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April 5, 2019

VIA ELECTRONIC FILING

Public Utility Commission of Oregon
201 High Street SE, Suite 100
Salem, OR 97301-3398

Attn: Filing Center

RE: LC 70—PacifiCorp's Energy Efficiency Analysis Report

In accordance with Order 18-420, PacifiCorp d/b/a Pacific Power encloses for filing its Energy Efficiency Analysis Report in the aforementioned docket.

Please direct any questions on this filing to Cathie Allen, Manager, Regulatory Affairs, at (503) 813-5934.

Sincerely,

Etta Lockey
Vice President, Regulation

Oregon Energy Efficiency Forecasting Analysis Report
April 5, 2019

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Acknowledgements

This report, and the underlying analysis, represents a considerable collaborative effort between PacifiCorp and staff of the Public Utility Commission of Oregon (Commission) and the Energy Trust of Oregon (ETO). In particular, PacifiCorp thanks Anna Kim and JP Batmale from Commission Staff and Jack Cullen and Spencer Moersfelder of ETO for their contributions to this work. Additionally, PacifiCorp appreciates the active participation of representatives from the Oregon Department of Energy, Oregon Citizens' Utility Board, and Northwest Energy Coalition, who provided input on the objectives, scope, methodology, and results of this analysis.

1. Analysis Background and Overview

PacifiCorp develops biennial Integrated Resource Plans (IRPs) to identify the optimal mix of resources to serve customers over a 20-year period. Incremental cost-effective energy efficiency has been, and continues to be, a significant component of PacifiCorp's least-cost, least-risk plan (referred to as the IRP "Preferred Portfolio"), projected to offset 88 percent of forecasted load growth from 2017 through 2026 in PacifiCorp's 2017 IRP.

During PacifiCorp's 2017 IRP public process, Commission staff and other stakeholders expressed concerns with historical differences between PacifiCorp's IRP targets for Oregon energy efficiency resources and ETO's actual achieved savings. As a result, the Commission order acknowledging PacifiCorp's 2017 IRP required PacifiCorp to investigate this issue further. On October 26, 2018, the order language was modified to read:

> PacifiCorp, in coordination with Staff and the Energy Trust of Oregon, will conduct an analysis by the next IRP that identifies and compares the ongoing differences between ETO's and PacifiCorp's near to long term energy efficiency forecast with ETO's actual achieved savings. PacifiCorp will report on the outcomes of this analysis, including any recommendations to both organizations regarding forecasting improvements, in the 2019 IRP. [1]

Additionally, the Commission directed PacifiCorp to:

- Coordinate with stakeholders to develop an Oregon-specific workshop agenda on the scope, methodology, and timeline for the analysis,
- File the results of its analysis in Docket No. LC 70, and
- Present a summary of its results at one if its regularly-scheduled 2019 IRP Public Input meetings.

To satisfy the requirements of the Commission's Order, PacifiCorp led the following stakeholder engagement efforts leading up to the filing of this report:

- November, 2, 2018. Conference call with Oregon stakeholders to develop an agenda for a workshop to discuss the scope, methodology and timeline of the analysis.
- November 16, 2018. Workshop with Oregon parties to review PacifiCorp's proposed scope methodology, and timeline.
- November 26, 2018. Received written comments from stakeholders on the proposed scope, methodology, and timeline presented at the November 16, 2018, workshop.
- November 30, 2018. Emailed final scope, methodology, and timeline to Oregon stakeholders.
- January 16, 2019. Meeting with stakeholders to review initial documentation phase and to identify potential drivers of differences for further analysis.

[1] Order 18-420, Dockets LC 67, LC 70.

- February 15, 2019. Draft report emailed to stakeholders for review and comment.
- February 21, 2019. Summary analysis results presented at PacifiCorp 2019 IRP public meeting.

The remainder of this report:

- Provides background on why and how PacifiCorp and ETO plan for and pursue cost-effective energy efficiency,
- Describes how PacifiCorp modeled energy efficiency as a resource in its 2017 IRP,
- Explains how PacifiCorp's 2017 IRP informed ETO's goal setting and savings acquisition,
- Documents efforts that PacifiCorp and ETO have already undertaken to better align 2019 IRP targets with ETO acquisition,
- Highlights key areas of differences between the two organizations' processes that may be causing differences in IRP targets and actual acquisition, and each organization's perception about the magnitude of the impact, and
- Recommends forecasting improvements for both organizations.

Throughout the report, text boxes summarize key takeaways and conclusions. In most cases, PacifiCorp and ETO arrived at the same or similar conclusions, however, in certain cases, the two organizations arrived at different conclusions. In these cases, both organizations' conclusions are presented.

2. Planning for and Pursuing Cost-Effective Energy Efficiency Resources in Oregon

PacifiCorp has a long history of planning for and pursuing all available cost-effective energy efficiency resource on behalf of its Oregon customers. In 2016, this practice became required by law with the passage of Oregon Senate Bill 1547:

> For the purpose of ensuring prudent investments by an electric company in energy efficiency and demand response before the electric company acquires new generating resources, and in order to produce cost-effective energy savings, reduce customer demand for energy, reduce overall electrical system costs, increase the public health and safety and improve environmental benefits, each electric company serving customers in this state shall:
> (a) Plan for and pursue all available energy efficiency resources that are cost effective, reliable and feasible.[2]

As defined in Oregon statute, a conservation measure[3] is deemed cost-effective if its life-cycle cost is less than 110 percent of the costs that would otherwise be incurred to provide the energy being saved by the measure:

> "Cost-effective" means that an energy conservation measure that provides or saves a specific amount of energy during its life cycle results in the lowest present value of delivered energy costs of any available alternative. However, the present value of the delivered energy costs of an energy conservation measure shall not be treated as greater than that of a nonconservation energy resource or facility unless that cost is greater than 110 percent of the present value of the delivered energy cost of the nonconservation energy resource or facility.[4]

In 1994, the Commission formally adopted the Total Resource Cost test as the means to determine program and measure cost-effectiveness:

> "The Total Resource Cost [TRC] test should be used to determine program and measure conservation cost-effectiveness. The TRC of a measure or program is the present value of retail revenue requirements plus the participant's cost for the measure(s), including operating costs, less quantified non-energy benefits and cost savings. TRC includes avoidable administrative cost. A program or measure passes the TRC if the TRC is less than the conservation cost-effectiveness limit (CEL) the CEL is the present value of revenue requirements of avoided utility supply, transmission, and distribution costs and the value of firm wholesale sales or purchases before new resources are on-line. CEL for programs and measures also includes a minimum value of ten percent of these costs to account for risk and uncertainty."[5]

In the same order, the Commission established seven conditions under which measures that are not cost-effective could be included in utility programs:

1. The measure produces significant non-quantifiable non-energy benefits. In this case, the incentive payment should be set no greater than CEL less the perceived value of bill savings, e.g., two years of bill savings;
2. Inclusion of the measure will increase market acceptance and is expected to lead to reduced cost of the measure;

[2] ORS 757.054 (3).
[3] Oregon statutes refer to both "energy efficiency" and "energy conservation." Lacking clear definitions for these terms in the statutes, this document treats these terms as synonyms.
[4] ORS 469.631 (4).
[5] Docket UM-551, Order 94-590, April 6, 1994.

3. The measure is included for consistency with other [Demand-Side Management] DSM programs in the region;
4. Inclusion of the measure helps to increase participation in a cost-effective program;
5. The package of measures cannot be changed frequently, and the measure will be cost-effective during the period the program is offered;
6. The measure or package of measures is included in a pilot or research project to be offered to a limited number of customers;
7. The measure is required by law or is consistent with Commission policy and/or direction.

2.1. Planning for Cost-Effective Energy Efficiency

2.1.1. PacifiCorp

For PacifiCorp, planning for all cost-effective, reliable, and feasible energy efficiency begins with its IRP. Guidance on how energy efficiency should be incorporated into resource portfolios and action plans was provided by the Commission in 2007:[6]

> Guideline 1: Substantive Requirements
> a. All resources must be evaluated on a consistent and comparable basis.
> • All known resources for meeting the utility's load should be considered, including supply-side options which focus on the generation, purchase and transmission of power – or gas purchases, transportation, and storage – and demand-side options which focus on conservation and demand response.
> • Utilities should compare different resource fuel types, technologies, lead times, in-service dates, durations and locations in portfolio risk modeling.
> • Consistent assumptions and methods should be used for evaluation of all resources.
>
> Guideline 6: Conservation
> a. Each utility should ensure that a conservation potential study is conducted periodically for its entire service territory.
> b. To the extent that a utility controls the level of funding for conservation programs in its service territory, the utility should include in its action plan all best cost/risk portfolio conservation resources for meeting projected resource needs, specifying annual savings targets.

Consistent with these guidelines, PacifiCorp's process for identifying best cost/risk conservation resources to include in its IRP action plan is described in detail in Section 0 of this report.

2.1.2. Energy Trust of Oregon

ETO engages in several activities to plan for cost-effective energy efficiency resources: annual budget and action plan development (short-term), five-year strategic planning (mid-term), and energy efficiency resource assessments for utility IRPs (long-term). The budget and action plan process, discussed in further detail in section 4.3, is the primary method ETO utilizes to plan for cost-effective energy efficiency in the short term. This process determines utility-specific savings goals and associated budgets for the following year by considering expected savings from the current suite of measures within ETO's portfolio and any planned changes to measure or program offerings. Savings goals are based on market intelligence from studies and ETO staff and contractors in the field.

For longer-term forecasting, ETO regularly models the available energy efficiency resource potential utilizing an internal Resource Assessment model (RA Model), which is discussed in detail in section 3.1.1. ETO provides the 20-year resource potential outputs from this model to each of its funding utilities for

[6] Order 07-002, Docket UM 1056, January 8, 2007.

use in Integrated Resource Plans. Additionally, ETO uses the RA Model for other internal purposes, including to inform its five-year strategic plans and support program development. The information provided to each utility from the RA Model is customized to meet the specific IRP modeling needs of that utility.

2.1.3. Similarities and Differences

While both organizations aim to identify and plan for all cost-effective energy efficiency, there are similarities and differences between the methods employed. Consistent with the Commission's directions above, both organizations consider the cost-effectiveness of energy efficiency resources based on the Total Resource Cost perspective accounting for the following costs and benefits:

Table 1. Total Resource Cost Perspective Components

Costs	Benefits
Incremental Measure Cost	Avoided Market Purchases
Program Administration Costs	Deferral of Generation, Transmission, and Distribution Resource Investment
	Reduced Risk
	Avoided Line Losses
	10% Credit, Consistent with Statutory Definition of "cost-effective"
	Non-Energy Benefits, where applicable

ETO performs cost-effectiveness analysis for energy efficiency resources by quantifying the costs and benefits of a given measure over its effective useful life. If the combined benefits of the measure exceed the combined costs, the measure is deemed cost-effective. The same analysis can be performed for groups of measures or at the program and overall portfolio level. Detail on how ETO develops the cost and benefit components is provided in section 0.

Based on the IRP guideline above to evaluate all resources on a consistent and comparable basis using consistent assumptions and methods, PacifiCorp evaluates the cost-effectiveness of energy efficiency resources based on their ability to contribute to a best cost/risk plan when compared to other resource options. PacifiCorp models different resource types based on their seasonal availability and levelized cost over the 20-year planning period. When the IRP model assesses energy efficiency as a resource, it considers its ability to avoid market purchases and to defer generation resource investments, but does not directly quantify the other benefits from Table 1. Therefore, to be consistent with both IRP guidelines and the Total Resource Cost framework, the other benefits are subtracted from the levelized cost of energy efficiency resources, making them more attractive when compared to other resource options. For each measure assessed, ETO provides PacifiCorp a levelized cost that already accounts for avoided line losses and non-energy benefits; PacifiCorp applies the other benefits as described in section 3.3.

Key Takeaway: PacifiCorp and ETO use different methods to screen energy efficiency resources for cost-effectiveness, both of which are consistent with Commission direction. The two organizations have worked together to ensure the same costs and benefits are included in both methodologies and in theory, the two methodologies should be well aligned.

Conclusion: Although the costs and benefits included in the two methodologies are the same, other differences in methodologies could lead to differing results. However, analysis presented later in this report suggests that screening resources by dividing benefits and costs vs. by levelized cost should not contribute to significant misalignment between IRP targets and achieved savings.

