Cost Effectiveness and Evaluation Advisory Committee Meeting

DATE: April 24, 2019
TIME: 10:00AM - 2:45PM
LOCATION: NEEA's Office - 421 SW 6th Ave. #600, Portland, OR 97204
REMOTE OPTION: Webinar: https://neea.adobeconnect.com/neeaceac2019q2/
Teleconference: 1-877-890-9502**,** Participant Code: 7702378329

MEETING GOALS:

- Review estimates of 2018 Market Transformation savings and cost-effectiveness metrics.
- Address any outstanding questions regarding the cost-effectiveness and evaluation of NEEA's work in codes and standards

AGENDA:

TIME	TOPIC	PRESENTER(S)	PACKET PG #
10:00am (30 min)	**Welcome/Agenda Review** • Agenda check • Icebreaker • Announcements	Jonathan Belais, NEEA Staff	
10:30am (90 min)	**Answering Questions on Codes and Standards** **NEEA staff will come prepared to discuss and answer questions on:** • Why and how we do codes and standards • How this work contributes to NEEA's portfolio • How does NEEA quantify, evaluate and allocate savings Objective: Develop a consensus understanding of NEEA's codes and standards work and address any outstanding questions.	Bing Liu, Christina Steinhoff, and Steve Phoutrides, and Steve Phoutrides, NEEA Staff	4
12:00pm (45 min)	**LUNCH**		
12:45pm (30 min)	**Luminaire Level Lighting Controls (LLLC) Key Assumptions** • Quantifying savings from distributor sales data • Cost effectiveness assumptions Objective: Provide NEEA's assumptions on energy savings and cost effectiveness estimates.	Kathryn Bae, NEEA Staff	5
1:15pm (30 min)	**Portfolio Overview** • Portfolio progress in market • Cycle to date and future look at savings • Cost effectiveness overview of portfolio Objective: Share comprehensive look at NEEA's Market Transformation portfolio and associated metrics	Stephanie Rider and Christina Steinhoff, NEEA Staff	6
1:45pm (20 min)	**Natural Gas and CEAC Follow-up** • Following the discussion in Q1, NEEA staff will review and solicit feedback on draft changes to the CEAC charter to incorporate natural gas. Objective: Solicit feedback to refine the charter before presentation to the governance committee for approval.	Jonathan Belais and Ryan Brown, NEEA Staff	27

TIME	TOPIC	PRESENTER(S)	PACKET PG #
2:05pm (25 min)	**Funder Portal** • Short Walkthrough of NEEA's Savings Report Site Objective: Provide location and guidance on NEEA.org for funders to access information regarding Annual Reports, Evaluations, Codes & Standards Models, UEC Methodologies, and other reference material.	Kyle Billeci, NEEA Staff	28
2:30-2:45pm (15 min)	**Wrap up and Feedback**	Jonathan Belais, NEEA Staff	

Memorandum *– Agenda item (Tier 1)*

April 11, 2019

TO: Cost-effectiveness and Evaluation Advisory Committee (CEAC)

FROM: Jonathan Belais, Stakeholder Relations Specialist

SUBJECT: Meeting Packet, Informational Updates, Additional Details

MEETING PACKET APPROACH

This packet continues the "tiered" approach:

- Tier-1 memos for active agenda items;
- Tier-2 memos for informational updates on items not currently requiring agenda time;
- Tier-3 materials provided as additional detail for those interested, accessible via links in the Tier-1 and Tier-2 memos.

This approach helps keep packets concise and digestible. Input appreciated on room for improvement.

INFORMATIONAL UPDATES

- 2019 Q2 NEEA MRE Newsletter
- 2019 Q1 NEEA Key Assumptions Update

  Note: Due to the short turnaround, this document has not been updated since the Q1 CEAC meeting in March

ADDITIONAL DETAILS (Tier 3)

Tier-3 materials related to the agenda items and informational updates listed above will be accessible through links in those memos. Additional Tier-3 details are available here:

- March 20, 2019 CEAC slides

Memorandum *– Agenda item (Tier 1)*

April 11, 2019

TO: Cost-effectiveness and Evaluation Advisory Committee (CEAC)

FROM: Jonathan Belais, Stakeholder Relations Specialist

SUBJECT: Codes and Standards Overview

Context

Recently, NEEA staff received a few questions regarding the treatment of NEEA's codes and standards work with respect to evaluation, reporting, and allocation. During the combined Board and CEAC workshop on January 11, 2019, there was a specific request to provide additional detail on the treatment of codes and standards. This agenda topic is intended to provide clarity on this subject for all CEAC members and interested board members.

