Energy Trust of Oregon

UM 2005 Survey Responses

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Submitted August 30, 2019

Contents

The following written survey responses are provided to OPUC staff as requested to inform UM 2005: Investigation into Distribution System Planning. Responses are to Section E—Questions for Energy Trust of Oregon. As directed by OPUC staff, responses are provided for Energy Trust planning and investments in electric efficiency and renewable energy, and do not include information related to natural gas efficiency planning and investments.

Organizational Overview

Energy Trust is an independent nonprofit organization, selected and overseen by the Oregon Public Utility Commission, to lead 1.6 million Oregon utility customers in benefiting from saving energy and generating renewable power. Energy Trust is funded by and serves Oregon customers of Portland General Electric, Pacific Power, Cascade Natural Gas and Avista, and Oregon and Washington customers of NW Natural.

Since 2002, Energy Trust's technical services, cash-back incentives and energy solutions have helped participating residential, commercial and industrial utility customers save nearly $3.4 billion on their utility bills. Energy Trust maintains a robust network of trade ally contractors, retailers, engineers, designers, architects and builders to serve customers. Energy Trust contributes to Oregon's energy goals by acquiring least-cost energy efficiency, helping transform markets to higher-efficiency products and practices, and making small-scale renewable energy investments more affordable.

Energy-efficiency programs support a range of customer investments, from efficient technologies and operations and maintenance practices to whole-building retrofits and new construction. As required by law, energy-efficiency measures supported by Energy Trust must be cost-effective, and the OPUC oversees Energy Trust's implementation of this requirement. Energy Trust designs and delivers the following efficiency programs: Existing Buildings, Existing Multifamily, New Buildings (including new multifamily buildings), Production Efficiency and Residential. Energy Trust maintains a contract with the Northwest Energy Efficiency Alliance (NEEA) for residential, commercial and industrial market transformation efforts.

Renewable energy programs and incentives are available for small-scale (less than 20 megawatt) renewable energy systems generating power from solar, hydropower, biopower, geothermal and, in limited cases, municipal owned community-scale wind. Energy Trust can fund the above-market costs of systems delivering power to PGE or Pacific Power. Energy Trust designs and delivers the following renewable energy programs: Solar and Other Renewables. The Solar program supports both residential and non-residential solar projects. The Other Renewables programs supports hydropower, biopower, geothermal and municipal owned community-scale wind projects.

More information about Energy Trust's background, funding sources, strategic plans, annual budgets, policies and energy-efficiency and renewable energy programs are available at www.energytrust.org/about.

Program Results

Provide annual savings/generation for years 2014-2018 for PGE and PAC service territories.

Portland General Electric Energy Efficiency Reportable Savings 2014 – 2018 (kWh)					
Program	**2014**	**2015**	**2016**	**2017**	**2018***
Existing Buildings	57,906,199	55,011,239	69,480,428	87,408,780	78,016,973
Existing Multifamily	12,999,498	14,573,338	13,196,187	11,589,816	11,829,506
New Buildings	32,214,540	24,684,622	37,461,575	34,957,547	40,462,039
NEEA Commercial	7,159,997	10,407,239	12,112,114	13,034,781	12,227,910
Production Efficiency	93,847,627	60,841,040	71,458,358	111,677,667	96,169,467
NEEA Industrial	1,902,703	815,972	699,557	550,349	534,218
Residential	70,460,223	76,655,966	95,655,542	93,746,485	39,857,717
NEEA Residential	37,193,078	28,606,202	28,075,767	23,922,899	24,738,374
Total	**313,683,865**	**271,595,618**	**328,139,528**	**376,888,324**	**303,836,204**

Portland General Electric Renewable Energy Generation 2014 – 2018 (kWh)					
Program	**2014**	**2015**	**2016**	**2017**	**2018***
Solar - Residential	4,595,715	6,370,918	5,442,134	5,750,336	7,398,603
Solar – Non-Residential	1,131,761	3,896,159	3,405,762	3,710,416	3,197,563
Other Renewables	0	15,333,960	0	0	0
Total	**5,727,476**	**25,607,037**	**8,847,896**	**9,460,752**	**10,596,166**