2.2. Pursuing Cost-Effective Energy Efficiency

2.2.1. PacifiCorp

In Oregon, PacifiCorp provides funding to the ETO to acquire cost-effective energy efficiency resources. This acquisition is funded through two distinct sources:

- **The Public Purpose Charge.** ORS 757.612 requires PacifiCorp to provide 1.7%[7] of total revenue for "new cost-effective energy conservation and new market transformation efforts" and that the Commission direct the manner in which these funds are collected and spent. The Commission has directed that these funds be provided to a nongovernmental entity, the Energy Trust of Oregon, under the terms of a 2005 agreement.[8]
- **The Energy Conservation Charge.** ORS 757.689 allows the Commission to authorize, in addition to the Public Purpose Charge, an electric company to include in its rates the costs of funding or implementing cost-effective energy conservation measures. Retail electricity customers with loads greater than one average megawatt are not required to pay this charge and do not receive any direct benefit of energy conservation measures paid for by this charge. Pacific Power currently collects these funds through Schedule 297 and uses them to pursue cost-effective conservation above and beyond what could be achieved through the Public Purpose Charge alone.

Each year, PacifiCorp works with the ETO to identify appropriate funding levels for the following year, accounting for projected carryover from the current year and the availability of cost-effective conservation. When necessary, PacifiCorp modifies Schedule 297 to reflect changes in funding levels.

2.2.1. Energy Trust of Oregon

ETO operates as the nongovernmental entity established in ORS 757.612 to administer the majority of Public Purpose Charge funds. Additionally, ETO negotiates supplemental funding levels with utilities (e.g., PacifiCorp's Energy Conservation Charge) as a part of its annual budget development process. The budget and action plan establish goals for the amount of energy efficiency resources to be acquired at a given budget level each year. This plan can be, but rarely is, adjusted over the course of the year, in consultation with the funding utilities and Commission staff, as market conditions change. This typically does not change ETO's annual goals, but may be considered in reviewing achievements.

[7] 56.7% of 3% of total revenues.

[8] Grant Agreement Between Energy Trust of Oregon, Inc. and Public Utility Commission of Oregon, December 1, 2005.

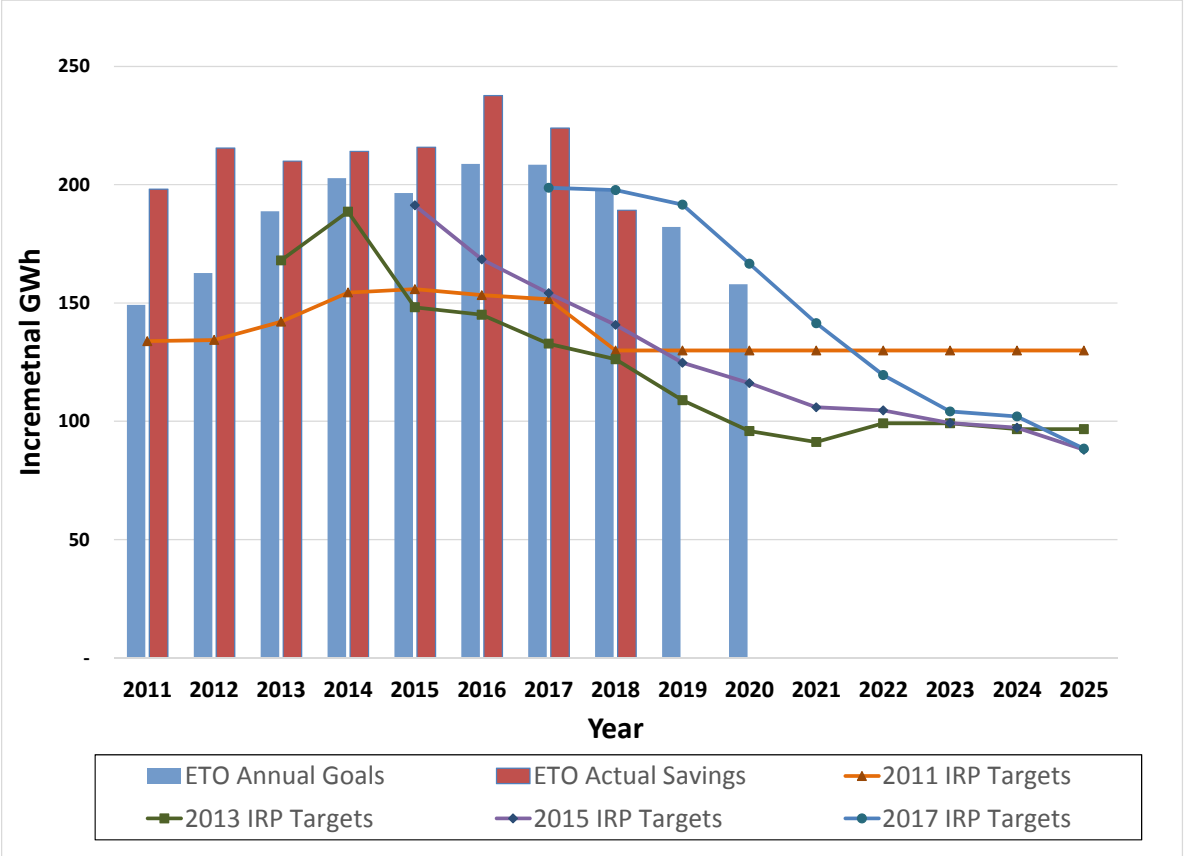
2.3. Comparing Planned and Actual Energy Efficiency Resource Acquisition

Figure 1 compares ETO's annual goals,[9] actual achieved savings in PacifiCorp's Oregon service territory to Oregon energy efficiency targets from PacifiCorp's recent IRP preferred portfolios. The lines in the graph show the energy efficiency targets included in the preferred portfolio of PacifiCorp's last four IRPs and the bars show annual ETO budgeted goals and actual acquisition. Actual acquisitions for 2018 are preliminary and will be updated in ETO's annual report to the Commission, to be filed April 15, 2018. All savings values shown in this graph, and throughout this report, are gross savings values at the generator (i.e., include avoided line losses). As shown in the graph, ETO's actual achieved savings consistently exceeded PacifiCorp's IRP targets through 2017. This is driven by two factors:

1. From 2011-2017, ETO annual goals exceeded PacifiCorp's IRP targets by 11%
2. From 2011-2017, ETO's actual achievement exceeded its annual goals by 15%

These data suggest that even if PacifiCorp IRP targets and ETO annual goals were perfectly aligned, ETO's actual acquisitions may still be higher. Reasons for historical ETO overachievement relative to its annual goals, including unexpected LED lighting opportunities and large projects are discussed in section 0. Also of note, although the last several IRP forecasts have predicted a large decline in long-term cost-effective energy efficiency resources, this trend has only recently begun to materialize in ETO actual acquisition and near-term projections.

Figure 1. Comparison of Historical and Forecasted ETO Savings to PacifiCorp's IRP Targets



[9] The 2020 savings goal is from ETO's Board-approved 2019-2020 action plan and will be updated in late 2019.

Key Takeaway: From 2011-2017, ETO's actual savings acquisition exceeded PacifiCorp's IRP targets by 28%; 17% of this difference is associated with ETO exceeding budgeted goals, while 11% of this difference is due to differences between IRP selections and ETO goals.

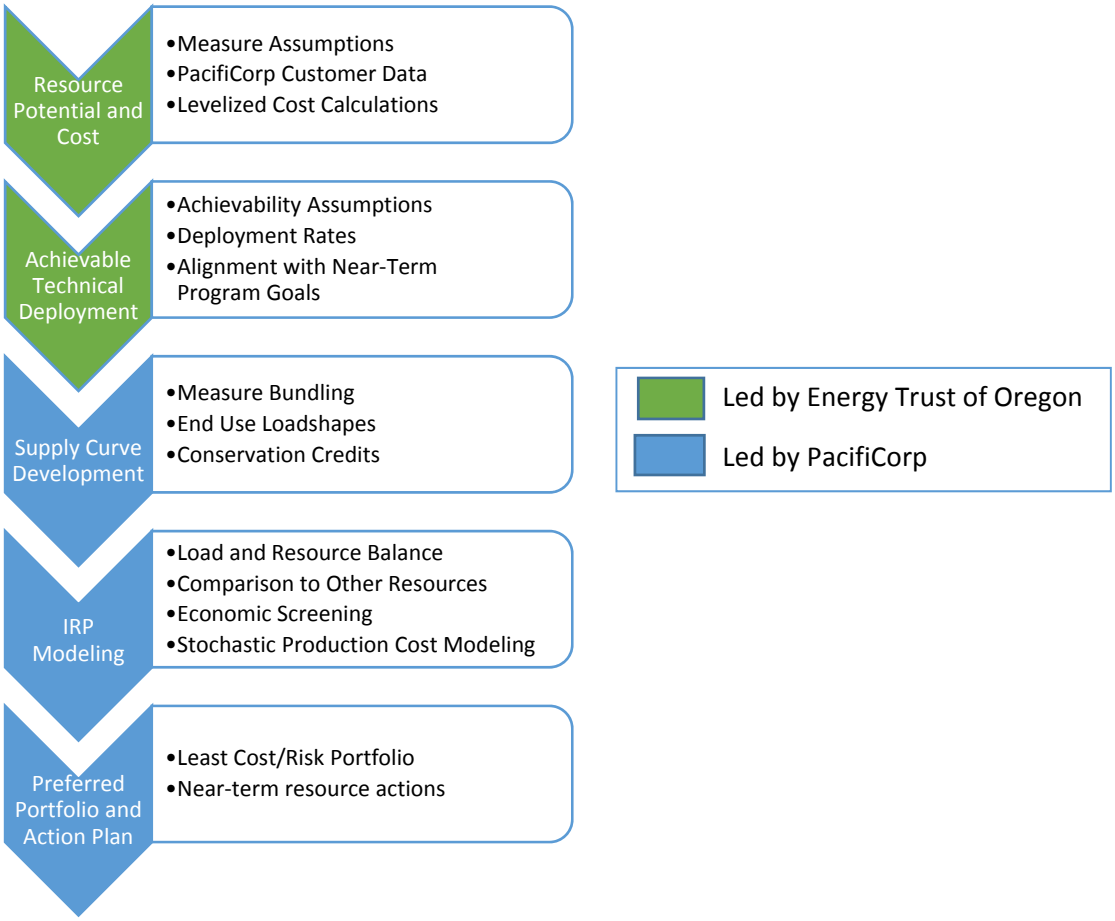
Conclusion: Since 2011, ETO overachievement relative to annual goals has accounted for roughly 60% of the total variance between PacifiCorp's IRP targets and actual acquisitions. Reasons for this historic overachievement include large, unforeseen savings opportunities, discussed in detail later in this report. This report also investigates potential explanations for the other 40% of the difference, representing the variance between PacifiCorp's IRP selections and ETO's annual goals. The organizations' perceived impact of drivers of both sources of variance are provided in section 5.

ETO Addendum: Figure 1 illustrates that ETO modeling has improved over the years relative to annual ETO goals. This is due to the development of a new ETO model in 2014 used for ETO's forecasting of targets during PacifiCorp's 2015 IRP, and the subsequent additions of measures and emerging technologies in the 2017 IRP. Additionally, the figure shows that calibration is generally working as intended for the years that it is applied. The 2015 IRP only calibrated the first year and the second year of the forecast has a significant drop in savings, increasing the difference between IRP targets and ETO goals. In the 2017 IRP, ETO calibrated the first two years and the IRP targets have tracked well with ETO goals.

3. Forecasting Cost-Effective Energy Efficiency in PacifiCorp's IRP

Figure 2 provides a visual representation of the process of developing the forecast of cost-effective, achievable Oregon energy efficiency resources for consideration in PacifiCorp's IRP modeling. Each of the steps in the process is described in detail below.

Figure 2. Process for Forecasting Oregon Energy Efficiency Resources in PacifiCorp's IRP Modeling



3.1. ETO forecasts the long-term potential for, and cost of, a variety of measures in PacifiCorp's Oregon service territory.