For the Meeting

NEEA staff will provide an overview of why and how NEEA works on codes and standards, how this work contributes to NEEA's portfolio, and how NEEA quantifies, evaluates, and allocates the associated savings. The primary focus for this meeting will be on NEEA's electric portfolio, with the potential for future committee discussion of natural gas savings associated with NEEA's codes and standards efforts. NEEA staff will look to the committee for guidance regarding where to focus this conversation and what additional questions should be answered in future meetings or individual dialogues.

The Ask

Prior to the April 24th meeting, please discuss within your organization to identify any questions regarding NEEA's codes and standards work and reported savings. We encourage you to bring these questions to the meeting, and if possible, send them ahead of time so NEEA staff can be best prepared to provide a thorough answer.

Additionally, we encourage participation by any other colleagues within your organization that have questions or expertise in this arena.

Memorandum – *Agenda item (Tier 1)*

April 9, 2019

TO: Cost-effectiveness and Evaluation Advisory Committee (CEAC)

FROM: Kathryn Bae, Senior Planning Analyst

SUBJECT: Luminaire Level Lighting Controls Initiative Update

The purpose of this memo is to inform the Committee on NEEA's key assumptions for the Luminaire Level Lighting Controls (LLLC) initiative for the upcoming Cost-effectiveness and Evaluation Advisory Committee meeting on April 24. NEEA will present its approach to quantifying energy savings associated with the acquired LLLC sales data as well as the key assumptions used in the initiative cost-effectiveness analysis.

Background

LLLC systems integrate controls and sensors into the luminaire to offer an improved lighting experience for occupants while increasing energy savings. LLLC is one coherent system designed to work together and address issues that have held back previous generations of controls by providing a better set up experience, more flexible configuration and added business value beyond energy savings.

The LLLC initiative aims to accelerate market adoption of LLLC technology by bringing clarity to a confusing controls market through development of best practice specifications and generating owner awareness of benefit. To date the initiative has laid a foundation for its long-term vision of the implementation of LLLC becoming standard practice for commercial buildings.

Progress to Date

Savings from LLLC Sales

NEEA executed contracts with total 6 distributors to support the collection of sales data for LLLC. NEEA applied the RTF's assumptions for Controls Savings Fractions (CSFs) and Hours of Use (HOU) to the submitted distributor sales data to quantify energy savings. NEEA's third-party evaluator, Energy 350, reviewed the approach and recommended NEEA to distinguish the installation between code compliant and retrofits as the baseline differs. Because the distributor data currently does not provide such details, and NEEA will be exploring how to obtain this information from the market. The evaluation report is available here.

Incremental Cost of LLLC

NEEA is tracking the incremental cost of LLLC systems. The most recent study[1] has found an incremental cost ranging $53 to $136 above a standard LED luminaire retrofit. The wide range in prices is due to varied capabilities beyond luminaire controls, such as energy monitoring and retail asset tracking. The report and the accompanying Excel workbook are available in the advisory committee resources.

[1] Energy Solutions. August 2018. Incremental Cost of Luminaire Level Lighting Controls (LLLC).

Memorandum – *Agenda item (Tier 1)*

April 15, 2019

TO: Cost Effectiveness Advisory Committee

FROM: Stephanie Rider, Senior Manager, Market Planning and Christina Steinhoff, Principal Planning Analyst

CC: Susan Hermenet, Director, Emerging Technology, Planning & Evaluation

SUBJECT: Agenda and Pre-Reading Packet for April 24th Cost Effectiveness Advisory Committee Meeting

The purpose of this memo is to update the committee on the status of the NEEA Market Transformation portfolio ("portfolio") for the upcoming Cost Effectiveness Advisory Committee (CEAC) meeting on April 24.

In the meeting we will cover:

- The market progress of the portfolio
- A historical and forecasted look at energy efficiency savings
- The forecasted cost effectiveness of the investments
- Additional portfolio metrics
- New funder portal for access to documentation supporting the above

The objective is to share comprehensive look at NEEA's Market Transformation portfolio and associated metrics now that NEEA staff have completed the updated savings estimates for 2018.