Pacific Power Energy Efficiency Reportable Savings 2014 – 2018 (kWh)					
Program	**2014**	**2015**	**2016**	**2017**	**2018***
Existing Buildings	33,223,971	36,578,691	47,891,008	55,328,270	42,941,157
Existing Multifamily	6,544,297	8,395,914	6,199,637	4,120,646	3,941,339
New Buildings	14,953,617	24,413,081	21,849,932	20,154,328	13,966,765
NEEA Commercial	4,975,589	7,232,147	8,416,892	9,058,067	9,123,314
Production Efficiency	50,538,236	41,965,046	45,600,415	48,423,240	50,320,716
NEEA Industrial	1,322,215	567,031	486,133	382,447	398,582
Residential	48,354,480	51,933,571	62,832,953	62,451,024	30,341,749
NEEA Residential	25,846,037	19,878,888	19,510,283	16,624,385	18,457,442
Total	**185,758,442**	**190,964,369**	**212,787,253**	**216,542,407**	**169,491,064**

Pacific Power Renewable Energy Generation 2014 – 2018 (kWh)					
Program	**2014**	**2015**	**2016**	**2017**	**2018***
Solar – Residential	2,167,795	2,990,254	4,120,813	4,889,792	4,395,800
Solar – Non-Residential	1,249,881	1,995,121	5,412,837	1,886,551	3,309,313
Other Renewables	10,846,199	2,107,650	81,895	14,551	807,000
Total	**14,263,875**	**7,093,025**	**9,615,545**	**6,790,894**	**8,512,113**

*Savings in 2018 have not been adjusted through Energy Trust's True-Up process. More information on Energy Trust's True-up process can be found at https://www.energytrust.org/wp-content/uploads/2019/06/True-Up-Report_2018.pdf

Per direction from OPUC staff, Energy Trust provided its energy efficiency and solar program impacts on utility peak demand in the 2017 and 2018 annual reports to the Oregon Public Utility Commission & Energy Trust Board of Directors:

a) Appendix 8 in the 2017 Annual Report to the Oregon Public Utility Commission & Energy Trust Board of Directors
b) Appendix 8 in the 2018 Annual Report to the Oregon Public Utility Commission & Energy Trust Board of Directors

In 2018, per direction from OPUC staff, Energy Trust provided a count of the solar installations that included "smart inverters" and/or battery storage. Between 2016 and the end of 2018, there were 76 solar plus advanced storage installations completed, totaling 1.09 MWh and 0.472 MW based on incentive documentation provided. For more information, see Appendix 9 in the 2018 Annual Report to the Oregon Public Utility Commission & Energy Trust Board of Directors

At what level of granularity are these results available? Locational? Hourly?

Energy Efficiency

Energy Trust has specific site addresses for many installed measures. Specific site addresses are not available for measures installed through mid-stream and upstream delivery mechanisms. For example, the Residential program supports the purchase of some energy-efficient products by buying down the price of products at their point of retail sale. Energy Trust uses a dissemination model that makes assumptions about the general geographic area where these products are installed after purchase but the specific locations of the installation of the products are unknown. In addition, Energy Trust also claims and reports market transformation savings related to NEEA activities that are funded by Energy Trust. These market transformation savings are typically reported for Energy Trust's entire service territory.

Energy Trust reports energy-efficiency savings on a quarterly and annual basis to the OPUC. For every efficiency measure installed, Energy Trust maintains assumptions about the annual load and savings shapes for them. These load and savings shapes can allow Energy Trust to make assumptions about the hourly savings profiles of the installed measures.

Renewable Energy

Energy Trust has specific site addresses for all renewable energy projects supported through the Solar and Other Renewables programs. Information on the project is provided before construction begins. Both the Solar and Other Renewables programs report renewable generation on a quarterly and annual basis to the OPUC.

For solar projects, per direction from OPUC staff, beginning with the 2017 annual report the Solar program created hourly generation profiles based on location, tilt and

orientation. The program then applied those profiles to all residential and non-residential solar projects to determine the hourly contribution to peak from solar. For more detail, see Appendix 8 in the 2017 Annual Report to the Oregon Public Utility Commission & Energy Trust Board of Directors or Appendix 8 in the 2018 Annual Report to the Oregon Public Utility Commission & Energy Trust Board of Directors.