3.1.1. ETO Resource Assessment Model Overview

ETO utilizes its Resource Assessment Model (RA Model), developed by Navigant Consulting, to determine the technical, achievable, and cost-effective achievable potential[10] for energy efficiency resources available within each funding utility's service territory. The model employs a combined "bottom-up/top-down" approach to identify and quantify the savings of all energy efficiency measures, depending on the sector. This modeling approach assumes an energy efficiency measure to be any possible change that can be made to building, equipment or process that could save energy through improved efficiency. The residential and commercial sector potential are estimated using a bottom-up approach, which considers the potential technical impacts of various demand-side technologies that are aggregated in the model to produce estimates of resource potential at the end use, customer segment, and service territory level.

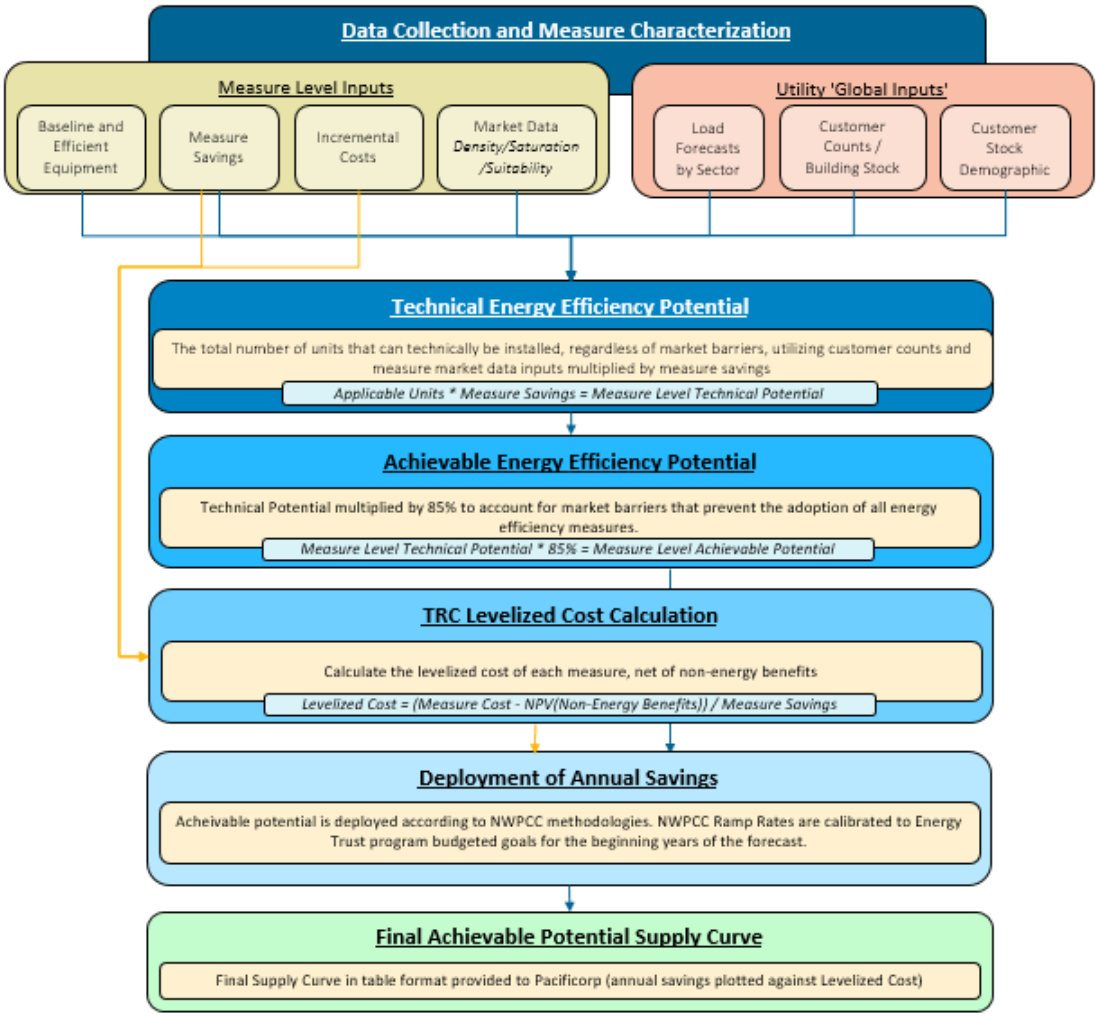
[10] Cost-effectiveness is not assessed within the RA Model for PacifiCorp, because this analysis occurs within PacifiCorp's IRP.

The industrial sector modeling approach is a top-down methodology that disaggregates utility load forecasts into end-use components. The RA Model calculates energy savings above a baseline that is determined by a regulatory (i.e., code or standard) or market driver.

The RA Model utilizes the modeling platform Analytica®,[11] an object-flow-based modeling platform designed to visually show how different objects and parts of the model interrelate and flow throughout the modeling process. The model utilizes multidimensional tables and arrays to compute large, complex datasets in a relatively simple user interface.

Figure 3 below provides a flow chart of the necessary data and types of potential calculated within the model. The first step is to collect and analyze data inputs for both measure-level and utility-level data inputs. For more information on the RA Model, please see the Navigant Resource Assessment Model Report on ETO's website.[12]

Figure 3. Flowchart of ETO's Energy Efficiency Forecasting Methodology for PacifiCorp



[11] http://www.lumina.com/why-analytica/what-is-analytica1/.

[12] https://www.energytrust.org/wp-content/uploads/2016/12/Energy_Efficiency__Resource_Assessment_Report.pdf.

3.1.2. Measure Characterization

Measure characterization is a comprehensive process of compiling over 30 data inputs for each measure modeled in the forecast. The suite of energy efficiency measures contains a representative set of measures currently offered by ETO plus a set of emerging technology measures that could become viable program offerings in the future. The currently offered energy efficiency measures are based largely on internal ETO Measure Approval Documents (MADs) and regional market data such as the Northwest Energy Efficiency Alliance's (NEEA's) Residential and Commercial Building Stock Assessments (RBSA and CBSA).[13] Measure savings and cost data are developed in the same units of measure (e.g. per home, per furnace, etc.), and then scaled to the utility service territory level using a universal scaling basis and market data – an example of a scaling basis is 'per home' for residential, scaled to a utility service territory level by multiplying by the total number of homes in that utility's service territory.

Emerging Technologies

An emerging technology is defined as a technology that is not yet commercially available, but which is under development with a reasonable chance of becoming commercially available and/or cost-effective within the 20-year forecast timeframe. Additionally, some measures are defined as emerging if the technology is relatively new to energy efficiency programs in general. Within the RA Model, the savings from emerging technology measures are reduced by a risk-adjustment factor based on the current stage of technology development. The concept is that the incremental risk-adjusted savings from emerging technology measures will result in a reasonable amount of savings over standard measures for those few technologies that eventually come to market without having to pick winners and losers at this early stage of development.

In the RA Model, it is assumed that as many technologies mature, their costs tend to decline and the technology may become more efficient. The quick evolution of LEDs and their rapid decline in cost is a prime example of this. ETORA Model tests for cost-effectiveness for each year if it is providing cost-effective potential to a utility and these adjustment curves are one of the ways that an emerging technology may come into the forecast in later years. This means that within the RA Model- if calculating cost-effective achievable potential- emerging technologies may become cost-effective in later years and be included in the forecast, even if they are initially not cost-effective. This does not apply to PacifiCorp's process because ETO does not model cost-effective achievable potential for PacifiCorp. More information on the measure characterization process and detailed descriptions of each input can be found in the Navigant RA Model Report.[14]

[13] https://neea.org/data

[14] https://www.energytrust.org/wp-content/uploads/2016/12/Energy_Efficiency__Resource_Assessment_Report.pdf.

Key Takeaway: ETO's RA Model considers a suite of technologies that are under development, but may emerge as viable options during the 20-year period. The potential is risk-adjusted to avoid providing resources that may never materialize for consideration in PacifiCorp's IRP. PacifiCorp's use of a fixed levelized cost for each measure over the 20-year period may preclude the IRP from identifying some emerging technology potential as cost-effective in later years.

Conclusion: Because of the nature of emerging technologies, they generally have little to no impact on near-term savings acquisition and thus, are not a significant contributor to misalignment of IRP targets and actual achievements. However, the rapid emergence of LEDs, which is discussed later in this report, is an example of an emerging technology driving actual acquisition above forecasts and technologies with large potential should be monitored and updated as appropriate in resource assessments and annual goal setting.

To align with PacifiCorp's IRP modeling framework, ETO provides a single levelized cost for each measure, rather than annual values, which may tend to lead to emerging technologies being underrepresented in the later years of the IRP. Because emerging technologies represent a small portion of the total energy efficiency resource, and measures would need to be near the margin of cost-effectiveness to be affected by this methodology, it is unlikely that this practice materially impacts near-term energy efficiency resource selections in the IRP, but may have a larger impacts over the longer term.

3.1.1. PacifiCorp Provided Inputs

The RA Model requires several utility-specific inputs to create the forecast, which are used to scale measure-level data to the utility-level forecast and screen for cost effectiveness. These inputs include:

- ***Customer and Load Forecasts:*** These inputs are essential to scale the measure-level savings to a utility service territory. For example, residential measures are characterized on a scaling basis 'per home', so the measure densities are calculated as the number of measures per home. The model then takes the number of homes that each utility serves currently and the forecasted number of homes to scale the measure level potential to their entire service territory. The load forecasts are utilized to create the commercial and industrial scaling basis stocks. The load forecasts for all sectors are aggregated and compared to the deployed energy efficiency potential to ensure that the potential looks reasonable as a percentage of overall load.
- ***Customer Stock Demographics:*** These data points are utility-specific and identify the percentage of stock that utilizes different space and water heating technologies and fuel types. The RA Model uses these inputs to segment the total stock to the stock that is applicable to a measure (e.g. gas storage water heaters are only applicable to customers that have gas water heat). PacifiCorp provided residential survey results that were utilized for these residential stock demographics, while RBSA was utilized for other end uses and for measure-level density and saturation data inputs to keep consistency between funding utilities. CBSA 2014 was the basis for commercial stock demographics and the measure level density and saturation inputs.

Key Takeaway: ETO uses PacifiCorp-specific data inputs in its potential forecasting to scale measure-level data to PacifiCorp's service territory and uses PacifiCorp load and customer forecasts when they are required for modeling and scaling measure data. For the residential sector, the load forecast is used only as a quality control metric because the required scaling input is the customer forecast (e.g. the number of homes served). ETO uses PacifiCorp survey data for high impact water and space heating fuel saturations. For measure-specific data inputs ETO uses the robust and comprehensive set of inputs in RBSA and CBSA, consistent with how ETO applies its RA model for ETO's other funding utilities.

PacifiCorp Conclusion: Using additional PacifiCorp data may help align ETO's resource assessment with the market in PacifiCorp's service territory. Because ETO already uses some PacifiCorp-specific data and relies on regional data for other inputs, using additional PacifiCorp data is not likely to significantly improve alignment of PacifiCorp IRP targets and ETO's actual acquisitions, but should be considered as a best practice in resource planning.

ETO Conclusion: ETO utilizes the necessary PacifiCorp specific data inputs and this has little to no impact on misalignment of IRP targets and actual acquisition.

3.1.2. RA Model Outputs - Types of Potential

The RA Model outputs two types of potential that inform the energy efficiency resource inputs for PacifiCorp's IRP.

- *Technical potential* is defined as the total amount of potential in the service territory that could be achieved regardless of market barriers, representing the maximum potential savings available.
- *Achievable potential* is simply a reduction to the technical potential by 15 percent, to account for market barriers that prevent total adoption of all cost-effective measures. Defining the achievable potential as 85 percent of the technical potential is the generally accepted method employed by many industry experts, including the NWPCC and National Renewable Energy Lab (NREL).

3.1.3. RA Model Outputs – Levelized Cost

The levelized cost of conserved energy for each measure is a key component of the PacifiCorp energy efficiency forecast. The levelized cost for each measure is determined by calculating the present value of the total cost of the measure, less non-energy benefits, over its economic life, per gross kWh of energy savings ($/kWh saved), as measured at the generator (i.e., including avoided line losses). The method used to calculate levelized cost for PacifiCorp is the discounted present value cost of the measure annuitized over the 20-year forecast timeframe[15] divided by the annual energy savings. For measures with a useful life less than 20 years, the measure is assumed to be re-purchased enough times to last for 20 years, with costs for installations that extend beyond the 20th year pro-rated to appropriately capture end effects. The costs included in this calculation are the incremental cost of each measure (including a 20% administrative cost adder) less any non-energy benefits. Some measures have negative levelized costs because non-energy benefits amortized over the 20-year period are greater than the total resource cost of the measure.