Background

The Northwest Energy Efficiency Alliance (NEEA) is an alliance of more than 140 utilities and energy efficiency organizations working on behalf of more than 13 million energy consumers. NEEA is dedicated to accelerating both electric and gas energy efficiency, leveraging its regional partnerships to advance the adoption of energy-efficient products, services and practices.

Since 1997, NEEA and its partners have saved enough energy to power more than 1 million homes each year[2]. As the second-largest resource in the Northwest, energy efficiency can offset most of our new demand for energy, saving money and keeping the Northwest a healthy and vibrant place to live.

[2] Based on Total Regional Savings and utilizing EIA RECS 2015 average energy consumption for homes in the West region.

Quantifying the estimated annual electric energy savings for the regional programs in which NEEA is involved is a critical role of NEEA. NEEA staff gather data to inform the inputs used to calculate the reporting of estimated energy savings for the region.

NEEA Annual Reporting Results

Portfolio Overview

The savings reported in this document are the result of current market transformation initiatives, ongoing work in codes and standards, and the continuing stream of energy savings[3] from previously funded initiatives.

There are many initiatives for which we are seeing increased adoption of efficient practices above the market baseline and are able to track and estimate energy savings and levelized cost forecast for the region. The graphics below depict the regional market transformation portfolio that NEEA is currently engaged in. NEEA uses a stage-gate approach to manage the development of this work for the region.

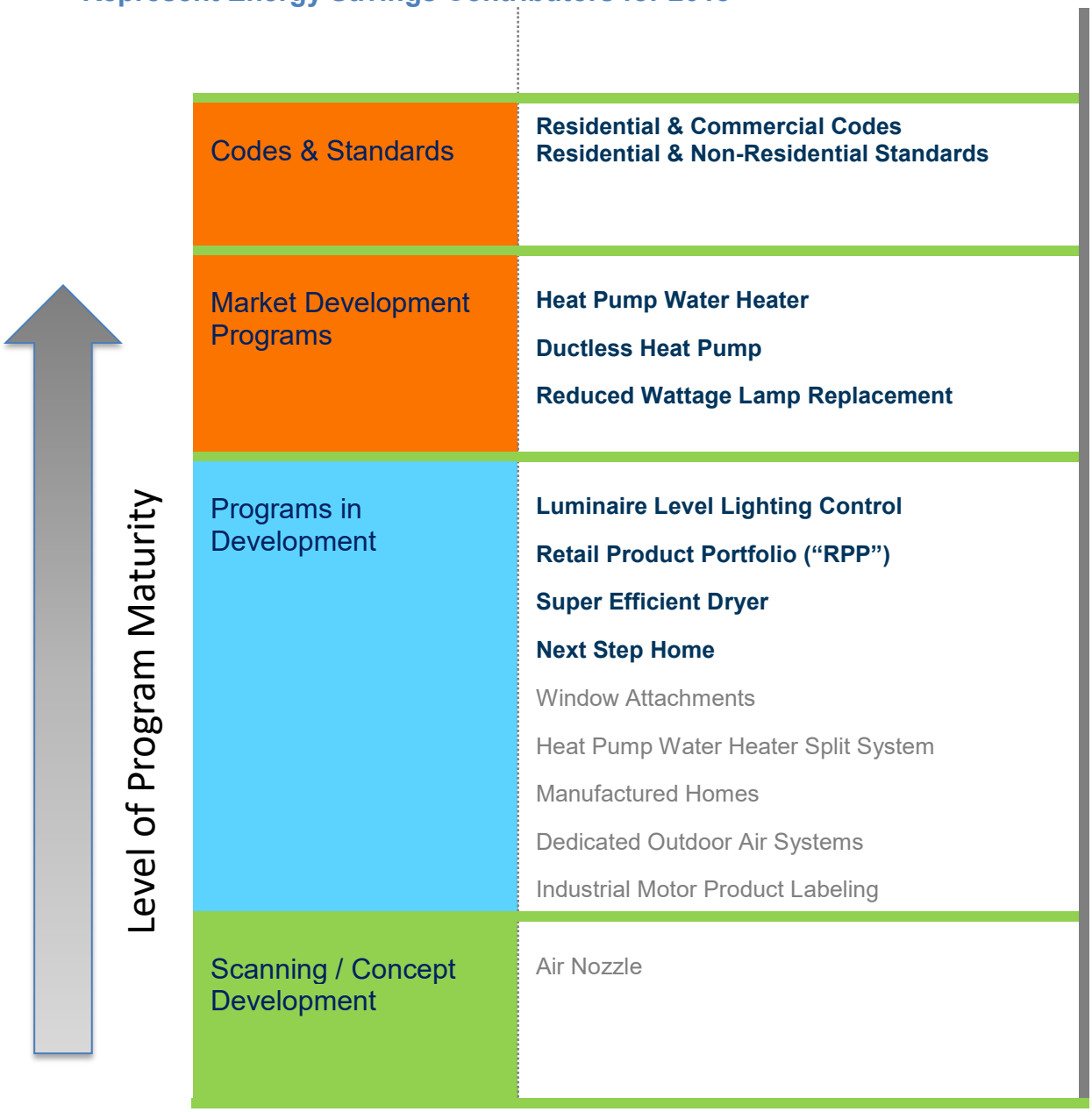
Current investment programs

- **Market Development Programs**. These initiatives have advanced through the lifecycle of development and are now in the mature phase of the lifecycle.

- **Programs In-Development.** The remainder of the portfolio is comprised of initiatives where the increased adoption of energy efficiency has yet to occur, or occur on a consistent basis, or NEEA is not yet able to measure the energy savings for the region. These are initiatives that are early in maturity, and NEEA is determining product performance, learning market dynamics, collecting data, and determining the feasibility of the regional program.

[3] The term 'energy savings' or 'savings' refers to incremental, first year electric energy savings, expressed in aMW, and use the Market Baseline methodology, unless otherwise noted. See **Appendix A** for the methodology of savings calculations.

Current Investment Portfolio Status as of December 31, 2018: Bolded Initiatives Represent Energy Savings Contributors for 2018



Long Term Monitoring and Tracking Programs

NEEA tracks the advancement of efficiency efforts in the region well after the period of active investment via regional funding has ceased. NEEA only tracks and reports first year savings that occur in the market, and the below initiatives are those initiatives that are still generating first year energy efficiency savings for the region.

Code & Standards *in effect prior to start of current funding cycle*	**Residential & Commercial Codes** **Residential & Non-Residential Standards**
Long Term Monitoring and Tracking	**Efficient Homes** **RETA CRES Refrigeration Operator Certification** **Drive Power** **Building Operator Certification and Expansion (BOC/E)** **Commissioning** **80 Plus/Computer Power Supply** **Televisions (older tier, pre RPP)** **CFLs (Power plan savings only)** **Clothes Washers (older tier, pre RPP)** **Refrigerators (Power plan savings only)**

When the market has reached saturation, and/or data needed to monitor the market progress is no longer available, NEEA will sunset the program. Based on 2018 results, NEEA has not identified any initiatives to sunset. See Appendix E for the NEEA Sunsetting Guidelines.

2018 Final Portfolio Estimates

NEEA estimates and reports energy efficiency savings as a result of the combined work that the region has achieved in the market transformation portfolio. By tracking the efficiency gains in the above lists of programs, the following categories of savings have been estimated for the region for 2018:

Regional Efficiency Metric	Definition	2018 Final Estimate
Total Regional Energy Savings	Total energy efficiency estimated for the region on the portfolio	148 aMW
Co-Created Energy Savings	Total energy efficiency estimated above the Market Baseline for the region. This includes work done individually by funders as well as the Net savings that occurred in the market as a result of combined efforts	46 aMW
Net Market Effects Savings	Net results after removing savings associated with units reported by local funder programs and by baseline	35 aMW
	(see Appendix A for savings accounting methodology)	
Co-created Annual Carbon Emissions Reduction	Total regional carbon emissions avoided annually due to energy efficiency efforts in 2018 (see Appendix C for methodology)	201,914 tons
Co-created Peak Capacity Savings	Regionally estimated wholesale peak capacity savings garnered during winter peak period (see Appendix D for methodology)	86.6 MW

Long-Term View of Market Transformation

NEEA works to remove market barriers leading to sustained market adoption of efficient practices and resulting in energy savings. Investments made today are bringing down barriers that will enable savings in future years. While NEEA reports an annual estimate for the savings achieved by the regional Alliance's joint work in the market, we also track and forecast this value over a 20 year horizon to account for the full value of the transformation the region is investing in together. This long-term view provides the appropriate alignment of the energy savings and investment in the market because it reflects the transformation of the market the region is working towards.

Regional Cost Effectiveness Forecast

NEEA assesses the cost-effectiveness of the region's investment and corresponding benefits over this 20-year transformation horizon, using a Total Resource Cost perspective. NEEA performs this analysis annually. As of 2018, the levelized cost of the NEEA Market Transformation investments is 2.8 cents per kWh.

To arrive at the Portfolio level metric, NEEA assesses the benefits of programs in the Market Development phase and uses the costs for the full NEEA portfolio, including those in program development, as well as all other NEEA costs (ie stock assessments, general administration not associated with a specific initiative) in order to present a conservative view of the cost effectiveness of the region's current cycle investment. The full methodology is outlined in Appendix B.

Cost Effectiveness Forecast of Cycle 5 Investment Portfolio

	Levelized Cost (cents per kWh)	Benefit Cost Ratio
Ductless Heat Pumps	4.6	1.1
Heat Pump Water Heaters	2.0	1.7
Reduced Wattage Lamp Replacements	1.0	2.2
Portfolio Cost Effectiveness	2.8	1.4

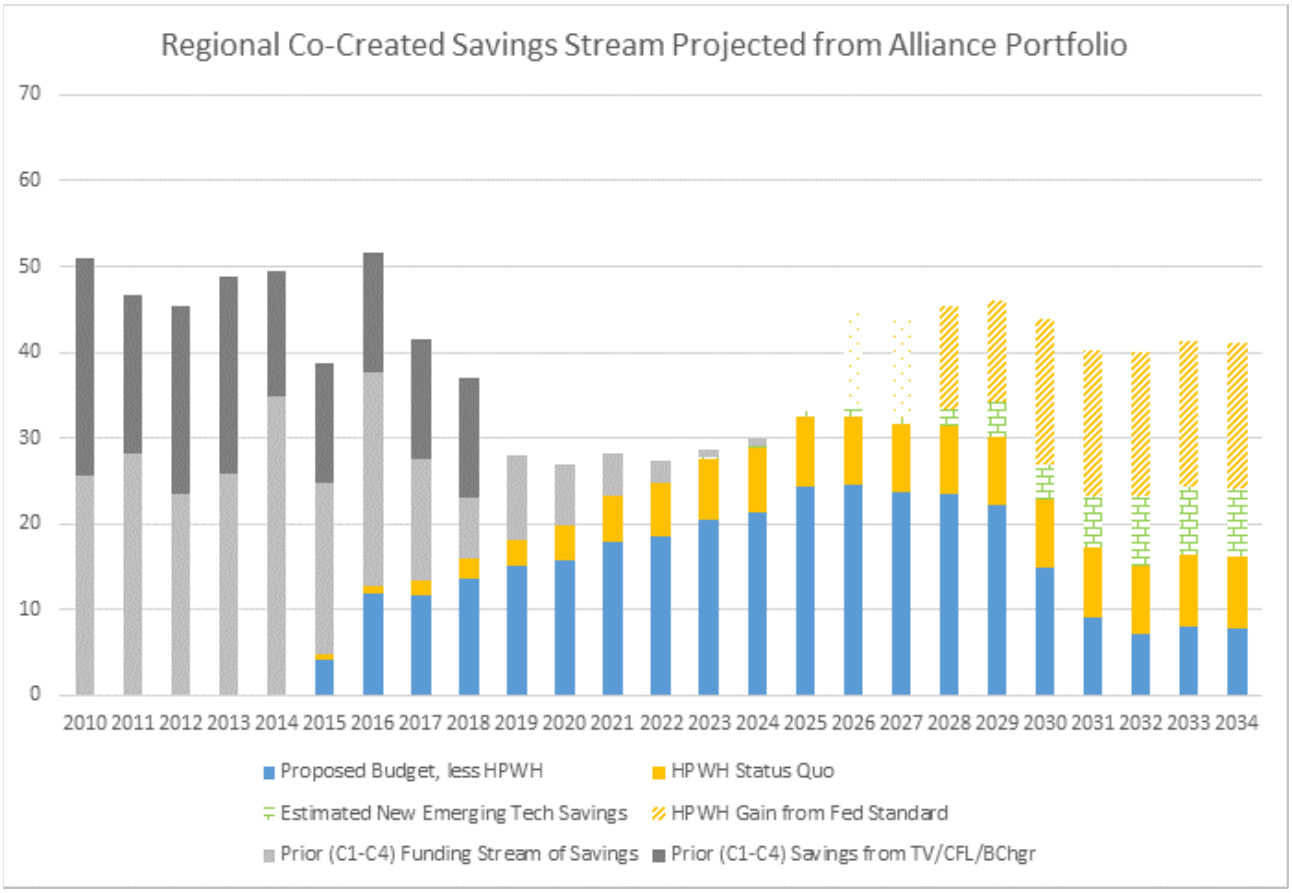
Regional Energy Savings Forecast

Based on the region's investment portfolio of initiatives to date, and estimates of sustained change, NEEA forecasts the total market efficiency potential over a 20-year horizon.

NEEA anticipates that the level of co-created energy savings for the region will be slightly lower in the upcoming years as

1) we have a high volume of programs in-development and many of the measures in these programs will take time to penetrate the market,
2) the savings accounting of sizeable past technologies (CFLs, TVs) and Federal Standards (Battery Charger 2014) will be expiring in the 2018+ time horizon, and
3) the timing of the new Federal Standard for small tank Heat Pump Water Heaters is delayed to later 2020's.

The below chart gives you a sense of the forecasted co-created energy savings stream for the regional portfolio based on the proposed budget levels for 2020-2024 Alliance activities at NEEA.



NEEA expects to continue collaborative work with the region to identify and progress additional market transformation initiatives into the portfolio to achieve efficiency gains and resulting energy savings in 2020 and beyond.

Appendices

Appendix A: Savings Calculation Methodology

NEEA reports energy savings to funders using two different baseline methodologies— a NEEA baseline perspective and a 7th Power Plan baseline perspective. The primary purpose of the NEEA baseline approach is to track the progress of Market Transformation efforts throughout the region. Meanwhile, the Power Plan approach fulfills a need to report savings against the regional Northwest Power and Conservation Plan's targets. In both cases, NEEA reports its savings in average megawatts[4] and nets out savings already claimed through local programs.

NEEA Baseline Approach

The NEEA baseline approach groups savings from market transformation into the following categories:

1) **Total Regional Savings:** Savings associated with all market changes.
2) **Baseline Savings:** Savings from naturally occurring market change without utility, NEEA, Bonneville Power Administration, and Energy Trust of Oregon funded intervention.
3) **Local Programs*:** Savings claimed through local utility, Bonneville Power Administration, and Energy Trust of Oregon activities.
4) **Net Market Effects:** Savings associated with market change that are not counted as Baseline or Local Programs. (Total Regional Savings less Baseline less Local Programs)
5) **Co-Created Savings:** Total Regional Savings less Baseline

Figure 1 illustrates the relationship among the savings categories.

Figure 1: Savings Categories for NEEA Baseline Approach

[4] An aMW is 8,760 (the number of hours in a year) megawatt hours. This is the continuous output of a resource with one megawatt of capacity during a year.

*The definition of Local Programs is:

$$Local\ Programs^{Net} = Local\ Programs\ Units - LocalPrograms\ Units * \frac{BaselineUnits}{Total\ Regional\ Units}$$

Local Programs is based on the sum of units the Funders report in NEEA's annual local incentives survey. As illustrated in the equation above, a fraction of Local Programs Units is counted toward Baseline in order to capture free ridership of incentives. NEEA assumes the free ridership share is equal to the share of Baseline with respect to the Total Regional Units. When NEEA reports Local Programs Savings, it is net of the Local Programs Units counted toward Baseline so that Baseline Units are not double counted.

Power Plan Baseline Approach

The Power Plan baseline approach uses the Northwest Power and Conservation Council's frozen efficiency baseline to calculate energy savings, which are grouped into the following categories:

1) **Total Regional Savings**: Savings associated with all market changes above the Power Plan baseline.
2) **Local Programs**: Savings claimed through local utility, Bonneville Power Administration, and Energy Trust of Oregon activities.
3) **Remaining Savings**: Savings above the Power Plan baseline not counted as Local Programs. (Total Regional Savings less Local Programs)

To calculate Local Programs, NEEA surveys regional stakeholders. The survey provides the amount of incentives local utilities, Bonneville and the Energy Trust of Oregon claim for the year. NEEA converts this information into savings against the 7th Power Plan baseline and subtracts the value from the Total Regional Savings estimates (Figure 2). The resulting Remaining Savings is what NEEA reports to its funders. Figure 2 illustrates the relationship among the savings categories.

Figure 2: Savings Categories for Power Plan Baseline Approach

Appendix B: Cost Effectiveness Methodology

To maintain a portfolio of programs that are cost effective, NEEA looks at the cost effectiveness of a program prior to adding it to the portfolio. This Appendix provides an overview of how NEEA calculates cost effectiveness metrics.

Cost Effectiveness Metrics

NEEA primarily focuses on Total Resource Cost (TRC) metrics, which consider all quantifiable costs and benefits regardless of who accrues them. NEEA considers both the levelized costs and benefit-cost ratio:

1. Net Levelized Cost: The Levelized Cost is the net present value of all the costs (capital and operation and maintenance) annualized over 20 years and divided by present value of the electricity savings in kWh.
2. Benefit-Cost Ratio: The Benefit-Cost Ratio includes the net present value of all quantifiable non-electric benefits in the numerator before dividing the net present value of all total benefits in dollars by the total costs in dollars. A measure is cost-effective if the ratio is greater than or equal to one.

The metrics are described in an equation form

$$\text{Net Levelized Cost (cents/kwh)} = \sum_{t=1}^{n} \frac{NetCosts_t}{(1+r)^t} \Bigg/ \sum_{t=1}^{n} \frac{EnergyBenefits_t}{(1+r)^t}$$

$$\text{Benefit-Cost Ratio} = \sum_{t=1}^{n} \frac{Benefits_t}{(1+r)^t} \Bigg/ \sum_{t=1}^{n} \frac{Costs_t}{(1+r)^t}$$

where

t = year

n = period of analysis

r = discount rate

m = measure

NetCosts = monetized cost associated with the Total Resource Cost (e.g. consumer capital costs, program administration costs, and operations and maintenance costs) less the monetized transmission and distribution benefits and the monetized non-electricity benefits
EnergyBenefits = per-unit savings (kWh) at busbar associated the measure

Benefits = any monetized benefit associated with the Total Resource Cost including the monetized electricity benefits and transmission and distribution savings
Costs = any monetized cost associated with the Total Resource Cost including the consumer capital costs, utility administration costs, and NEEA direct costs

Calculating the Metrics

To calculate the metrics, NEEA uses ProCost cost effectiveness model developed by the Northwest Power and Conservation Council. The avoided costs, carbon values, discount rates and other assumptions[5] come from the Council's Seventh Power Plan. The ProCost model and associated files, including the user guide, are available on the Regional Technical Forum's website:
NEEA uses the most recent version of ProCost. The files are located on the Regional Technical Forum's (RTF) website: https://rtf.nwcouncil.org/work-products/supporting-documents/procost

[5] NEEA reports the metrics with and without the Northwest Power Act credit. The Act gives conservation a 10% cost advantage over sources of electric generation.

Appendix C: Estimating Carbon Dioxide Emissions Avoided

Carbon Dioxide Emissions

In October 2015, the Council shared their 7th Plan assumption for carbon dioxide (CO_2) emissions from electricity generation in an October meeting of the Cost-effectiveness Advisory Committee (CEAC). The Council's assumption was that energy efficiency displaces natural gas generation plants that are "on-the-margin." On-the-margin means electricity prices are barely covering the natural gas plant's marginal cost of generation. As new energy efficiency is introduced, these natural gas plants are assumed to back down their generation commensurate with the amount of new energy efficiency. The Council has previously assumed that for each megawatt-hour (MWh) of generation displaced by energy efficiency, the displaced marginal emissions include avoiding approximately 950 pounds of CO_2.

Since 2015, the Council has worked on more detailed emissions estimates, knowing of more planned coal plant retirements. A January 2018 Council Draft whitepaper by John Ollis finds a wider range of CO_2 emissions per MWh of generation displaced. That analysis uses the Aurora XMP model, solving for the entire Western Electric Coordinating Council (WECC) with explicit accounting of between 1,200 and 1,800 megawatts of operating reserves; using 80 different hydro conditions instead of average hydro; and consideration of emissions avoided elsewhere in WECC. As noted in the paper, the reduction in CO_2 intensity of the WECC fleet of resources (coal plant retirements, etc.) seems to be the main driver in the avoided emissions rate. As seen in Table 1 below, it falls significantly between 2016 and 2021, then rises slowly.

Table 1: Annual Average Avoided CO_2 Emissions Rate (lbs./kWh)

2016	1.83
2021	0.91
2026	0.93
2031	0.97

Source: "Avoided Carbon Dioxide Production Rates of the Northwest Power System," Ollis, John, Draft, Northwest Power & Conservation Council, 2018

Absent the annual average numbers, linear interpolation results in the annual average emissions rates in Table 2.

Table 2: Annual Average Avoided CO_2 Emissions Rate (lbs./kWh)

2016	1.830
2017	1.650
2018	1.460
2019	1.220
2020	1.090
2021	0.910
2022	0.914
2023	0.918

ProCost calculates carbon dioxide emissions avoided by energy efficiency at a measure and kilowatt level. For sake of simplicity, we use the total savings in this example instead of rolling up the carbon savings from each measure in ProCost. The equation below uses results of the Council's 2018 carbon emissions analysis:

Displaced metric tons of CO_2 emissions in the year 2021 = (EE*8,760*1000*CER)/2,204.62

Where:

EE = *Annual average megawatts (aMW) of energy efficiency from NEEA market transformation*
8,760 = *Number of hours in a year, used to convert to aMW to megawatt-hours (leap year 8,784)*
CER = *Council assumption for annual average carbon dioxide emissions rate in pounds per kWh of WECC generation displaced.*
1,000 = *Conversion factor from megawatt-hours to kilowatt-hours*
2,204.62 = *Pounds per metric ton. The social cost of carbon is denominated in metric tons.*

ProCost will do this calculation for each measure, summing to the total carbon dioxide displaced.

Appendix D: Estimating Capacity Savings of Energy Efficiency

The capacity value of energy efficiency has seen growing interest in the Pacific Northwest. An important change in the planning methodology for the Northwest Power & Conservation Council's 7th Plan was to include an estimate of the capacity value of energy efficiency. This resulted in a reduction in the need for new generation capacity within the 7th Plan.

Capacity from Electric Generation

Capacity from a utility generation perspective is often defined as the maximum electricity that can be reliably generated upon short notice, usually within one hour or less. A more static measure of generation capacity is "nameplate capacity," or the maximum machine capacity listed upon a metal plate affixed to the generating unit, along with other information about who manufactured it, when manufactured, and some basic operating characteristics.

Historically, the capacity benefit of energy efficiency has meant little to Pacific Northwest utilities, because they viewed themselves as capacity-rich. This was the result of the region having many hydropower generation plants, whose vast reservoirs could deliver surplus capacity at the flip-of-a-switch during normal water years. Capacity as an hourly product, when infrequently sold in the Mid-Columbia power market, long traded for a modest premium (10%-20%) over the value of one-hour of energy, which itself may have zero capacity value. However, with the continued growth of intermittent generation such as wind and solar that requires capacity to integrate it; increasing operational constraints on hydropower plants; and planned retirements of coal-fired plants, capacity is growing in value to regional utilities. As identified within the Northwest Power & Conservation Council 7th Plan, the Pacific Northwest was capacity-short in 2016. In the 7th Plan, the Council identified the need for 2,600 megawatts of new capacity by 2025.

Capacity from Energy Efficiency

For NEEA, capacity from energy efficiency is defined as the maximum energy efficiency savings of an end use (or portfolio of end uses) at the time of system peak demand. The building blocks to prepare the most accurate estimate of capacity from energy efficiency include:

- Time-differentiated demand (load) data for baseline measures
- Time-differentiated load shapes for efficient measures
- Adjustments to the baseline load data for known future code changes
- Sales forecasts of the energy efficiency measure(s)
- Levelized costs of baseline and efficient measures
- Load factor of aggregated measures by customer class
- Diversity factor of aggregated measures by customer class
- Coincidence factor of aggregated measures by customer class

Ideally, all the above information would be available for regional planning. In reality, we may not have the right time-differentiated end use demand data or an accurate representation of the diversity of the load for the diversity factor. