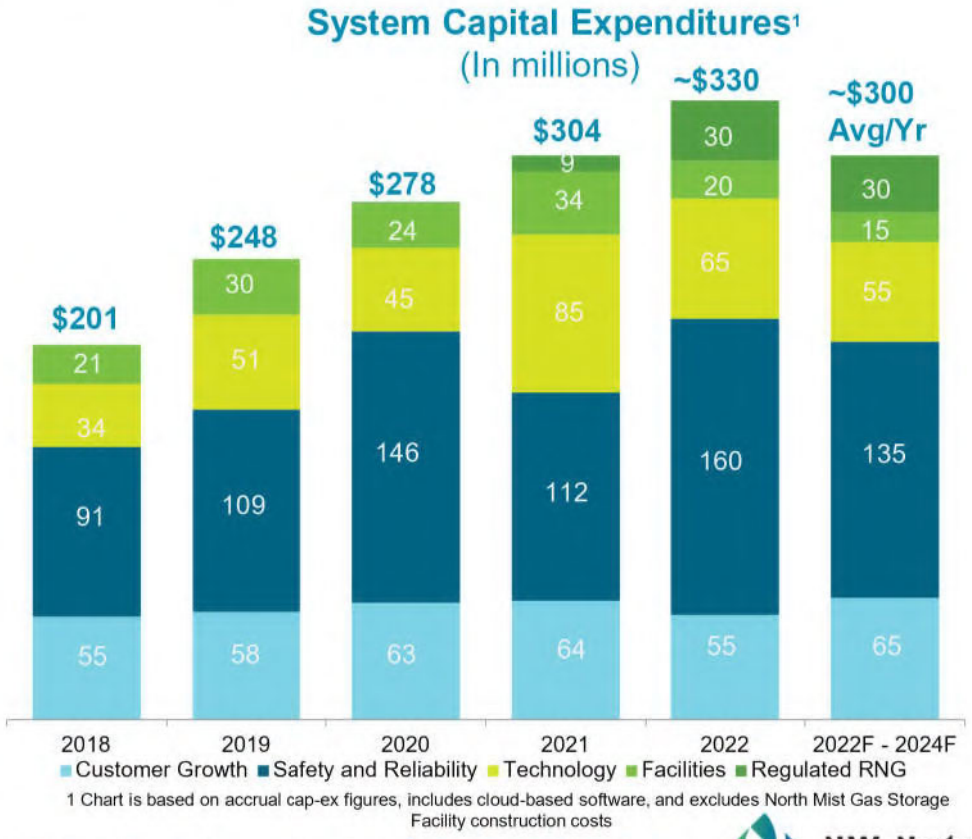
Safety & Reliability
- Recurring replacements
- Enhanced system reliability to support growth

Technology
- Cybersecurity
- Efficiencies and upgrades
- Enterprise resource planning system
- Customer information system

Facilities
- Resource and operations center renovations

Renewable Natural Gas (RNG)
- Planned investments for gas utility under Senate Bill 98

The timing and amount of the core capital expenditures and projects for 2022 and the next five years could change based on regulation, growth, and cost estimates. Additional investments in our infrastructure during and after 2022 that are not incorporated in the estimates provided will depend largely on additional regulations, growth, and expansion opportunities. Required funds for the investments are expected to be internally generated and/or financed with long-term debt or equity, as appropriate.



1 Chart is based on accrual cap-ex figures, includes cloud-based software, and excludes North Mist Gas Storage Facility construction costs

Five-Year 2022-26 Cap-Ex Approximately $1.4 Billion

NW Natural®

SB 98 - Senate Committee on Environment and Natural Resources (2-7-2019)

Cost cap and cost recovery section:

48:47 Anna Chittum, Business Development Segment Manager, NW Natural: "This bill includes some important customer protections. First of all, purchases or investments must be prudently incurred, and second there is a cap on the total amount that the utility can spend on renewable natural gas procurement each year that we cannot exceed without approval from the Commission."

54:20 Vice-Chair Senator Olsen: "So what, by using RNG, what's the cost implication to your customers. I know you've said everyone is clambering to get onboard with this, but have you told them your gas bill is going up by $100 a month?"

54:49 Zack Kravitz, Director, Rates and Regulatory Affairs, NW Natural: "There is a cost cap associated with the program especially for the large natural gas utilities at 5% annually of our revenue requirement, and what that actually translates to on a per customer basis, a residential customer, and this is an approximation at the moment, but about $2.50 - $3 a month."

Vice-Chair Senator Olsen: "Is the increase in their gas bill would only be $2.50-$3 a month"

Zack Kravitz: "That is correct, for a residential customer"

Chair Dembrow: "So I'm part of NW Natural's offset program, how much extra am I paying for that?"

Anna Chittum: "I believe, I wanna say, about $5 a month"

Chair Dembrow: "Will I get a rebate now under this?"

Anna Chittum: "I think we are going to keep it as a separate program, but you could have renewable natural gas on top of your offset programs."

Vice-Chair Senator Olsen: "Back to where we were, and for a commercial customer?"

Zack Kravitz: "It is closer to $11 a month."

Vice-Chair Senator Olsen: "Even in the quantity they consume it's only going to be $11 more."

Zack Kravitz: "Chair Dembrow, Vice-Chair Olsen, that is correct."

56:30 Vice-Chair Senator Olsen: "By you getting into the market of RNG, how does that impact those folks that are outside the utility, we give you a monopoly, how does that impact their ability to compete and do business in this RNG market."

Zack Kravitz: "As NW Natural gas company, we are required to purchase this gas for our customers. So we can buy conventional gas, or with this bill we can serve our customers with renewable natural gas. It is our company's mission to lower our carbon footprint and to decarbonize the product going through our pipe. As a utility we have to purchase gas, and we want to purchase as much renewable natural gas as possible. As part of purchasing renewable natural gas, one thing we're going to have to demonstrate to the Commission, and which is a part of this bill, that we're making prudent purchases. It's a slightly different

framework from how we currently purchase gas, which is only looking at a least cost resource. For this purchase, we will look at RNG and do an analysis based on our potential purchases of RNG for our least cost resource there. That can be in the form of a purchase from a third-party, or the qualified investment portion of this bill, if we are able to demonstrate to the Public Utilities Commission that a qualified investment is the least-cost acquisition of RNG we will do so. In terms of us being a monopoly, we still have to demonstrate that the purchase is a least-cost resource, so if there are other people out in the market selling this and it's a lower cost product than we could develop ourselves, we are going to go out and buy it ourselves…"

AWEC

01:48:21 Ed Finklea, Natural Gas Director, Alliance of Western Energy Consumers (AWEC)

"Good afternoon, Chair Dembrow, Vice-Chair Olsen, and other members of the committee. I am Ed Finklea, I'm the Natural Gas Director for the Alliance of Western Energy Consumers.

We have 55 member companies with facilities in Oregon, Washington, and Idaho. Our members have over 100 facilities in Oregon that use natural gas to make products, heat space, or heat water. The vast majority of our members purchase their own natural gas from marketers in what we call transportation service, which is simply a reference to how the gas is delivered. It's not a reference to how the gas is used, it's not gas in the transportation sector, it's our jargon for unbundling. Other members do purchase sales service from local distribution companies such as NW Natural and Avista in what we refer to as bundled sales service. The bill before you only applies to sales customers.

SB 98 proposes to allow Oregon gas utilities to voluntarily pursue purchases of renewable gas for their sales customers as an alternative to traditional natural gas that is produced from either wells or from shale. AWEC is not opposed to a voluntary effort to get bio-gas on the system to substitute for a portion of the portfolio used to serve sales customers.

We do however have concerns that the aggressive numbers in the bill may create an unrealistic expectation as to [the] degree to which renewable gas can replace traditional gas without simply driving up cost and receiving no cost-effective benefit for consumers or the environment. Natural gas is a critical energy source in Oregon and North America. For most of its direct applications there is no more efficient, less impactful way to heat space, water, cook food, or create heat for industrial processes. Natural gas has the least impact of the three fossil fuels when used today and will continue to be true so long as gas is used. For renewable gas to exist, a waste stream must create it. So, we are under no illusion that someday renewable gas is going to replace traditional gas. Lessons from the electric industry thus only apply to a small degree when we take on this discussion.

With all those cautions, AWEC is not opposed to allowing Oregon LDC's on a voluntary basis to fill a small portion of their sales portfolio with renewable gas. We are however concerned with the provisions of the bill that authorize the local distributors to spend up to 5% of their revenue requirement in any year on renewable gas purchases and investments in facilities. We're particularly concerned about investments to connect renewable gas sources to the gas distribution grid. This 5% number, I know it got reduced to a couple bucks a month, but for NWN it's $32 million dollars, that's over twice the size of the Company's last rate increase. These levels of increases could occur year after year and in the language of the bill, the distributor would get a tariff rider to automatically pass through those increases without the offsetting aspects of a general rate case. So, consumers are squarely being asked to foot the bill on this. Our

organization as consumer advocates we're just really not big fans of automatic pass-through clauses, everybody in the room would know I would have to be on that page.

AWEC is apprehensive about over-promising and under delivering in the field of renewable gas. But our primary concern is with the provision that allows up to 5% of revenue requirement to be spent, that is a great deal of money. At the same time, we are supportive of the notion of putting our toe in the water in the renewable gas field. I am available for any questions."

NW Natural

Rates & Regulatory Affairs
UG 435
Request for a General Rate Revision
Data Request Response

Request No.: UG 435 CUB DR 44

44. Refer to UG 435 – NWN / 1300 / Walker / Page 31,
a. What is the status of insurance claim proceeds for this incident? CUB requests that NWN supplement this data request if the Company receives insurance proceeds from this outage event.

Response:

NW Natural has pursued claims both with the responsible driver and their insurer, as well as the Company's own property insurance carrier for damages relating to the Hood River event as detailed below:

- **Claim on behalf of NW Natural against the responsible driver / insurer.**

  The responsible driver (Benjamin A. Solorio) had no insurance but was driving a vehicle owned and insured by his mother (Maria Solorio) at the time of the accident. We pursued claims against both these auto insurance policies: Safeco ($25,000 limit for property damage) and Geico ($10,000 limit for property damage).

  In addition to our direct efforts, on our behalf our excess carrier engaged a recovery specialist firm to assess the viability of direct actions against the driver and to confirm available insurance policies. However, given the driver's lack of assets and limited insurance coverage/policy limits, the costs of pursuing such claims were deemed unlikely to be exceeded by any further potential recovery. As a result, the parties reached a settlement (detailed further below) on insurance claims.

- **Claim on behalf of NW Natural with our property insurance carrier, AEGIS**

NW Natural has a $250,000 self-insured retention (like a deductible) for property loss coverage. We filed a claim with our carrier seeking to recover as much of the costs incurred by the Company in connection with this event. The claim submitted totaled $1,032,526.95. We are working on finalizing settlement of this claim with the insurer, and we will supplement this response if and when it receives insurance proceeds from this outage event.

Rates & Regulatory Affairs
UG 435
Request for a General Rate Revision
Data Request Response

Request No.: UG 435 CUB DR 60

60. Refer to NW Natural RG 2 "NWN's 2020 Reconciliation Report", NW Natural lists the following assumptions:

i. 11.7 pounds per therm based on the recognized standard of U.S. Energy Information Administration

ii. 170.94 therms per short ton

a. Please provide the source documents used to establish these two assumptions.

b. Please explain how these assumptions are used by the Smart Energy Program in calculating Greenhouse Gas Offset purchased by NWN.

Response:

a. Please refer to following the table with references:

Assumption	Value	Reference
Therms per MMBTU	0.10 MMBTU	
Pounds CO2 per MMBTU	116.65	EIA_CO2_coefficients.pdf
Pounds CO2 per therm	11.7 (rounded to tenth)	0.10 * 116.65
Pounds in a short ton	2,000	NIST Handbook-44e2022.pdf
Therms per short ton	170.94	2000 ÷ 11.7
Pounds in a metric ton	2,204.62 (rounded to hundredth)	NIST Handbook-44e2022.pdf
Therms per metric ton	188.43 (rounded to hundredth)	2204.62 ÷ 11.7

Please see UG 435 CUB DR 60 Attachment 1 for the EIA reference for pounds of CO2 per MMBTU. The referenced NIST handbook is voluminous, therefore screenshots are provided below. For convenience the link to the handbook is https://doi.org/10.6028/NIST.HB.44-2022

NIST handbook Appendix B – Units and Systems of Measurement
Handbook 44 – 2022 Page: B-12

4. Specialized Use of the Terms "Ton" and "Tonnage"

As weighing and measuring are important factors in our everyday lives, it is quite natural that questions arise about the use of various units and terms and about the magnitude of quantities involved. For example, the words "ton" and "tonnage" are used in widely different senses, and a great deal of confusion has arisen regarding the application of these terms.

The ton is used as a unit of measure in two distinct senses: (1) as a unit of mass, and (2) as a unit of capacity or volume.

In the first sense, the term has the following meanings:

(a) The short, or net ton of 2000 pounds.

(b) The long, gross, or shipper's ton of 2240 pounds.

(c) The metric ton of 1000 kilograms, or 2204.6 pounds.

In the second sense (capacity), it is usually restricted to uses relating to ships and has the following meaning:

(a) The register ton of 100 cubic feet.

(b) The measurement ton of 40 cubic feet.

(c) The English water ton of 224 British Imperial gallons.

In the United States and Canada the ton (mass) most commonly used is the short ton. In Great Britain, it is the long ton, and in countries using the metric system, it is the metric ton. The register ton and the measurement ton are capacity or volume units used in expressing the tonnage of ships. The English water ton is used, chiefly in Great Britain, in statistics dealing with petroleum products.

There have been many other uses of the term ton such as the timber ton of 40 cubic feet and the wheat ton of 20 bushels, but their uses have been local and the meanings have not been consistent from one place to another.

NIST Handbook 44 – 2022 Appendix C – General Tables of Units of Measurement
Page: C-15

Units of Mass Not Less Than Avoirdupois Ounces
(all underlined figures are exact)

Starting Unit ↓	Multiply by the Conversion Factor Below the Ending Unit:				
	Ending Unit →	**Avoirdupois Ounces**	**Avoirdupois Pounds**	**Short Hundred-weights**	**Short Tons**
1 avoirdupois ounce =		1	0.0625	0.000 625	0.000 031 25
1 avoirdupois pound =		16	1	0.01	0.000 5
1 short hundredweight =		1 600	100	1	0.05
1 short ton =		32 000	2 000	20	1
1 long ton =		35 840	2 240	22.4	1.12
1 kilogram =		35.273 96	2.204 623	0.022 046 23	0.001 102 311
1 metric ton =		35 273.96	2204.623	22.046 23	1.102 311

b. The factors provided in answer a above are used for purchasing offsets and reporting. Historically, reporting for the Commission and customers has been in short tons. Total therms from Smart Energy participants are divided by the therms per short ton factor of 170.94 to determine short tons used for reporting purposes.

   Please note that carbon markets transact in metric tons. A carbon offset is one metric ton of CO2. Total therms from Smart Energy participants are divided by the therms per metric ton factor of 188.43 to determine total carbon offsets to procure and retire.

Comparison of Rate Spread Proposals for RNG

	Sales Only	**NWN Proposal**	CUB Proposal
Residential	55.15%	39.66%	37.11%
Small Commerical	23.08%	16.60%	15.53%
Commerical Sales	12.62%	9.07%	8.49%
Commerical Transport	0.00%	1.56%	1.46%
Industrial Sales	9.15%	6.58%	6.16%
Industrial Transport	0.00%	26.53%	24.82%
Special Contract	0.00%	0%	6.43%

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 435

REDACTED OPENING TESTIMONY OF THE OREGON CITIZENS' UTILITY BOARD

EXHIBIT 300

I. INTRODUCTION

Q. Please state your name, occupation, and business address.

A. My name is Sudeshna Pal. I am an Economist employed by Oregon Citizens' Utility Board (CUB). My business address is 610 SW Broadway, Ste. 400 Portland, Oregon 97205.

Q. Please describe your educational background and work experience.

A. My witness qualification statement is found in exhibit CUB/301.

Q. What is the purpose of your testimony?

A. My testimony provides comments and suggestions for use per customer (UPC) forecast for Northwest Natural's (NWN) residential and commercial customer classes. UPC forecasting for gas customers can be performed in many different ways. The goal of forecasting is to obtain the best predictions. As explained in various parts of NW Natural/1400, the UPC forecast has important applications in the rate case analysis, including being used in conjunction with the customer forecast to derive the weather normalized volume forecast that is used to calculate revenues at existing rates in NWN's proposed revenue requirement.[1] It is therefore important to consider improvements to the forecasting models. CUB acknowledges that NWN responded to Staff's comments on forecasting methodology from the previous rate case, and appreciates the Company incorporating several of those recommendations in the current analysis.[2]

[1] UG 435 – NW Natural/1400/Wyman/5, lines 20-23; 6, lines 1-3.
[2] UG 435 – NW Natural/1400/Wyman/10, lines 1-18.

The existing literature on natural gas usage forecasting suggests multiple ways to improve model accuracy. I will discuss these suggestions and recommend that NWN consider these alternatives to see if there is room for improvement in UPC forecasting going forward.

II. UPC METHODOLOGY

Q. Does CUB find NWN's use per customer forecast methodology reasonable?

A. Yes. CUB finds that NWN's UPC forecast methodology is generally reasonable for creating base rates. However, CUB believes there may be room for improvement. CUB used the STATA software to rerun and verify models estimated by NW Natural from responses to Staff DR 283.

Q. What methodological improvement does CUB suggest for use per customer forecasting?

A. CUB suggests exploring:

- the use of a composite weather variable, especially for residential and small commercial customers, as opposed to simply using heating degree days as a proxy for weather patterns;
- using multiple heating degree days (HDD); and
- controlling for days of the week effect.

CUB will explain the benefits of using the above explanatory variables below.

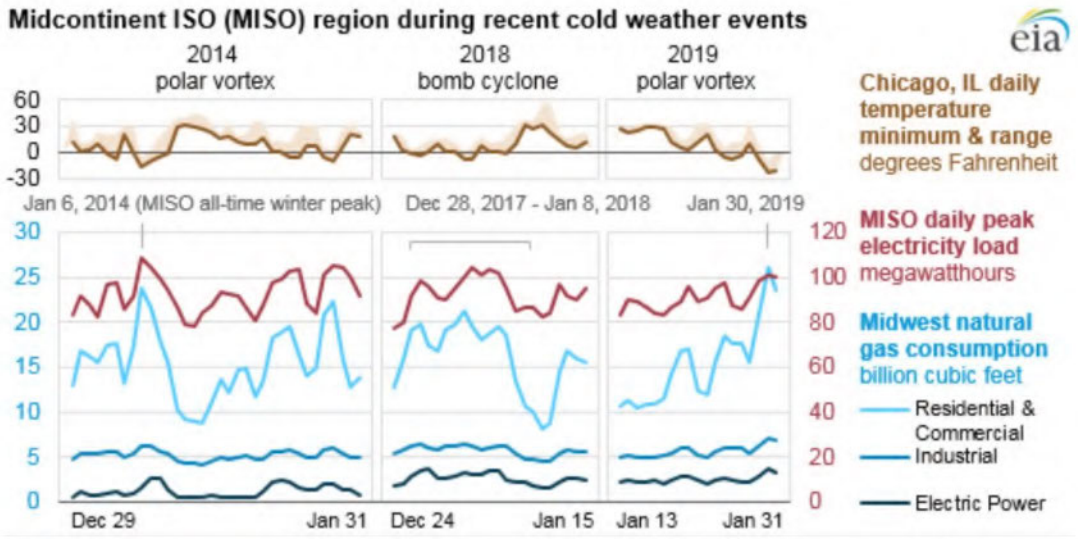
Q. What is a composite weather variable?

A. A composite weather variable (CWV) is a combination of various weather indicators, for example, temperature, wind speed, and others.

Q. Why is a CWV more appropriate weather indicator for residential and small commercial customers?

A. Residential and small commercial loads are not metered daily. Research shows that non-daily metered loads have greater weather sensitivity compared to loads that are metered daily such as large industrial loads (see Figure 1).[3] NW Natural/1400 also explains that residential load has greater weather sensitivity compared to industrial loads.[4]

Figure 1



The following graphs from National Grid's study[5] on gas forecasting methodologies shows a strong correlation between CWV and gas demand in general (see Figure 2), and particularly for non-daily metered (NDM) load (see

[3] Speake, Andrew, Paul Donohoo-Vallett, Eric Wilson, Emily Chen, and Craig Christensen. "Residential natural gas demand response potential during extreme cold events in electricity-gas coupled energy systems." *Energies* 13, no. 19 (2020): 5192, p.2, Figure 1; *see also*
National Grid. "Gas Demand Forecasting Methodology". November 2016, p.7, Table 1.1, *available at* https://www.nationalgrid.com/gas-transmission/document/132516/download.
[4] UG 435 - NW Natural/1400/Wyman/22, lines 5-14.
[5] National Grid. "Gas Demand Forecasting Methodology". November 2016, p.11, *available at* https://www.nationalgrid.com/gas-transmission/document/132516/download.

Figure 3). Figure 1 also shows how using a CWV as opposed to simply temperature improves model fit.

Figure 2

Figure 2.1 – Demand Plotted Against Temperature

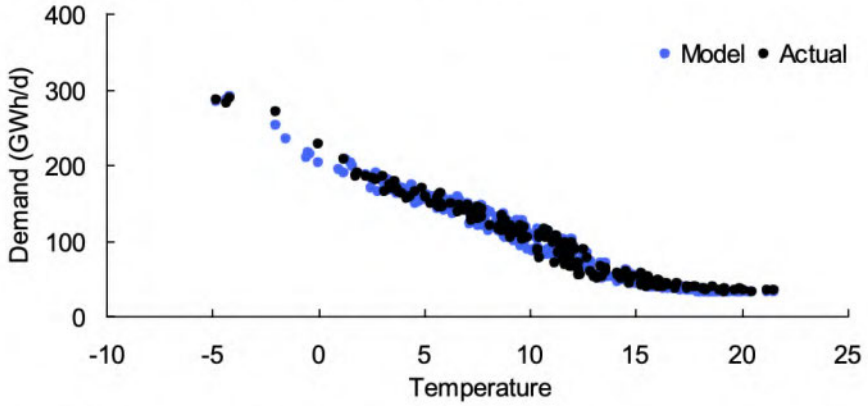


Figure 2.2 – Demand plotted against CWV

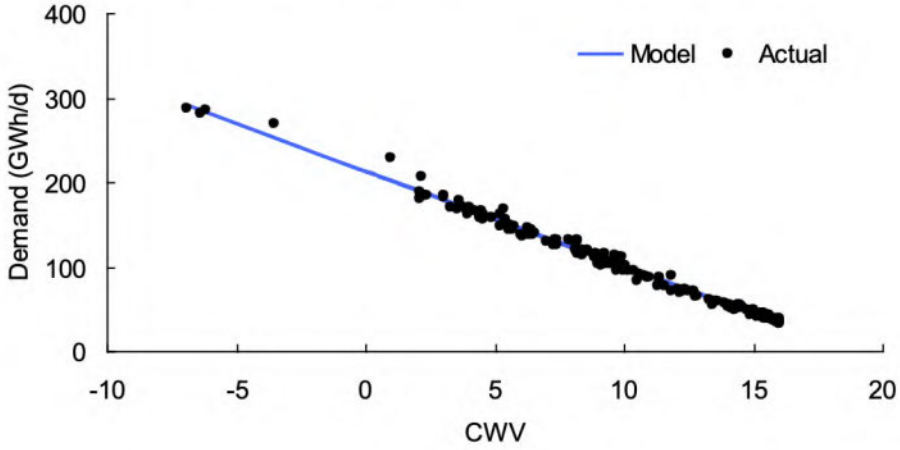


Figure 3

Figure 4.1 – NDM Demand 2010/11

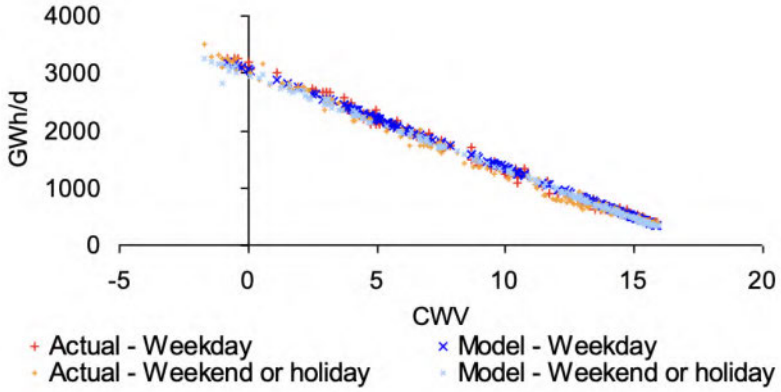


Figure 4.1 shows the relationship between NDM demand and CWV. The chart shows a strong relationship between CWV and gas demand.

CUB requests that NWN consider using CWV for its UPC forecast for the residential and small commercial loads.

Q. What other methodological refinements does CUB suggest?

A. CUB also suggests testing models with multiple HDDs, and using indicators for days of the week.

Q. What are multiple heating degree days?

A. Multiple HDDs refer to more than one HDD used in the forecast model to capture the dynamic nature of heat loss. Simply using the same HDD will not capture this effect.

Q. What forecasting improvement can be achieved by using multiple HDDs?

A. Multiple HDDs are used to capture the dynamic nature of heat loss. Heat loss is a measure of total transfer of heat through a building fabric from the inside to the outside via conduction, convestion, radiation or a combination of these. Heat loss is important as it will impact natural gas consumption needed to maintain a

certain indoor temperature for space heating. The greater the heat loss the greater is the need for energy and higher are the running costs.

Some studies have suggested using HDDs for current and previous days to account for the dynamic nature of heat loss.[6] Adjusting HDD for wind effect also captures the dynamic nature of heat loss. Buildings lose more heat on windy days and the impact of wind increases with HDD.[7]

Q. Why is it important to control for days of the week or holidays in daily UPC forecasting model?

A. Daily gas consumption varies by days of the week within and across customer segments. For instance, residential demand would be low during a work week compared to weekends when customers are not leaving their home to work from an office. The opposite would be true for commercial and industrial demand. It would be interesting to see if, however, we see a different pattern of gas use due to more work from home post-COVID-19 pandemic. Including indicators for days of the week, or even for the COVID lockdown days will capture this effect.

Similarly, holidays would also increase residential natural gas consumption while shifting demand away from commercial and industrial sectors. Controlling for holidays can capture this effect. CUB recommends that NWN use indicator variables for holidays in the forecast model.

[6] Vitullo et.al. "Mathematical Models for Natural Gas Forecasting." *Canadian Applied Mathematics Quarterly*, 17, No. 4 (Winter 2009):1005-1013.
[7] *Id.*

Q. Are there any other recommendations for the UPC forecast model?

A. CUB found that NW Natural uses several of the explanatory variables related to weather, weekdays, weekends and holidays in the Company's load forecast model in its IRP. CUB suggests that NW Natural make the load forecast model consistent across rate related and planning demand forecast models.[8]

Besides the modeling suggestions that CUB has presented in this testimony, the general recommendation is for NW Natural to continue to improve the current forecast model, review the evolving literature on gas consumption forecasting, and aim to incorporate granular data and advanced techniques in the analysis going forward. CUB looks forward to the results of incorporating CUB's suggestions into NWN's modeling in the Company's future general rate case or PGA forecast.

Q. Does this conclude your testimony?

A. Yes.

[8] Slide 42, NW Natural Technical Workgroup Meeting 2. https://webfrontend-sc-pd.azureedge.net/-/media/nwnatural/pdfs/twg2_loadforecast_february_11_2022_updatedandpostedround2.pdf?la=en&rev=e3adeb06f75c404db0747a9088e78c2e&hash=B767FC111E96E359CF9D5992DB6D7E3D

WITNESS QUALIFICATION STATEMENT

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EDUCATION: Ph.D., Economics
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Jawaharlal Nehru University, New Delhi, India

EXPERIENCE: Provided comments in several Oregon Commission dockets including LC 73, LC 70, LC 71, LC 74, LC 75, LC 76, LC 77. Written testimony in UG 388, UE 374, UE 394. Worked as Assistant Professor of Economics at Georgia College and State University (2003 -2008). Employed part-time as Adjunct Faculty in the Department of Economics at Portland State University (2014 – present).

UG 435– CERTIFICATE OF SERVICE

I hereby certify that, on this 22nd day of April, 2022, I served the **Confidential Opening Testimony of the Oregon Citizens' Utility Board** in docket UG 435 upon the Commission and each party designated to receive confidential information pursuant to Order 21-461 through a secure, encrypted attachment to an e-mail.

I hereby certify that, on this 22nd day of April, 2022, I served CUB's **Highly Confidential Opening Testimony of the Oregon Citizens' Utility Board** in docket UG 435 upon the commission and each party designated to receive highly confidential information pursuant to Modified Protective Order 21-465 via U.S. First Class Mail.

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Dated this 22nd day of April, 2022.

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