Staff uses a flat generation shape for biogas generation projects, and staff doesn't currently have hourly generation shapes for hydropower projects. For hydropower projects the majority of sites are qualifying facilities and the utilities have hourly generation data available to them.

What program result details are shared regularly with utilities?

Energy Trust program results are provided or made available to utilities in quarterly reports, annual reports, through Utility Customer Information data exchanges and potentially through use of Kevala Analytics.

Quarterly reports: Energy Trust provides an update on activities and results in Quarter 1, Quarter 2 and Quarter 3 reports. On the same timeframe, individual utilities receive quarterly summaries of utility-specific results. Quarter 4 data are appended to annual reports. Official quarterly reports can be found on the Energy Trust website.

Annual reports: Energy Trust provides an update on annual activities and results in annual reports. Annual reports can be found on the Energy Trust website.

Utility Customer Information (UCI) data exchange: Via mutual agreement between Energy Trust and PGE, and Energy Trust and Pacific Power, the utilities regularly provide information on utility customer usage and Energy Trust regularly provides information on installed projects.

Kevala Analytics: Under a memorandum of understanding as part of a federal grant, Energy Trust is working with Kevala Analytics to determine the value of visualizing energy efficiency and solar project data combined with publicly available data including tax lot information and electrical grid infrastructure in Kevala's Grid Assessor platform. PGE has indicated it will be working with Kevala within their Smart Grid Test Bed pilot areas, which provides an opportunity to coordinate and share information through the platform. PGE and Energy Trust will explore the value of that data sharing capability in 2020.

What level of certainty do you have in those results? Estimated? Metered/measured? Pre/post evaluation?

Energy Efficiency

For the year in which Energy Trust is reporting savings, the savings are estimates of the savings that will be achieved. To make these estimates, Energy Trust relies on a variety of sources including prior evaluations, the Regional Technical Forum and third-party studies. Energy Trust has historically made adjustments to estimated savings to account for:

a) engineering realization rates (prior evaluated savings as a percent of site-estimated savings)
b) market effects including free-ridership and spillover
c) additional electric savings that are attributed to offsetting line losses from friction associated with transmitting and distributing electricity from the generator to its point of consumption

Engineering realization rates and market effects that are being applied in a given year are respectively based on a three-year rolling average of the most recent evaluation results or other technical information on savings realization from the Regional Technical Forum or other sources.

Impact evaluations retroactively review whether a statistically significant sample of projects installed in a given year are achieving the expected savings at specific sites. For measures where field evaluation is less practical, estimated savings are based on lab tests (e.g., residential washers, dryers, refrigerators, dishwashers, lighting sold through retail). Energy Trust tracks research from national laboratories and other sources which improve understanding of savings from these measures.

In addition, Energy Trust has engaged customers in "Fast Feedback" surveys to quantify the relative influence of Energy Trust energy-efficiency programs on customer decision-making in order to establish free-ridership rates. For spillover estimates Energy Trust has historically applied a 1% factor to all programs with the exception of the Existing Buildings program which receives a 6% spillover rate as a result of a specific study that Energy Trust conducted to quantify spillover in this market.

Energy Trust has historically applied retroactive adjustments to past year's results via a "True-up" process once evaluation results for those years become available.

Note that beginning with 2020 budgeting and reporting, Energy Trust will shift to reporting savings in "gross" terms, which essentially eliminates the inclusion of factors for market effects that are factored in to calculate savings in "net" terms.

Renewable Energy

Each solar project is modeled using installed equipment information and site-specific variables (i.e., tilt, orientation, shading, geographic location) and industry standard datasets to calculate annual estimates of generation that are expected to be achieved at the site. A Solar program impact evaluation completed in 2017 indicated that solar systems incentivized by Energy Trust were producing more electricity than estimated allowing the program to update the estimation methodology to capture additional generation.

After biopower, hydropower, geothermal and municipal owned community-scale wind projects are funded, the expected annual level of generation is documented in a funding agreement with Energy Trust. Whether the expected level of renewable generation is achieved for any project over the life of its funding agreement (typically 20 years) is a function of individual project performance and the market. Regardless, projects that cease operation or generate below their minimum generation requirement are subject to incentive payback provisions. Prior to commercial operation, generation is modeled using site-specific variables, comparable projects and industry standards.

Are there different levels of certainty associated with results for different types of measures and resources? If so, please explain.

Energy Efficiency

Overall, efficiency savings estimates are most reliable for measures that have large sample sizes, and the statistical laws provide the most certainty. For resource planning that includes energy efficiency measures, it is useful to consider the impact of the efficiency measures within the context of the loads and savings opportunities in a specific geographic area. For example, if the peak savings are highly dependent on the installation of five heat pumps, there may be considerable uncertainty. If there are 500 heat pumps, there is significantly more confidence that savings will follow historic patterns. If the savings are dependent on a single industrial process, it may be prudent to enhance the site study and commissioning or metering to provide more certainty for that single site.

The different evaluation methods applied to various measures and programs each have strengths and uncertainties, but all are considered to be reliable within the statistical bounds provided in impact evaluations. Impact evaluations are designed to provide reliable savings estimates at the program level with a 90% probability of being within plus or minus 10% of properly representing the savings achieved for all projects, for each fuel (gas and electricity) and year. Measure specific savings have been estimated to help adjust engineering estimates for some measures. Project specific savings have also been evaluated for some very large projects.

Renewable Energy

For solar projects, annual production estimates are calculated using datasets made up of conservative assumptions and long-term average solar irradiance data as well as other weather conditions from historical data. The Typical Meteorological Year (TMY) 3 dataset is composed of measured data from 1976 to 2005 and is considered the industry standard. Estimates of annual solar generation at the site level include the effect of tilt, orientation and shading. The accuracy of the estimate decreases when compared to real-time measurements as the time period becomes more granular. As compared to an annual production estimate, it becomes more difficult to estimate a monthly, daily or hourly production value considering the variability of temperature, weather and solar resource.

Every non-solar renewable energy generation project that receives an incentive from Energy Trust undergoes custom analysis: the expected level of generation is based on site-specific conditions and based on conservative assumptions and best practices.

For hydropower, the expected level of generation is a function of head (pressure) and flow (cubic feet) of water. These estimated variables, the hydrograph and the specific turbine efficiency curve are used to estimate the level of expected generation. For hydropower projects associated with irrigation districts, generation is traditionally limited to the irrigation season (roughly March through September). The level of generation certainty involving hydropower is often a function of water availability (wet year vs. drought year).

For biopower, the level of expected generation is based on volume of available feedstock (e.g., wastewater solids, manure, woody biomass), the energy content of the

feedstock and the output of the prime mover (e.g., reciprocating engine with an appropriately sized generator).

Planning and Program Design

How are program results forecasted?

Energy Efficiency

Long-term basis: On an approximately two-year basis, Energy Trust provides 20-year forecasts of the energy efficiency resource that PGE and Pacific Power can expect will impact their respective utility systems. The first few years of these forecasts are based on what the programs believe that they can accomplish in their respective markets in consideration with the most recently completed annual budget. Energy Trust can provide peak reduction estimates with the 20-year forecasts by estimating what portion of energy savings in the forecast will occur during utility defined peak periods by using the load and savings profiles associated with the measures that save energy. Staff provides this data to PGE and PGE uses the 20-year forecast as a component of its Integrated Resource Plan (IRP) modeling process. Pacific Power develops this peak reduction forecast within the "System Optimizer" model that it uses for its IRP modeling. The utilities have not engaged with Energy Trust to develop forecasts of distributed renewable generation.

Short-term forecasts: Each year, savings results and expenditures are forecasted for individual programs as a component of the annual budget process. Energy Trust produces updated year-end program forecasts in Quarter 2 and Quarter 3 to provide clarity on whether Energy Trust is on track to meet the annual projections set in the annual budget.

Energy Efficiency and Renewable Energy

Targeted Load Management: Beginning in 2017, Energy Trust started work with Pacific Power on targeted load management projects to investigate whether targeted marketing and delivery of energy efficiency and solar project installations could cost-effectively defer Pacific Power's investment in local distribution system expansions in two areas within its Oregon service territory. Energy Trust forecasted results are based on targets that have been set to achieve specific load reduction goals. Actual results are being measured against these targets.

Renewable Energy

The Solar program has a limited annual budget that is relatively consistent from year to year and therefore the budget itself is typically the constraining factor for the number of projects that can be installed each year. The incentive rate is set and decreases over time as a function of the volume of applications being submitted to ensure that the program remains funded throughout the year. The Solar program estimates the number of installations based on the program's market insight into the average system size being installed, average installation cost and the anticipated market demand. The annual estimate also takes into consideration other incentives or tax credits that customers are eligible to receive in order to model anticipated market demand.

The Other Renewable program forecasts generation based on the project's estimated commercial operation date. Given a project's development horizon, Other Renewables will estimate the year of commercial operation and credit the generation the same year. Project development assistance incentives are essential to building a pipeline of non-solar generation projects. Only projects entering into funding agreements are sufficiently advanced to allow program results to be forecasted. Annual Other Renewables program results are forecasted based on pipeline, project development and budget availability to serve projects in the pipeline.

At what level of granularity are program impacts forecasted? Broadly across the service territory or by region? By location?

Organization

Increasingly Energy Trust is engaging in more targeted delivery of energy efficiency and renewable energy, which is currently taking several different forms:

a) working to increase access to Energy Trust offers by focusing outreach to people with lower incomes, communities of color, smaller businesses and rural communities as aligned with the organization's diversity, equity and inclusion goals
b) supporting communities that are engaging in energy planning to implement their strategic goals
c) running or supporting "solarize" campaigns with communities to increase adoption of solar and solar plus storage technology through community-driven bulk buy programs
d) coordinating with utilities in an effort to address load constraints on a substation or increase adoption of specific technology on a feeder to better understand the impact it has on the grid

While each of the market drivers and the goals behind this work are different, they all impact the distribution grid and they all require months or years of planning in advance of the implementation.

Energy Efficiency

Long-term: Currently, the 20-year forecasts that Energy Trust provides for utility IRPs are applicable for the broader utility service territory.

Short-term: The geographic specificity of short-term project forecasts varies based on the nature of projects. Large projects in the pipeline that require studies and have longer timelines have specific site addresses. Forecasts for smaller projects with shorter timelines will either not have specific locations associated with them until they are completed or may never have specific site locations because the savings are based on averages for a particular type of measure. Forecasts for these measures are based on market trends and market intelligence.

Energy Efficiency and Renewable Energy

Targeted Load Management projects: Forecasts are based on projections of projects Energy Trust expects to achieve in the selected geographic areas. These forecasts are a

mix of large projects that are in the pipeline and projections of other projects that Energy Trust expects to acquire based on market trends and market intelligence. Energy Trust is working with Pacific Power to find the right balance of specificity and efficiency for the targeted load management forecasting process.

New construction: Both the residential and commercial new construction programs at Energy Trust work with customers, builders and developers during the early design phase of a project to translate their stated project goals into energy efficiency and solar targets for their projects in order to increase adoption of energy efficiency and solar and maximize the incentives the customers are eligible to receive. The scope of new construction projects can range from a single home or building to large scale developments with hundreds of new construction sites. There is currently no method for sharing the site-specific energy models and lists of equipment being installed that are generated as part of this design process with the utility who is planning the line extension service which will be required for the new construction site(s).

Renewable Energy

The Solar program is a market-driven program that is delivered through a closed network of solar trade ally contractors. The incentives are set at a level that will drive activity within the annual budget available. The program can encourage increased adoption in specific locations by improving the market conditions for installation. For example, targeted marketing or education and outreach like that associated with a solarize campaign.

In the Other Renewables program, biopower and hydropower projects (technologies dominating Energy Trust's distributed renewable energy pipeline) traditionally take more than 12 months from project conception to commercial operation, and often much longer. For biopower projects, their proximity to a distribution feeder is known and may be disclosed early in the development timeline, which may hold value for distribution planning. If the project is being developed by a municipality, this information may be shared well before commercial operation. If it is a private development, disclosure of location is left to the discretion of the project proponent. Energy Trust is also identifying significant hydropower (qualifying facilities) potential resulting from the Irrigation Modernization program. From this planning work Energy Trust will be able to estimate long-term projections in hydropower generation capacity for specific irrigation districts. Overall, development of custom distributed renewable generation projects is determined by market demand and project technical and financial viability.

How is planning data shared with utilities?

Long-term: Through the long-term forecasting process previously described. As noted, although energy efficiency forecasting is typically part of the IRP process, utilities have not engaged with Energy Trust staff in forecasting distributed renewable generation impacts.

Short-term: Through the annual budgeting process and quarterly reporting and forecasting.

Special projects: Through targeted load management efforts with Pacific Power and through coordination with PGE on its Smart Grid Test Bed.

Use of program targeting to meet specific utility system needs as a non-wires alternative.

Energy Trust has been working with Pacific Power to investigate whether targeted marketing and delivery of energy efficiency and solar projects could cost-effectively defer local distribution system expansion in two areas within Pacific Power's service territory. Pacific Power has defined specific targets for load reduction (kW) within these areas. Energy Trust has identified which measures are most likely to achieve load reduction objectives and is working with Pacific Power to design marketing and outreach approaches to achieve the targets that have been identified.

Energy Trust is engaged with PGE in support of its Smart Grid Test Bed pilot programs, which are geographically focused in three cities: Hillsboro, Milwaukie and Portland. The goal for the pilot is not to address a grid constraint but to focus adoption of demand response-capable technology onto specific distribution feeders. This will allow the utility to learn how high penetrations of energy efficiency, solar, battery storage, and utility-led demand response will affect how the utility operates the grid and allow PGE to plan for the future.

How do you incorporate customer accessibility and inclusivity into program planning and design?

Energy Trust needs to effectively engage Oregon's diverse residents and businesses to fulfill the organization's core purpose of delivering cost-effective energy efficiency and small-scale renewable energy to all eligible utility customers. Starting in 2019, organizational and program planning began incorporating activities to meet 10 diversity, equity and inclusion goals outlined in the Energy Trust Diversity, Equity and Inclusion Operations Plan. The goals were set to increase participation outcomes by 2021 across a broad range of customer characteristics, including communities of color, rural communities, smaller businesses and people with low and moderate incomes. The goals also support customer accessibility and inclusivity in program planning, design and delivery.

To increase program participation, staff are implementing new approaches in energy efficiency and renewable energy program design and delivery to reach customers who have yet to participate. Energy Trust is also enhancing the use of market research and is working with community-based organizations to inform program approaches or directly engage communities.

Ensuring awareness of Energy Trust programs is critical to increasing participation. As part of program implementation, Energy Trust has been adjusting its marketing approaches to reach new customers, including increased outreach to rural communities, expanded advertising channels and approaches, increased accessibility on the website and more translated materials.

In addition, staff have started to use a diversity, equity and inclusion lens during program design and other decision points. It is a critical thinking tool that can be applied to the internal systems, processes, resources and programs of Energy Trust to create

increased opportunities for underserved communities by evaluating burdens, benefits and outcomes to underserved communities.

Further, a Diversity Advisory Council is being formed in late 2019. Council members will be knowledgeable about the communities Energy Trust seeks to serve, and will provide advice and resources to the Energy Trust board to support staff in achieving the goals in the diversity, equity and inclusion operations plan.

Other Issues or Topics

Are there other issues or topics not covered here that are relevant to discuss in distribution system planning? If so, what are they and why are they relevant?

Many communities in Oregon are actively moving to create climate action plans and community energy plans that identify an increase in adoption of energy efficiency and renewable energy as a method to meet larger community goals. For example, Hood River County, City of Hood River and the ports of Hood River and Cascade Locks underwent a public process to develop a broadly supported energy plan. The Hood River Energy Plan envisions increasing adoption of energy efficiency, focusing on providing equitable access with an emphasis on resilience and vulnerable communities, and deploying distributed renewable generation projects within the community including irrigation-sourced small hydro, municipal biogas, residential and non-residential solar, and solar plus storage to enhance community resilience during extended power outages. The effects of these community-led efforts currently occur independent of the state's long-term energy resource planning process. Community-led energy planning efforts, when coordinated with other planning efforts, have the potential to create benefits for the electricity grid.

Otherwise, we attempted to incorporate the intent of this question into all previous sections.

Thank you for the opportunity to submit responses to this survey request. We look forward to continuing to coordinate with stakeholders and OPUC staff as this docket proceeds.