

# GENERAL CAPACITY WORKSHOP

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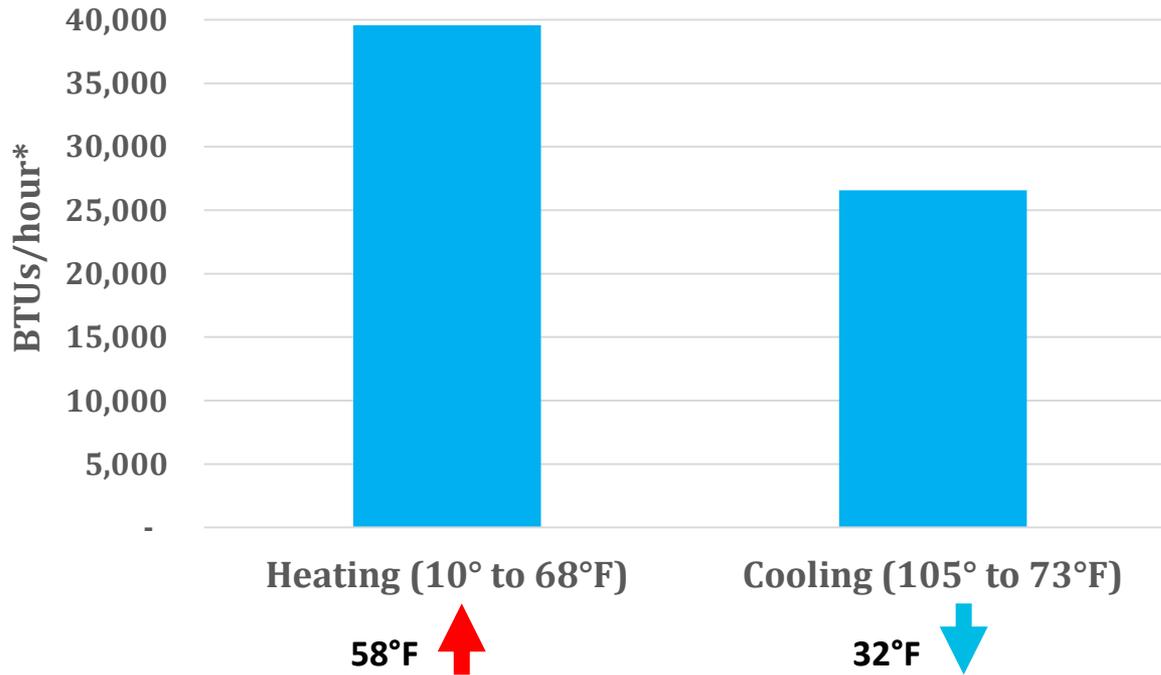
# What is capacity?

Capacity refers to the energy system infrastructure contributing to the ability to meet the region's **peak** demand for energy services

- When thinking about energy capacity, it needs to be inclusive of the whole energy sector
- Here in the Pacific Northwest, demand for energy services peaks during the winter
- A significant percentage of the peak demand for energy services is currently being served by direct use natural gas
- Energy storage capacity is currently a critical component to serving peak loads

# What makes a peak?

Energy Required to Heat or Cool the Average Oregon Home During Cold and Hot Events

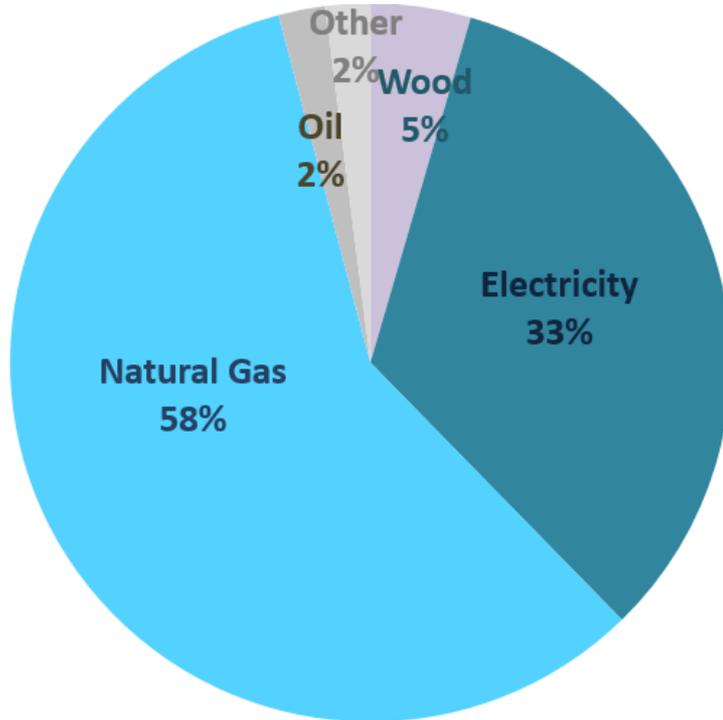


- Peak needs are typically driven by heating or cooling loads during extreme weather events
- In the NW it takes more energy to heat a home during cold snaps than to cool a home during heat waves
- When considering all energy use in the region, the NW is a winter peaking climate

\*Based upon energy needs of 2,000 square feet single family home with average shell efficiency. Shows the energy required to heat or cool a home, not the energy usage of the equipment used to provide those energy services

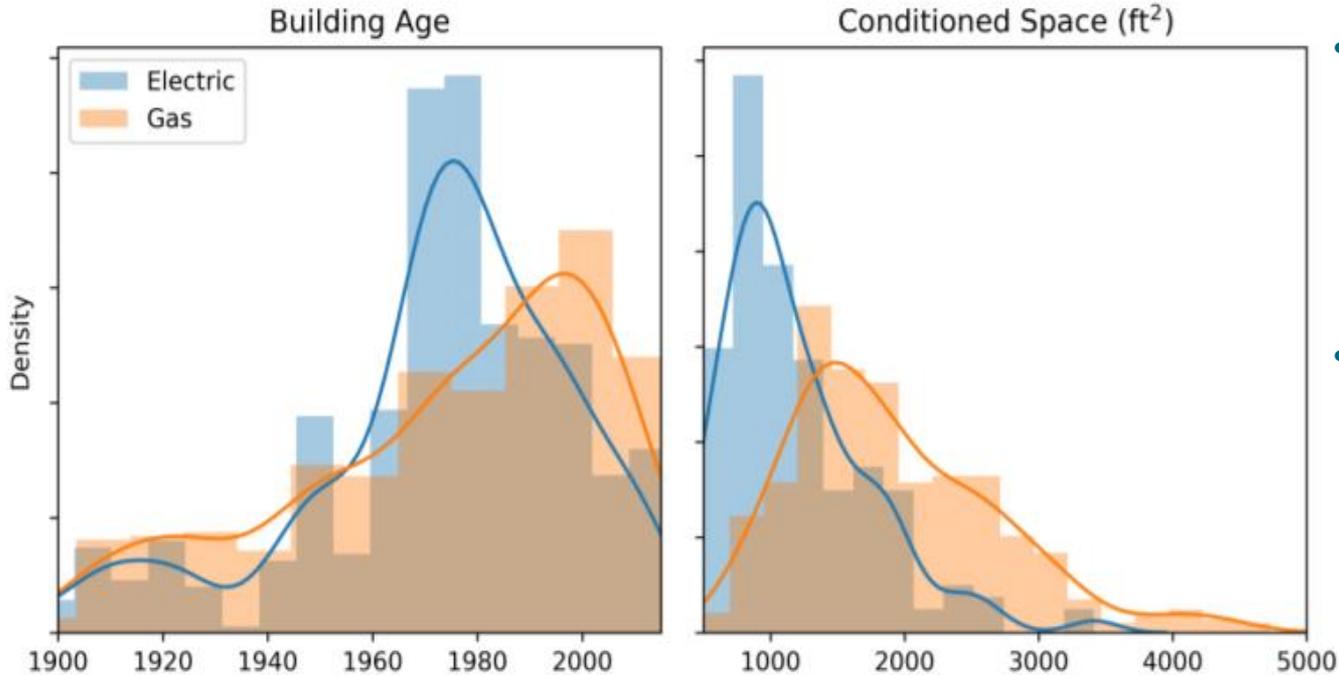
# Space Heating in Oregon

Space heating share of Oregon homes by fuel type



- The majority of homes in the region use direct use natural gas for space heating
- The number of units underestimates the share of the state's space heating energy needs served by natural gas

# Space Heating in Oregon



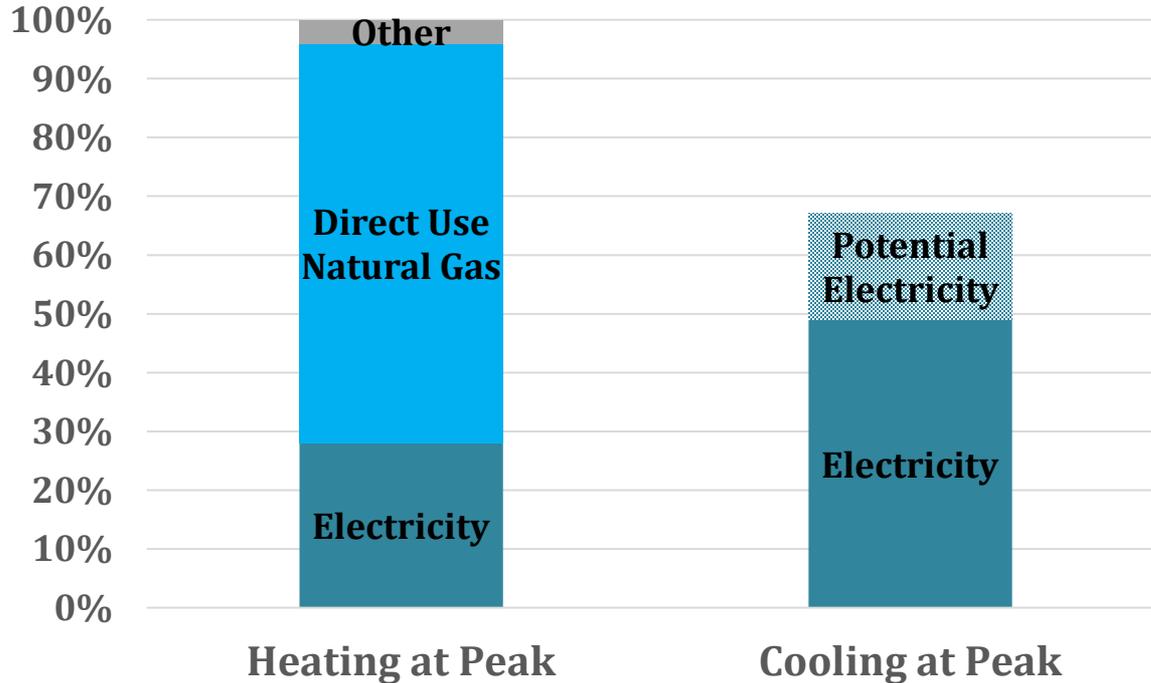
- On average, natural gas heated buildings are larger and newer than electric heated buildings.
- Combining this information with shares of housing units, 68% of regional space heating needs are served by direct use natural gas, compared to roughly 30% for electricity

Source: “Pacific Northwest Pathways to 2050: Achieving an 80% reduction in economy-wide greenhouse gases by 2050” by Energy and Environmental Economics.

[https://www.ethree.com/wp-content/uploads/2018/11/E3\\_Pacific\\_Northwest\\_Pathways\\_to\\_2050.pdf](https://www.ethree.com/wp-content/uploads/2018/11/E3_Pacific_Northwest_Pathways_to_2050.pdf)

# NW Shares of Peak HVAC Loads

Fuel Share of Energy Services Provided for Heating and Cooling During Cold and Hot Events



To understand customer electricity and natural gas use the efficiency of the heating and cooling equipment also needs to be known. For example, the average electric space heating end use equipment efficiency in the region is currently around 100% during a winter peak and closer to 300% during a summer peak. Potential electricity for cooling is the share of electric load needed to serve buildings in the region currently without air conditioning.

- The region's energy delivery capacity that allows reliable service during extreme cold weather is highly dependent upon the direct use natural gas system
- As we look toward a more regional approach to resource adequacy and capacity planning, it is important to consider and value all interdependent systems that deliver energy to Oregonians



# Electric and Direct Use Natural Gas Grids Peak Concurrently

During last severe cold snap:

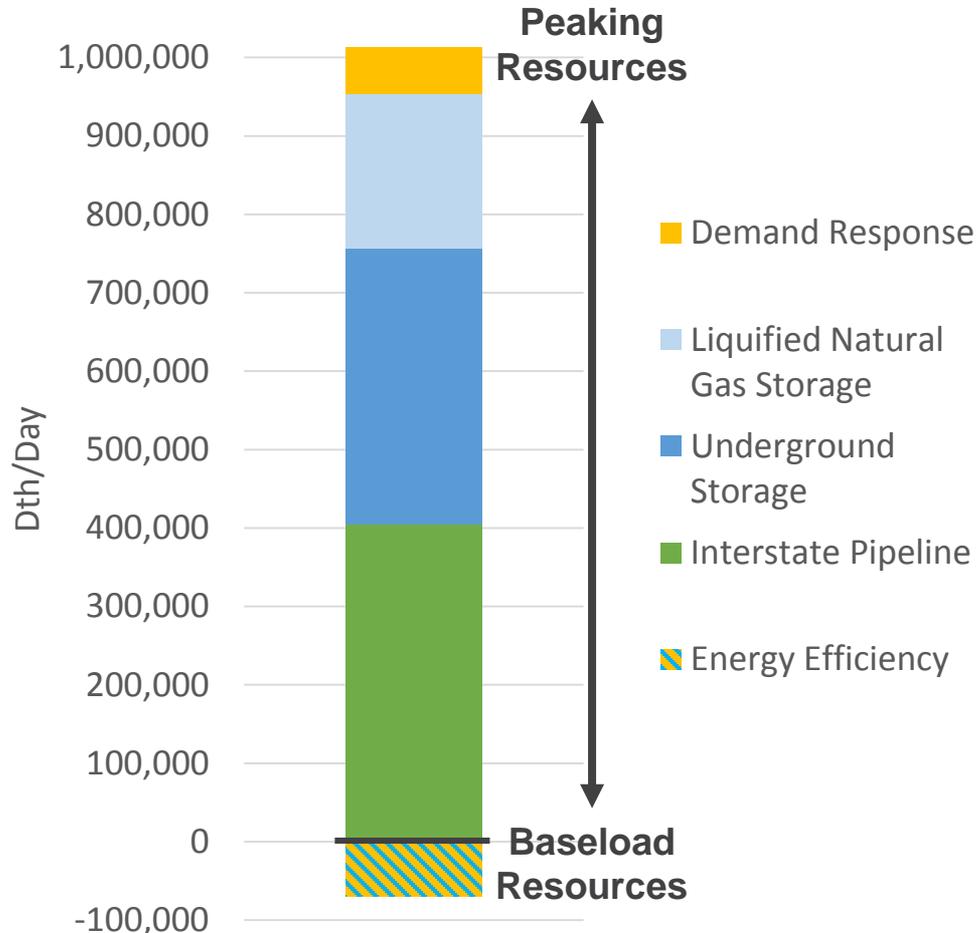
The region's electric system experienced the largest peak in the region in the last few years during the 7am hour on Jan 5<sup>th</sup> 2017, with a load less than 30 GW

During the same hour, the direct use of natural gas system also experienced its largest peak in recent years and delivered about 1.5 million therms of natural gas to homes and businesses in the PNW

In BTUs :

1.5 million therms  $\approx$  44 GWh

# NW Natural's Current Capacity Resources



- NW Natural's Current Capacity Resources just over 1 Bcf/day
- The gas industry has a long history of demand response through interruptible tariffs and industrial recall agreements
- Peak savings from energy efficiency is considered a capacity resource
- Storage accounts for 54% of NW Natural's daily capacity
- Regional storage is currently a critical part of serving space heating demand for both the electric grid and gas system

# Answering the Key Question

How do the resource characteristics factor into the definition of capacity?

- Dispatchable – what is the firm contribution of a resource to meet peak energy demand
- Storage Capacity – correctly value hourly, daily, and seasonal storage appropriately
- Carbon Intensity – the value of reducing GHGs to meet carbon reduction goals
- Geographic placement – value to the transmission and distribution systems for geographically placed resources

# Capacity Characteristics

		Natural Gas Capacity Resources			
Electric Resources		Direct Use		Demand-side Options	
Wind, Solar, CCT, etc.		Conventional	RNG	Demand Response	Energy Efficiency
Dispatchable		✓	✓	✓	
Storable		✓	✓	?	
Renewable			✓		✓
Distributed			?	✓	✓