[15] ETO typically uses a measure's assumed measure lifetime, sometimes called Effective Useful Life, or EUL, to calculate levelized costs. PacifiCorp requested that ETO use the 20-year planning horizon to keep the methodology consistent with other resources in their resource option mix and with the levelized cost methodology of the NWPCC.

Providing total achievable potential with a levelized cost of energy allows PacifiCorp's System Optimizer model to directly compete energy efficiency with other resources on an equal basis. *Table 2* below lists the components of the levelized cost calculation:

Table 2. Levelized Cost Calculation Components

Levelized Cost Component	Value
Incremental Measure Cost	Varies by Measure
Administrative Cost	20% adder to Incremental Measure Cost[16]
Non-Energy Benefits	Varies by Measure
Discount Rate	Provided by PacifiCorp
Levelized Time Period	20-year forecast timeframe[10]
Avoided Line Losses	Sector-specific values provided by PacifiCorp

3.2. ETO applies deployment curves and achievability assumptions to develop estimates of annual achievable technical potential and levelized cost of conserved energy for each measure.

3.2.1. Annual Savings Deployment by Measure Delivery Type

An essential component of the forecast provided by ETO is the assumed deployment of estimated annual savings. Consistent with NWPCC definitions, ETO distinguishes between retrofit and lost opportunity resources and deploys potential over the 20-year timeframe in a similar manner to the NWPCC. However, ETO utilizes calibrated annual deployment curves at the program level rather than the default NWPCC measure-level ramp rates. For the 2017 IRP, ETO deployed savings potential at the program level in order to calibrate the early years to budgeted program goals in an effort to align potential with expected acquisition. The deployment rates for lost opportunity and retrofit resources were informed by:

- Expected Program Activity – ETO calibrated expected program savings to the potential savings available in the model, as discussed further in the next section. In some instances, ETO's near-term budget goals, which are established through ETO's annual budget process, exceed the estimated resource available for that year, in which case a ramp rate higher than 100% was used to align with expected program activity levels.
- NWPCC 7th Plan achievability methodologies by delivery type, e.g. 100% of achievable retrofit potential deployed over the timeframe.
- Market Considerations and Portfolio Management – ETO sought to balance the portfolio offerings utilizing deployment rates to ensure that there is an equitable share of savings for all customer types and programs are not shocked by dramatic changes to the overall portfolio.

Similar to the NWPCC ramp rates, ETO deploys 100% of retrofit measure achievable potential over the 20 years and achieves 85% of the lost opportunity achievable potential across the forecast for the 2017 IRP.

[16] Assumption from NWPCC 7th Power Plan.

3.2.2. Calibration to Projected ETO Acquisition

As discussed above, calibration is intended to align early-year energy efficiency resource selections in PacifiCorp's IRP with what ETO plans to achieve based on its budgets and action plans. This process sets the first two-year deployment rates and the remaining years are established as described in the previous section. ETO deploys and calibrates at the program category level rather than the measure level for several reasons:

1. Calibration is necessary as ETO has ramped faster in many program offerings than the NWPCC ramp rates reflect.
2. Programs have on-the-ground experience and knowledge of near-term markets and ETO believes that pegging the first years of deployment to budgeted goals and near-term program forecasts is likely more accurate than choosing from a suite of preset ramp rates.
3. Budget timing and IRP timing do not line up; between the time that ETO provides forecasts and PacifiCorp files its IRP, ETO has a new approved budget and/or an updated forecast of available savings

For other funding utilities, the calibration process is straightforward, because ETO provides forecasts of cost-effective potential for inclusion in IRP modeling. For PacifiCorp, however, because the identification of economic potential occurs in the IRP model, calibration requires assuming which levelized cost bundles will be deemed economic in PacifiCorp's IRP. Typically, the best information on economic levelized costs at the time of calibration is from the previous IRP, which may not align with the value of energy efficiency in the current IRP, and may lead to differences between calibrated potential and IRP resource selections. ETO works with PacifiCorp to determine what the levelized cost threshold might be in order for the system optimizer model to select energy efficiency. Measures with savings under that threshold are essentially considered cost-effective. The deployment rates are developed based on looking at how much savings potential is available each year under that levelized cost threshold and calibrating the available potential each year to what programs think they will achieve.

3.2.3. Final Deliverable to PacifiCorp

Once the deployment curves by program category have been developed, they are applied to the achievable energy savings for each measure in the model based on its sector and delivery type. Once the steps above have been completed, ETO compiles the calibrated, deployed annual achievable savings by measure into a final table to deliver to PacifiCorp. This table also contains the levelized cost for each measure (described in Section 3.1.3), the end-use category, deployment category, and associated load shape. ETO identifies the most applicable load shape for each measure during the measure characterization process, which is then mapped to the most appropriate PacifiCorp Oregon load shape. As mentioned in section **Error! Reference source not found.**, the load shapes were reviewed for differences for the 2019 IRP, but differences were minor and changing load shape sources would have had a negligible effect on the overall potential savings and value.

Key Takeaway: ETO's calibration process is an effort to align near-term IRP targets with expected near-term acquisition levels. However, without knowing which levelized cost bundles the IRP model will identify as cost-effective, and given the misaligned timing of PacifiCorp and ETO planning processes, it is not possible to ensure perfect calibration. ETO recognizes that the current method is imperfect, but represents ETO's best effort to calibrate inputs into PacifiCorp's unique modeling process with ETO's near-term goals.

Conclusion: The current calibration process is ETO's attempt to incorporate near-term acquisition expectations into PacifiCorp's IRP energy efficiency resource selections. A review of the calibration process may identify opportunities for improvement, however, the timing of the organizations' planning cycles and the potential for large, unforeseen savings opportunity that drive ETO acquisition above near-term goals will likely continue to present a challenge in aligning resource potential provided to PacifiCorp's IRP and ETO actual acquisitions.

3.3. PacifiCorp bundles ETO measure-level potential into supply curves for IRP modeling.

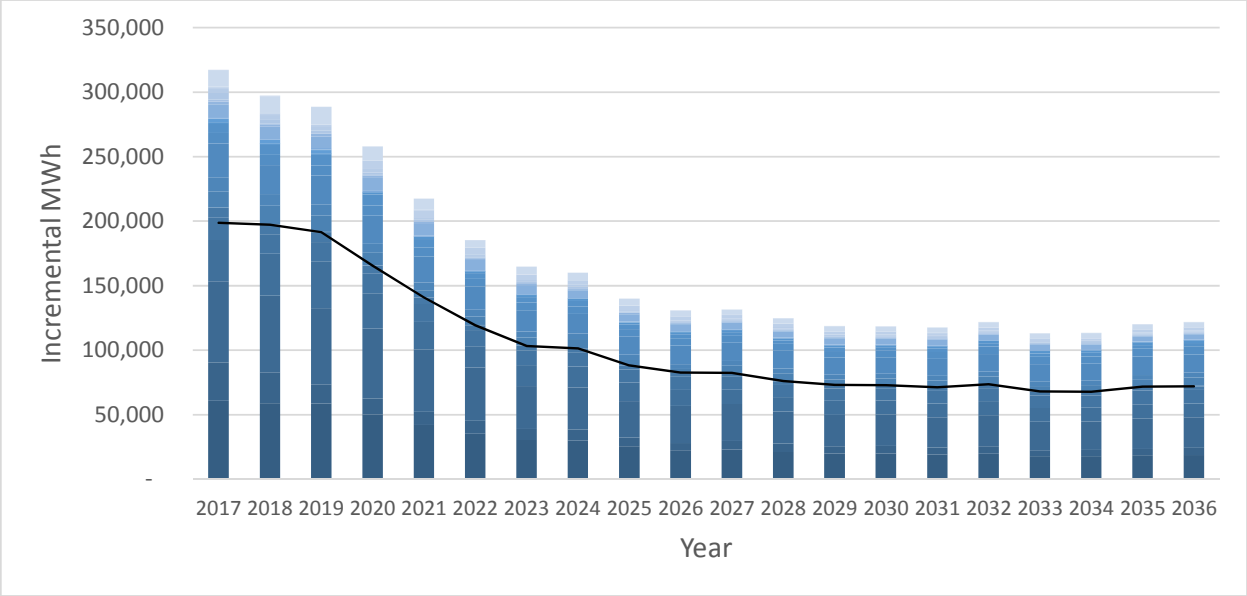
Due to the granularity of energy efficiency measures analyzed, it is impractical to model each measure as a separate resource in PacifiCorp's IRP. To reduce the resource options for consideration without losing the overall resource quantity available or its relative cost, resources are consolidated into bundles, using ranges of levelized costs to reduce the number of combinations to a more manageable number of bundles. After receiving measure-level potential from the ETO, PacifiCorp goes through the following steps to create energy efficiency supply curves:

1. Map each measure to a bundle based on the levelized cost calculated by the ETO.
2. Calculate average cost of each bundle
    a. Calculate the average levelized cost of all measures in the bundle, weighted by energy savings.
    b. Reduce the bundle cost by applying the following credits to arrive at an adjusted bundle levelized cost:
        i. Transmission and distribution investment deferral credit during the summer peak period
        ii. Stochastic risk reduction credit
        iii. 10 percent credit, consistent with the definition of "cost-effective" in ORS 469.631 (4)
3. Calculate hourly impacts
    a. For each measure in a bundle, spread the annual energy savings potential over the applicable hourly load profile identified by the ETO.
    b. Sum all hourly energy savings for measures in a given bundle to create a weighted hourly load profile for the bundle.
    c. Identify the peak hourly impact in each year, considered the "nameplate" capacity of the bundle.
    d. Divide hourly values by the nameplate capacity, to create a shape with a maximum hourly value of 1.0, representing the percent of nameplate capacity available in each hour.
4. Create a summary file of adjusted levelized cost, incremental nameplate capacity, and incremental energy savings for each bundle in each year.

Figure 4 displays the annual incremental Oregon energy efficiency potential input into the 2017 IRP (blue bars) and the resulting resource selections (black line), by levelized cost bundle and year. As shown, the

available incremental potential, at any cost, identified by the ETO declined over the IRP planning horizon due to changes in building codes and equipment efficiency standards, market baselines for lighting measures, saturation of efficiency measures, natural equipment turnover, and market transformation.

Figure 4. Incremental Annual Oregon Energy Efficiency Potential and Selections – 2017 IRP



As discussed in Section 0 below, measures that save energy during summer peak periods have more value to PacifiCorp's system than those that save energy during other times of year. While the application of hourly load profiles in the bundling process accounts for this, because measures are assigned to bundles by levelized cost, rather than end use, each bundle is inherently a composite of measures with different load profiles and seasonal impacts. In its 2019 IRP, PacifiCorp is investigating an alternative method of bundling to assess whether bundling based on value, rather than cost, would materially change energy efficiency resource selections.

Key Takeaway: PacifiCorp currently bundles measures together by levelized cost, not by measure type or loadshape.

PacifiCorp Conclusion: PacifiCorp is testing a different bundling methodology in the 2019 IRP, which will inform the extent to which bundling by levelized cost vs. value affects resource selections.

ETO Conclusion: The bundling process may be a driver of the misalignment between IRP targets and ETO acquisitions and ETO recognizes that this is being investigated in the 2019 PacifiCorp IRP.

3.4. PacifiCorp uses the System Optimizer model to determine the optimal mix of resources, including energy efficiency, to serve forecasted load for a variety of scenarios.

The System Optimizer (SO) model operates by minimizing operating costs for existing and prospective new resources, subject to system load balance, reliability and other constraints. Over the 20-year planning horizon, SO optimizes resource additions subject to resource costs and capacity constraints (summer peak loads, winter peak loads, plus a target planning reserve margin for each load area represented in the model). In the event that an early retirement of an existing generating resource is assumed for a given

planning scenario, SO will select additional resources as required to meet summer and winter peak loads inclusive of the target planning reserve margin.

Resource adequacy is modeled in the portfolio development process by ensuring each portfolio meets a target planning reserve margin. In its 2017 IRP, PacifiCorp applied a 13 percent target planning reserve margin. The planning reserve margin, which influences the need for new resources, is applied to PacifiCorp's summer and winter coincident system peak load forecast net of offsetting "load resources" such as energy efficiency capacity. Planning to achieve a 13 percent planning reserve margin ensures that PacifiCorp has sufficient resources to meet peak loads, recognizing that there is a possibility for load fluctuation and extreme weather conditions, fluctuation of variable generation resources, a possibility for unplanned resource outages, and reliability requirements to carry sufficient contingency and regulating reserves.

Consistent with the Commission's IRP guidelines discussed in Section 2.1, the SO model compares the cost and benefits of the following resource options in determining the lowest cost means of meeting the projected load and planning reserve margin:

- Dispatchable Thermal Resources
- Front Office Transactions (FOTs)
- Wind and Solar Resources
- Energy Storage
- Energy Efficiency
- Demand Response

Thus, the energy efficiency resources selected in an SO model run represent the amount expected to contribute to a least-cost portfolio as compared to resource alternatives. Historically, PacifiCorp allowed SO to optimize energy efficiency resource selections in all years of the IRP planning horizon, including the year in which the IRP was finalized. Leading up to the 2017 IRP, PacifiCorp identified this first-year practice as a potential source of disconnect between IRP energy efficiency targets and acquisitions, because planning for first year acquisition had already occurred months in advance of IRP finalization. To address this, beginning with the 2017 IRP, PacifiCorp aligned first-year energy efficiency targets at expected acquisition levels, allowing the model to optimize energy efficiency resource selections beginning in the second year of the planning horizon. In Oregon, the first-year target was based on a preliminary savings forecast for 2017 provided by the ETO.

3.5. PacifiCorp selects a preferred portfolio and uses resource selections from that portfolio to inform its near-term IRP Action Plan and the value of energy efficiency.

Informed by comprehensive modeling, PacifiCorp's preferred portfolio selection process involves evaluating cost and risk metrics reported from the Planning & Risk (PaR) model, comparing resource portfolios, developed in the SO Model, on the basis of expected costs, low-probability high-cost outcomes, reliability, CO2 emissions, and other criteria.[17]

The energy efficiency resources included in the preferred portfolio represent the level of acquisition PacifiCorp should pursue as part of a best cost/risk portfolio, based on the best information available at the time of modeling. The near-term resource acquisition targets inform PacifiCorp's IRP Action Plan, which is updated with each subsequent IRP to reflect updated data, market conditions, and system needs.

[17] For additional information on how PacifiCorp's IRP evaluates costs and risks, see Chapter 7 of PacifiCorp's 2017 IRP.

In the 2017 IRP, system-wide energy efficiency was projected to offset 88 percent of load growth over the first ten years of the planning horizon. Because of the magnitude of this resource, and to understand the value of energy efficiency to the system, PacifiCorp conducted the 2017 Class 2 Demand-Side Management Decrement Study,[18] which investigates the impact on the 2017 IRP preferred portfolio if new energy efficiency had not been available as a resource to SO. The study found that, absent system-wide new energy efficiency resources, the resource portfolio would have included:

- 150 MW of additional wind in 2021
- 416 MW combined cycle combustion turbine (CCCTs) on the west side of PacifiCorp's system in 2028
- Two 200 MW Frames on the east side of PacifiCorp's system in 2028
- 477 MW CCCTs in 2029 and 2033
- Additional FOTs and demand response

Although the study is not specific to Oregon energy efficiency, it does provide information on the value of energy efficiency to PacifiCorp's system based on the cost of resource alternatives, consistent with ORS 757.054 (3).

Key Takeaway: PacifiCorp has historically used the results of the Decrement Study to inform avoided cost component inputs to provide to the ETO. This study demonstrates the value of system-wide energy efficiency, which may differ from the value of Oregon energy efficiency.

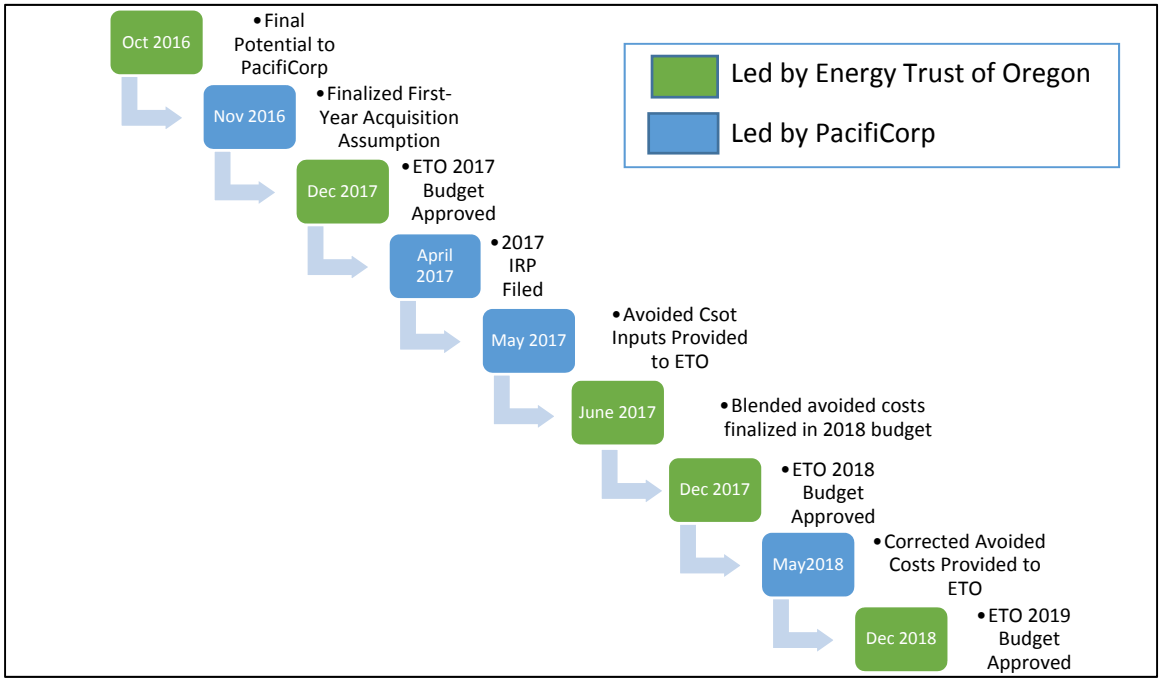
Conclusion: Through UM 1893, PacifiCorp should continue to work with ETO, Commission staff, and stakeholders to review this practice and determine the most appropriate means of identifying the value of Oregon energy efficiency to PacifiCorp's system moving forward.

18 http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Demand_Side_Management/2017/PacifiCorp_Class2_DSM_Decrement_Study.pdf.

4. ETO Goal Setting, Savings Acquisition, and Reporting Processes

Figure 5 provides a visual representation of the key milestones associated with identifying Oregon energy efficiency potential in PacifiCorp's 2017 IRP and setting goals for ETO savings acquisition for the 2017 IRP Action Plan period. Key steps not addressed in Section 0 are described below.

Figure 5. Timeline for Establishing PacifiCorp IRP Targets and ETO Goals



Key Takeaway: Differences in timing between PacifiCorp's biennial IRP cycle and ETO's annual budget cycle have likely led to divergence between IRP targets and ETO goals. However, there may not be an opportunity to better align schedules, given both organizations' timelines for completing these tasks. For example, although PacifiCorp aligned first-year energy efficiency resources with expected acquisitions in the 2017 IRP, the target was based on a preliminary forecast from ETO, which was later refined through the ETO's comprehensive budgeting process. Additionally, ETO's biennial avoided cost update cycle did not allow for changes due to corrections or updated data. This should be addressed through new avoided cost update rules being considered in AR 621, which would currently require an annual avoided cost update.

Conclusion: Differences in timing of PacifiCorp and ETO planning processes drives some misalignment between IRP targets and actual acquisitions, but this may be difficult to address given both organizations' established processes and requirements. Annual updates to avoided costs will add flexibility, but misalignment of other processes will likely persist.

4.1. PacifiCorp Development of Avoided Costs for Energy Efficiency

As defined in proposed rules in Commission Docket AR 621, and consistent with the definition of "cost effective" in ORS 469.631 (4):

> "Energy Efficiency avoided cost" or "EE avoided cost" means the value to an energy utility of avoiding the use of other resources to provide energy services to its customers through the use of an energy efficiency measure or program.[19]

Thus, the key to assessing the value of energy efficiency to a utility's system is identifying the resources that would have otherwise been used in the absence of the energy efficiency measure or program, and their associated costs.

PacifiCorp assessed the value of system-wide energy efficiency in the 2017 IRP through the 2017 Class 2 Demand-Side Management Decrement Study (Decrement Study), which sought to quantify the additional cost to PacifiCorp's system if no new energy efficiency was included in the 2017 IRP Preferred Portfolio. The cumulative nameplate capacity of new and retiring resources, including energy efficiency, from the 2017 IRP Preferred Portfolio are shown in Figure 6.

Figure 6. New and Retiring Resources in the 2017 IRP Preferred Portfolio

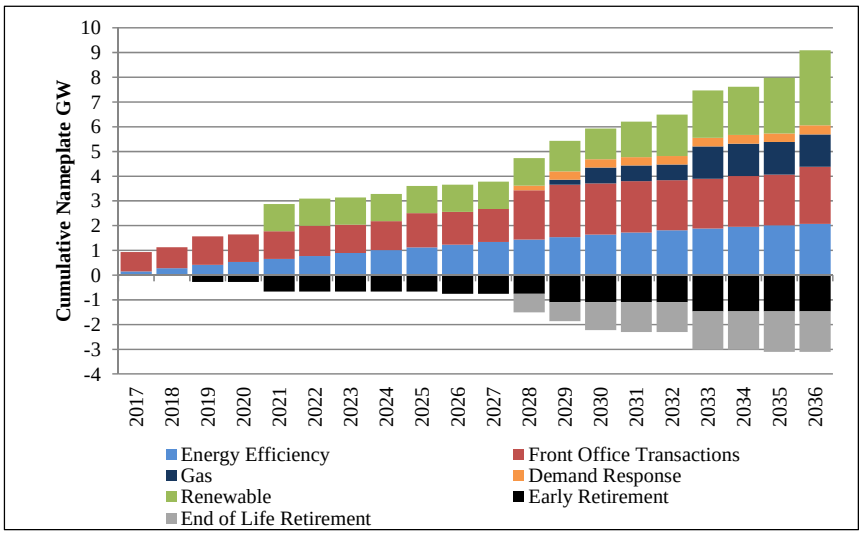
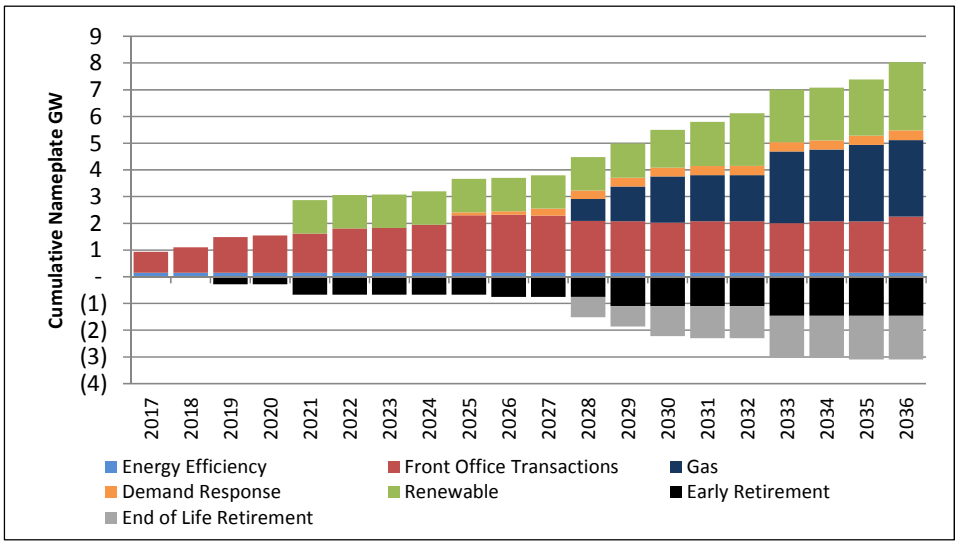


Figure 7 shows new and retiring resources in the resulting portfolio when new energy efficiency is not allowed to be selected. Note, for the reasons discussed in section 3.4, energy efficiency resources for the year 2017 were left in this portfolio, hence the small amount of energy efficiency in all years.

[19] Notice of Proposed Rulemaking, Chapter 860, Filing Caption: Rulemaking regarding Energy Efficiency Avoided Costs for Use by Nongovernmental Entity, November 20, 2018.

Figure 7. New and Retiring Resources without New Energy Efficiency



Comparing Figure 6 and

Figure 7 indicates that post-2017 new system-wide energy efficiency in the 2017 IRP Preferred Portfolio:

- Decreases the need for front office transactions.
- Decreases the amount of renewable (wind) resources included, beginning in 2021.
- Defers the need for new natural gas resources from 2028 to 2029 and decreases the overall need for new natural gas generation.

Based on the costs associated with the differences in resource selections between portfolios with and without energy efficiency, PacifiCorp calculated the hourly avoided cost of system-wide energy efficiency. A summary of the avoided cost by month and year is presented in the Decrement Study.

In May of 2017, PacifiCorp worked with ETO staff to translate the results of the Decrement Study into inputs for use in ETO's avoided cost analysis. These values are provided in Table 3 below. In May of 2018, PacifiCorp reviewed the avoided costs previously provided to the ETO and discovered that a correction was required to more accurately reflect the energy value of energy efficiency. As a result, PacifiCorp provided an updated generation deferral value to ETO, however, due to the timing of ETO's avoided cost update process, this information was not incorporated into ETO's blended avoided costs.

4.2. ETO Creation of Blended Avoided Costs

ETO works with PacifiCorp and Portland General Electric to obtain each utility's avoided cost component values and then blends each component based on revenue shares from each utility in the year of the avoided cost update: a practice that has been in place since the inception of ETO. Blending the avoided costs creates a single avoided cost value for ETO to use across utility service territories, creating internal and external efficiencies in terms of both time and cost. This section covers ETO's methodology for calculating avoided costs, the blending process, the benefits of blending, and changes to the avoided cost methodology and update process currently underway.

There are two potential differences associated with avoided costs, both of which are described and analyzed in subsequent sections:

1. Methodological differences in the calculation of avoided costs between the organizations
2. The effect of blending the avoided costs using the ETO methodology.

4.2.1. Avoided Cost Calculation Methodology

For consistency with PacifiCorp's 2017 IRP process and energy efficiency resource inputs and outputs detailed in this document, this section describes the methodology that was in place in 2017. Since that time, ETO, PacifiCorp and other funding utilities, Commission Staff, and interested stakeholders have worked to review, update, and improve the avoided cost development process through dockets UM 1893 and AR 621. In 2017, ETO's basic formula for calculating electric avoided costs was:

Electric Avoided Cost =
Energy price forecast x (1+10% Power Act Credit) x (1 + marginal line losses)
+ Transmission and Distribution (T&D) deferral value x (1+10% Power Act Credit) x (1 + marginal line losses)
+ Generation deferral value x (1+10% Power Act Credit) x (1 + marginal line losses)
+ Risk Reduction Value

The above calculation is performed for each NWPCC load shape, apportioning the utility-provided inputs according to the distribution or timing of expected savings. In the 2017 methodology, only the energy price forecast and the T&D capacity deferral value accounted for timing variation across load shapes. This practice is currently being reviewed through docket UM 1893 to better align ETO's avoided costs with the value to the funding utilities' systems in future avoided cost updates. The resulting avoided cost values are converted to net present value based on measure life and the resulting value is applied to the estimated electric savings achieved at the site.

Additional detail on the methodology for developing avoided costs and about each component can be found in an avoided cost briefing memo found on ETO's website.[20] The marginal line loss calculation follows the Regional Technical Forum (RTF) methodology, which is applied to the utility-provided line loss estimates for both transmission and distribution.[21]

4.2.2. Avoided Cost Blending Process

Since its inception, ETO has blended funding utility avoided costs to create a single set of values to offer uniform programs across the state. The blending process enables program efficiencies that improve savings volume and decrease overall program costs, including:

1. **Increased internal ETO efficiencies:** One set of uniform program offerings streamlines data systems and reduces staff time on measure development and approval, program planning and forecasting, communication with delivery contractors, reporting, and administrative time.
2. **Increased clarity and engagement of customers:** Offering different incentives based on funding utility service territory could create disparity and confusion among customers served by ETO, particularly those customers who own or operate sites in multiple funding utility service territories. Under the blended approach, marketing and outreach efforts use the same measure lists, incentives and value messages, which allows customers to receive the same incentive regardless of which funding utility's service territory they are located in.
3. **Increased Trade Ally engagement:** Trade allies, including delivery contractors, retailers, distributors, technical analysis contractors, and designers, are a crucial component of ETO's delivery system and a single set of offerings is a clearer message for trade allies to assimilate, manage, and pitch to customers. It also may reduce trade allies' internal burden, who may otherwise need use different forms, tracking, and incentives if they work in multiple funding utilities' service territories. ETO believes this helps in recruiting more allies and serving more customers, and engaging with them more deeply, resulting in more savings and a lesser need for incentives to overcome increased transaction costs.

The blending process is relatively straightforward. For electric avoided costs, ETO blends each avoided cost input for the elements described in the section above based on the percent of electric energy efficiency revenue received from Portland General Electric and PacifiCorp, which in 2017 was 63% and 37%, respectively. Table 3 compares each component of the blended avoided costs ETO currently utilizes to PacifiCorp-specific avoided cost component values.

Table 3. Comparison of PacifiCorp and ETO Blended Avoided Costs - 2017

Avoided Cost Component	PacifiCorp	Energy Trust of Oregon
Energy	PacifiCorp forward market prices, value varies by resource load profile	Blended forward market prices, value varies by resource load profile

[20] https://www.energytrust.org/wp-content/uploads/2018/01/Energy-Trust-Avoided-Cost-Update-for-Oregon-2018.pdf.

[21] RTF decision to adopt marginal line loss methodology: https://nwcouncil.app.box.com/s/9g9i79pwmmwzmldai9qy5ekd81tov76q; detailed report on marginal line loss: methodology. https://www.raponline.org/wp-content/uploads/2016/05/rap-lazar-eeandlinelosses-2011-08-17.pdf.

Generation Capacity Deferral	$102.19 per kW-year,[22] valued during PacifiCorp's summer peak[23]	$8.83/MWh for 2018-2020 *(where PacifiCorp is in its sufficiency period),* and $14.65/MWh for 2021-2037 *(where both utilities' values are incorporated)* (2017$)
Generation Capacity Deficiency Year	2021	2018
Transmission and Distribution Deferral	$13.56 per kW-year, applied during PacifiCorp's summer peak (2017$)	$25.93 per kW-year, applied during Northwest Power and Conservation Council winter peak (2017$)
Risk Reduction Value	$1.74 per MWh (2017$)	$3.65 per MWh (2017$)
10% NW Power Act Credit	10% applied to forward market prices, generation deferral,[24] and T&D deferral values	10% applied to forward market prices, generation deferral, and T&D deferral values

Table 3 identifies both differences in values before and after blending and methodological differences in how PacifiCorp and ETO value energy efficiency, such as differences in peak periods for generation and T&D deferrals. These are two distinct issues, which the following analyze to identify the impact of each to the overall difference in IRP targets and actual acquisitions.

4.2.3. Comparison of ETO and PacifiCorp avoided costs for select load shapes

To compare the differences in methodology and blending, PacifiCorp and ETO each calculated aggregated avoided costs utilizing their respective methodologies. The purpose is to compare not only the effect of blending utility values, but also to show the relative difference in value due to some of the other methodological differences identified in Table 3, such as the difference in peak periods for generation and T&D deferrals.

It is important to note that differences in individual components are not representative of overall variance of combined avoided costs when spread across load shapes. The magnitude of each component varies by measure due to the differences in measure life, measure savings, and load profiles (i.e. one component may have a large difference between its blended and utility-specific value, but only make up a small portion of the avoided cost value for a measure). To allow direct comparison PacifiCorp and ETO each calculated total avoided costs for select measure types utilizing the methodologies and values presented in Table 3. This comparison illustrates the combined effect of blending utility values and the relative

[22] In May of 2018, PacifiCorp provided a corrected value to ETO of $30.56/kW-year.

[23] In 2017, PacifiCorp provided ETO with both a $/kW-year and a $/MWh ($15.73, beginning in 2021) value to allow comparisons and discussion with Commission staff. After deliberations, ETO continued to use a $/MWh value until a change in methodology could be more fully vetted.

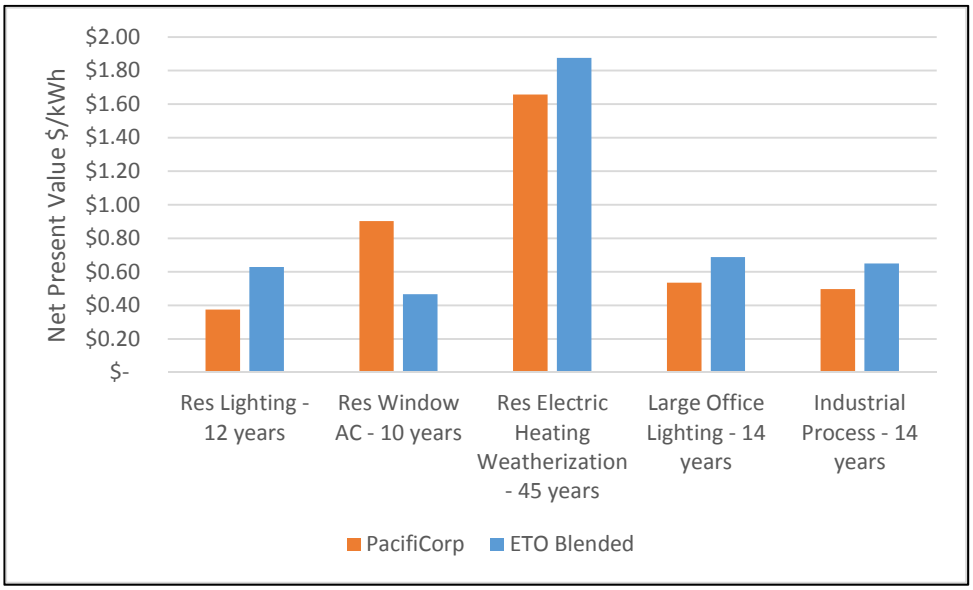
[24] In PacifiCorp's modeling, 10% credit is applied to resource bundle costs before running the IRP model, however, the extent to which energy efficiency defers the need for generation resources is not known until after IRP modeling is complete. Because of this, PacifiCorp uses forward market prices as a proxy for generation resource deferral in applying the 10% credit.

difference in value between measure types stemming from methodological differences, including how the two organizations value generation and T&D deferral.

Figure 8 compares the combined PacifiCorp and ETO blended avoided cost for select combinations of load shapes and measure lives, selected based on their contribution to overall ETO portfolio savings and/or illustration of seasonal variation.

As shown, with the exception of cooling measures, the 2017 blending process tended to increase the value of energy efficiency resources above the value that PacifiCorp's System Optimizer saw when comparing energy efficiency to other resources. This is likely driven by Portland General Electric's earlier resource deficiency date and the differences in application of generation and T&D capacity deferral between PacifiCorp and ETO methodologies shown in Table 3. As discussed above, this comparison reflects the avoided costs in place in 2017 for the 2018-2019 period and may not reflect outcomes of ongoing dockets or the relationship of utility-specific and blended avoided costs in the future.

Figure 8. Comparison of PacifiCorp and ETO Blended Avoided Costs for Representative Measures



Key Takeaway: ETO blends avoided cost values to provide efficiencies in delivery and recognizes that this causes some misalignment between how ETO values energy efficiency and how individual utilities value the same resource. There are differences in how ETO, the NWPCC, and PacifiCorp value energy efficiency in their respective 2017 avoided cost calculations. The 2017 ETO methodology shifted value from the summer to winter for PacifiCorp and the practice of blending utility values tended to increase the value of energy efficiency relative to PacifiCorp's IRP, as the value to Portland General Electric's system accounts for over 60% of the blended values.

Conclusion: While there are good reasons why ETO blends utility values, this practice is a driver of variance between IRP targets and actual acquisitions. PacifiCorp, ETO, Commission staff, and other stakeholders are currently investigating opportunities to better align avoided costs used by ETO with the value to funding utilities' systems through docket UM 1893.

4.2.4. ETO Resource Assessment Model Comparison of Blended Avoided Costs

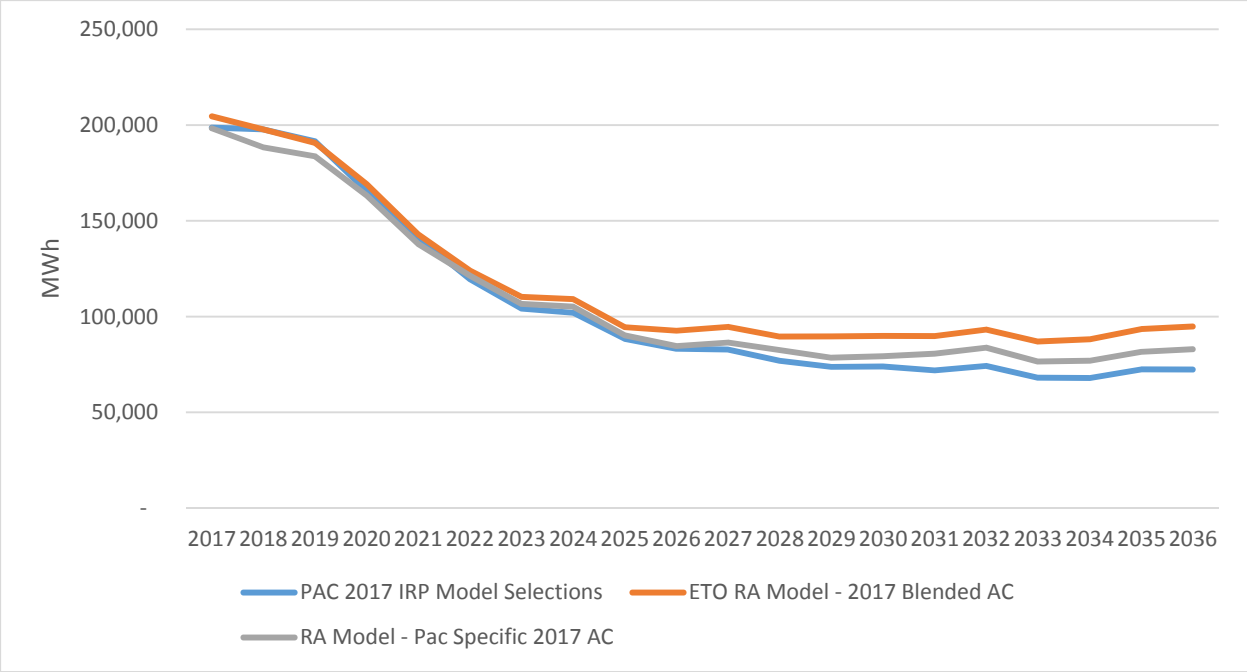
As discussed above, the differences shown in Figure 8 include the impacts of 1) PacifiCorp and ETO using different methodologies to apply the avoided cost elements and 2) ETO's use of blended utility avoided cost values. To isolate and quantify the impact of blending and methodological differences on ETO's assumed resource potential deployment, ETO compared what its RA Model would have identified as cost-effective using PacifiCorp-specific vs. blended avoided costs. This analysis used ETO's avoided cost methodology for both sets of avoided cost data to isolate the impact of blending only and comparing this directly to the IRP selections is a way to isolate the impact of methodologic differences.

As previously mentioned, the RA model is designed to calculate cost-effective achievable potential and because ETO already performs this work for most funding utilities, it was relatively straightforward to perform the same analysis for PacifiCorp's resource potential retrospectively once avoided costs had been provided by PacifiCorp. For this comparison, ETO calculated the cost-effective achievable potential using both the blended 2017 avoided costs and PacifiCorp-specific 2017 avoided cost inputs. The same methodology and peak assumptions were utilized for both avoided cost scenarios; ETO only changed the blending to 100% PacifiCorp rather than 37%/63% PacifiCorp/PGE. This changes the generation deferral start date to 2021 for the PacifiCorp avoided cost scenario, but does not address the difference in peak assumptions between the two organizations' methodologies. Note that ETO does not provide a cost-effective achievable forecast for PacifiCorp's IRP process and this cost-effective achievable view can only be performed retrospectively for PacifiCorp because the avoided costs utilized for this analysis are an output of the 2017 IRP. Additionally, these two model runs were compared to 2017 PacifiCorp IRP selections to isolate the impact of methodological differences in modeling and avoided cost calculations.

The purpose of this analysis was to attempt to quantify and isolate both the impact of blending utility avoided cost values and the impact of methodological differences described in the previous section, such as peak period definitions. The avoided costs used were those provided by PacifiCorp in 2017 and the deployment rates were unchanged from the original IRP achievable potential forecast provided by ETO to PacifiCorp for the 2017 IRP in order to keep this as much of an apples-to-apples comparison as possible.

Figure 9 compares the cost-effective achievable potential identified by ETO in each scenario, as compared to PacifiCorp's 2017 IRP selections. The graph helps to quantify the overall impact of blending and methodological differences on the identification of cost-effective energy efficiency resources, as discussed below.

Figure 9. Comparison of 2017 IRP selections to ETO's Cost-Effective Model Results



1. **Impact of blending on ETO's identification of cost-effective energy efficiency resource potential**: Comparing the orange and grey lines provides the difference in cost-effective resource potential identified by ETO's RA Model using ETO blended 2017 avoided costs and PacifiCorp-specific 2017 avoided costs using ETO's avoided cost calculation methodology. Some key takeaways are:
    a. The cumulative difference in cost-effective savings is about 7% higher utilizing blended avoided costs compared to PacifiCorp specific avoided costs.
    b. In the near term, the difference is smaller, at an average of 4% for the first five years of the forecast.
    c. The later years of the forecast, years 5-20, have a larger variance at an average of about 10% over the 15 years. This is due to measures near the margin of cost effectiveness that become cost-effective over time becoming cost-effective earlier in the forecast using blended avoided costs.
2. **Comparison of PacifiCorp's IRP selections to cost-effective resource potential identified by ETO using PacifiCorp-specific avoided costs and ETO's calculation methodology:** Comparing the grey and blue lines provides the difference in cost-effective energy efficiency resources identified by PacifiCorp's 2017 IRP and ETO's PacifiCorp-specific analysis. Some key takeaways are:
    a. The results are relatively aligned, but the RA model identifies less cost-effective potential in early years using PacifiCorp specific avoided costs, which is likely due to the calibration of early years to ETO budgets, which are based on blended avoided costs.
    b. As seen in comparing the orange and gray lines, the divergence between the orange and blue lines diverges in the later years. The reason for this divergence is more difficult to ascertain at the measure level because of the bundling method utilized by PacifiCorp and various differences between the two organizations' methods of identifying cost-effective energy efficiency resources discussed throughout this report, but potential reasons include:
        i. The calibration method assumes lower cost measures (i.e., those that are likely to be cost-effective regardless of avoided cost source or methodology) will be deployed in the early years of the study period.

ii. ETO's RA Model tests for cost-effectiveness each year, whereas PacifiCorp's IRP uses a single average levelized cost for a measure in all years. As emerging technologies become more efficient or decline in costs, they may become cost-effective over time in ETO's analysis and be included in the results. This trend would not be picked up in PacifiCorp's IRP modeling.
iii. Methodological differences in avoided cost calculations and values, described in previous sections and being considered formally in docket UM 1893. These methodological differences likely have a larger impact over

Key Takeaway: ETO's RA Model provides a convenient way to investigate the impact of blending avoided costs and other methodological differences on cost-effective resource potential. While the latter comparison is not perfect, the overall difference in resource selection is informative in trying to identify overall misalignment in IRP targets compared to ETO achievements, as Figure 9 illustrates.

Conclusion: There are two comparisons shown in Figure 9 that each have different conclusions:

1) *Blending Impacts***:** The difference in total cost-effective achievable savings potential using blended PacifiCorp/PGE avoided costs and using PacifiCorp specific avoided costs under ETO's calculation methodology is 7%. The difference is smaller in the near-term where the impact of blending on cost-effective resource potential in ETO's RA Model is only 4% over the first 5 years. This shows that, using ETO's methodology, the difference in cost-effective potential using blended and PacifiCorp-specific avoided cost values is relatively small, indicating that the majority of the measures in ETO's portfolio are cost-effective regardless of whether PacifiCorp or blended avoided costs are applied.
2) *Methodological impacts of avoided cost calculations and forecast modeling:* Figure 9 also shows that the difference between the cost-effective achievable savings potential selected by the ETO RA model (using PacifiCorp specific avoided costs under the ETO calculation methodology) and the selections by the PacifiCorp 2017 IRP are only 3% over the 20-year planning horizon. This indicates that the methodological differences in calculating avoided costs between what PacifiCorp and ETO value energy efficiency are small. Furthermore, it indicates that the updated calibration process that was used for the 2017 PacifiCorp IRP seems to be working. In the 2015 IRP, ETO only calibrated the first year of savings, and the impact of not calibrating the second year of the 2015 IRP is Figure 1.

4.2.5. Updates to Avoided Cost Methodology Since 2017

Since the finalization of blended avoided costs in 2017, the Commission opened dockets UM 1893 and AR 621 to investigate and formalize avoided cost calculations, methodology, and data submission timelines. Some of the components discussed above that are divergent have already been discussed and are slated to be updated, for use in ETO's 2020 budget and goals. These updates include:

1. **Updated submission timeline:** Avoided cost submissions and updates will now occur annually rather than biennially. This will allow ETO's program offerings to more quickly reflect the current value of energy efficiency.
2. **Formalized review and approval process:** AR 621 will establish a formal process by which utilities will submit, and the Commission will approve, avoided cost inputs for use by ETO.
3. **Generation Deferral Value:** The methodology will be updated to value generation deferral according to the efficiency measure's contribution at the time of funding utilities'

system peaks, rather than applied equally across all hours in the current methodology. The utility peak period has been added to the avoided cost submission form.

Key Takeaway: The changes to avoided cost methodology and process already underway should help improve alignment between ETO avoided costs and the value to funding utilities' systems. Additionally, the formalized annual avoided cost review process will improve transparency and flexibility in adapting to changes to the value of energy efficiency. PacifiCorp, ETO, Commission staff, and stakeholders should continue to review avoided cost submissions and methodology to identify additional opportunities to better align ETO's avoided costs with the value to funding utilities' systems.

4.3. ETO Development of Annual Goals and Budgets

Each year, ETO develops a savings goal for the following year with an action plan and associated budget to achieve that goal. The budget is developed in coordination with ETO staff, program management contractors, and program delivery contractors, all of whom have a deep understanding of how products and delivery strategies are performing in Oregon markets. Utilizing this combined expertise, each program builds a budget based on its market intelligence and currently approved measures, incorporating small nuances unique to each program.

In building this budget, ETO considers cost and savings from available measures. Custom measures are qualified based on site-specific calculations and are forecast based on past trends and new market influences. Prescriptive measures (those with a single estimate of average cost and savings across many sites) are updated and approved at least once every three years. However, measures that make up a large portion of anticipated savings in the portfolio or have rapidly changing market conditions may be updated more often. For example, some lighting measures are updated every year with current market data and avoided costs. Conversely, some measures that are currently offered by programs that have not been reviewed recently use older versions of avoided costs.

ETO does not believe this mismatch of avoided costs presents a serious problem because these measures make up a relatively small portion of portfolio savings (because measures with the most savings tend to be reviewed frequently) and most measures are not close to the cost-effectiveness limit (i.e., a modest or moderate change in avoided cost only impacts the inclusion measures that are close to the limit).

4.4. Impact of Large Projects and Measures with Cost-Effectiveness Exceptions on ETO Savings Acquisition

Since its inception, ETO has had some large, unforeseen projects come through programs, which can have a significant impact on realized savings in a given year. Additionally, ETO offers a suite of measures that are not cost-effective, but are exempted from the cost-effectiveness rules by the Commission for one or more of the reasons listed in section 0. Because of the uncertainty around large projects and PacifiCorp's' System Optimizer model's focus on cost-effective resources, these two types of savings have not historically been well represented in PacifiCorp's IRP. This section outlines the impacts of these two types of savings on ETO actual acquisition as compared to PacifiCorp's IRP targets.

4.4.1. Savings Impact of Large Projects and Measures with Cost-Effectiveness Exceptions

Large projects considered in this analysis, and for the large project adder that was included in the supply curves for PacifiCorp's 2019 IRP, are projects that save over 5,000 MWh. which are large enough to make a significant impact on achievements These large projects may be, but are not necessarily "mega projects" as defined by ETO's Board, which are a type of large project over $500,000 in incentives in one year. Mega projects must go to ETO's Board for approval of the incentives, which are capped at $500,000 per year.

However, if the project scoping shows an incentive over $500,000, the incentive may be paid out over 3 years, up to $500,000 per year.[25]

When developing energy efficiency supply curves for PacifiCorp's IRPs, PacifiCorp and ETO work collaboratively to assess whether known large projects should be included in the identified potential in the early years of the planning horizon, recognizing that even expected projects may be delayed or may not occur at all. Decisions on whether to include known projects in IRP supply curves are based on the best information available to both organizations at the time of supply curve finalization, including whether new construction projects have requested service from PacifiCorp. However, even with the best information available, large projects may still emerge unexpectedly and these types of projects have not been accounted in PacifiCorp's 2017 IRP or previous IRPs. To better reflect these opportunities in PacifiCorp's 2019 IRP, PacifiCorp and ETO worked together to develop a "large project adder," as noted in section 0.

As discussed previously in this report, the Commission established seven conditions under which exceptions to measure-level cost-effectiveness may be granted. Because PacifiCorp's System Optimizer model selects energy efficiency resources based on their costs relative to other resource options, IRP targets are unlikely to account for measures that are not cost-effective.[26]

Table 4 shows the savings impact of large projects and measures with cost-effectiveness exceptions on historical ETO savings acquisition in PacifiCorp's service territory. Of note:

- Measures with cost-effectiveness exceptions have historically represented around 1% of annual savings acquired, with a range of 0.24% to 3.92% since 2017. This analysis suggests that these measures are not a large contributor to differences between PacifiCorp IRP targets and ETO actual savings acquisitions.
- Large projects have represented between 0% and 22% of annual savings acquisition since 2011, with significant annual fluctuation and a downward trend since 2013. The analysis suggests that large projects may have been a significant contributor to ETO actual savings exceeding PacifiCorp's IRP targets in the past, but have been less of a driver in recent years. However, recent years may not be reflective of the future and unexpected large projects may again drive variance between IRP selections and ETO actual savings.

Table 4. Savings Impact of Large Projects and Exception Measures on Historical ETO Achievements for PacifiCorp

Year	PacifiCorp MWh	Measures with Cost-Effectiveness Exceptions		Large Projects		Exceptions and Large Projects	
		MWh Savings	% of Total	MWh Savings	% of Total	MWh Savings	% of Total
2011	198,110	471	0.24%	25,091	12.67%	25,562	12.90%
2012	215,532	773	0.36%	40,501	18.79%	41,274	19.15%
2013	209,937	1,654	0.79%	45,512	21.68%	47,166	22.47%
2014	214,064	2,168	1.01%	21,659	10.12%	23,827	11.13%

[25] The ETO Board's policy on mega projects is available at: https://www.energytrust.org/wp-content/uploads/2016/11/4.20.000-P.pdf.

[26] Due to ETO's avoided cost blending process and seasonal valuation methodology, ETO may identify some measures as cost-effective that PacifiCorp's model does not see as economic, and vice versa.

2015	215,849	2,005	0.93%	9,606	4.45%	11,611	5.38%
2016	237,682	9,322	3.92%	6,189	2.60%	15,511	6.53%
2017	223,955	1,975	0.88%	-	0.00%	1,975	0.88%

4.5. Impact of Light Emitting Diode (LED) Savings on ETO's Portfolio

The rapid emergence of LED lighting options over the past several years was difficult to predict and significantly changed the contribution of lighting to ETO's portfolio savings. As shown in Table 5, LEDs increased from 1% of program savings in 2011 to 38% of savings in 2017, increasing the overall share of lighting in the portfolio from 25% to 43% in the same timeframe. It can be difficult to accurately reflect opportunities in such rapidly changing markets through the biennial IRP process, and the annual ETO budgeting process and the LED market in particular may have been a cause of significant ETO overachievement against PacifiCorp IRP targets and ETO annual goals over the past several years. However, given the transformation this market has already experiences, LEDs are not expected to continue to be a large source of variance moving forward.

Table 5. LED Lighting Impacts on ETO Achievements

Program Year	LED Savings	Total Lighting	Total Savings	LED as % of Portfolio	Lighting as % of Portfolio
2011	5,558,282	108,263,931	439,148,632	1%	25%
2012	12,205,075	114,398,507	547,602,871	2%	21%
2013	27,968,661	112,184,107	518,516,259	5%	22%
2014	70,943,989	150,635,247	522,223,846	14%	29%
2015	117,128,463	174,894,893	500,872,928	23%	35%
2016	204,745,514	237,952,971	567,035,655	36%	42%
2017	223,887,855	256,721,091	591,133,323	38%	43%

Key Takeaway: As discussed previously, from 2011-2017, ETO's actual savings acquisition consistently exceeded its annual savings goals. Because ETO acquires cost-effective savings opportunities when they become available, large, unforeseen opportunities can lead to savings exceeding forecasts and goals. Large projects and the rapid change in the LED lighting market had a significant impact on ETO acquisition that ETO did not foresee when setting goals for respective delivery years. ETO's understanding is that the rapid changes in the LED lighting market are not unique to Oregon. Moreover, measures with cost-effectiveness exceptions have not been a significant driver of misalignment of actual achievements and forecasts.

Conclusion: Large, unforeseen projects and rapid changes in the LED lighting market created opportunities for significant amounts of cost-effective savings acquisition for ETO, which were not fully captured in forecasts of potential or annual budgets, leading to actual acquisitions exceeding PacifiCorp's IRP targets and ETO's annual goals. The incorporation of a proxy for large projects in the 2019 IRP forecast is designed to account for the possibility of large, unforeseen cost-effective opportunities moving forward, however, as shown in the table above, it is unclear to what extent these projects will continue into the future.

5. Potential Drivers of Differences Between Historical PacifiCorp IRP Targets and ETO Actual Savings Acquisition

PacifiCorp and the ETO both plan for and pursue all available energy efficiency resources that are cost effective, reliable and feasible, however, as discussed throughout this report, each organization has various requirements that dictate how this resource is identified. Additionally, as the entity that acquires this resource on behalf of PacifiCorp customers, the ETO acquires cost-effective savings as they become available, even if, in some cases, these savings were not foreseen in ETO's annual goal-setting process. The two organizations continue to work collaboratively to identify opportunities to better align planning processes; some recent efforts to improve alignment are discussed in the next section of this report.

Based on the documentation, analysis, and conclusions from the previous sections, PacifiCorp and ETO staff attempted to determine the relative magnitude of the identified potential drivers of variance between PacifiCorp's IRP energy efficiency resource targets and ETO's actual acquisition. An assessment of each organization's perceived impact of the various drivers is shown in Table 6 below. In general, the organizations' perceptions regarding the magnitude of drivers were well aligned.

Table 6. Perceived Impact of Potential Drivers of Variance

	Perceived Impact	
Potential Driver of Variance	**PacifiCorp**	**Energy Trust of Oregon**
Forecasting Available Achievable Potential		
Uncertainty in forecasting large, cost-effective opportunities (e.g., large projects, LEDs)	High	High
Misalignment of timing between PacifiCorp and ETO planning cycles (e.g. IRP targets do not represent ETO budgeted goals)	Medium	High
Calibration of resource potential to program forecasts and assumed IRP cost-effectiveness threshold	High	Low
ETO use of regional data in place of PacifiCorp-specific data	Low	Low
Identification of Cost-Effective Resource Potential		
Differences in avoided costs (methodology and blending)	High	Medium
PacifiCorp's IRP bundling process	Low	Low
PacifiCorp levelized cost vs. ETO benefit/cost screening	Low	Low
One-time vs. annual screening of emerging technologies	Low	Low
Savings Acquisition		
ETO historic overachievement relative to annual goals	High	High
Large, unforeseen cost-effective savings opportunities	High	High
Savings from measures with cost-effectiveness exceptions	Low	Low

6. Efforts to Improve Alignment for PacifiCorp's 2019 IRP

Even before the Commission's order acknowledging PacifiCorp's IRP and requiring this report, PacifiCorp and ETO were investigating ways to improve alignment for PacifiCorp's IRP. In September 2017, ETO hosted a stakeholder workshop to provide an overview of its Resource Assessment model and brainstorm opportunities to improve alignment between ETO achievements and funding utility IRP targets.[27] This engagement resulted in the following improvements that have been implemented in ETO's modeling process and reflected in PacifiCorp's 2019 IRP:[28]

- Deployment of savings potential is calibrated to acquisition expectations for the first five years, based on conversations with program staff. Previously, the ETO only calibrated the first two years.
- Research and include additional emerging technologies and associated risk factors, based on known technologies at the time of the analysis
- Include an adder for savings from large, unanticipated projects, based on historical large project savings in each utility's service territory. Does not apply in years that already account for large projects in the calibrated forecast.
- Since the 2017 IRP, ETO has worked to further adhere to the Northwest Power and Conservation Council (NWPCC) methodology, such as ramping to achieving 100% of lost opportunity achievable measure potential rather than 85% and utilizing formulaic diffusion adoption curves for the later years rather than trending. Additionally, the 2017 deployment rates highlighted the need to take review delivery categories that calibrated to over 100% in order to identify the disconnect between program savings projections and RA Model outputs. For the 2019 IRP, ETO overhauled its measure savings and assumptions for existing measures, included a broader list of measures/emerging technologies, as well as added new construction package options to the measure list to better align with program offerings, resulting in more savings potential for these categories.

ETO implemented these improvements in late 2017. Prior to forecasting energy efficiency potential for PacifiCorp's 2019 IRP, ETO and PacifiCorp revisited the above improvements and identified two additional potential drivers of divergence between PacifiCorp IRP targets and ETO actual acquisition; both were analyzed and addressed before the completion of ETO's energy efficiency potential forecast for PacifiCorp's 2019 IRP:

- **Load Shapes:** ETO utilizes load shapes from the Northwest Power and Conservation Council (NWPCC) to value and allocate energy savings across the year, while PacifiCorp has its own set of load shapes in a different format, many of which also come from the NWPCC. ETO compared these load shapes to determine whether they were potentially causing difference in savings or value identified by the two organizations and found that the load shapes were generally close and unlikely to cause a material difference in savings or value.
- **Measure List Alignment:** ETO compared its Resource Assessment measure list with the list PacifiCorp uses to identify energy efficiency potential in its other five states. From that review, ETO identified additional measures that may have potential in PacifiCorp's Oregon service

[27] A more detailed memo on the outcomes of this meeting can be found on ETO's website at: https://www.energytrust.org/wp-content/uploads/2018/01/Outcomes-Stakeholder-Meeting-on-Resource-Assessment.pdf.

[28] For utilities for which ETO provides forecasts of economic potential for IRP modeling, ETO began including savings for measures with cost-effectiveness exceptions and measures that are cost-effective with blended avoided costs, but not utility-specific avoided costs. This update does not apply to PacifiCorp, because this economic screening occurs in PacifiCorp's IRP model.

territory, including residential air conditioning measures, and included these in the potential forecast for PacifiCorp's 2019 IRP.

7. Recommendations for Forecasting Improvements

As discussed throughout this report, and as summarized in sections 5 and 6, many of the drivers of variance between PacifiCorp's IRP targets and ETO's actual savings acquisition are either perceived to have a small impact on variance or already being addressed or investigated in PacifiCorp's 2019 IRP. Nonetheless, this analysis has identified opportunities for both organizations to improve forecasting of available cost-effective energy efficiency. To address these, PacifiCorp recommends the following:

1. PacifiCorp and ETO:
    a. Continue to work with Commission staff, other utilities, and interested stakeholders through dockets UM 1893 and AR 621 to improve alignment between avoided costs for energy efficiency used by both organizations.
    b. Continue to investigate opportunities to improve energy efficiency forecasting through additional inter-organization data sharing and use.
2. PacifiCorp:
    a. Continue to evaluate alternate energy efficiency bundling methodologies.
3. ETO:
    a. Consider including a factor in the early-year calibration process that could account for historic overachievement relative to goals.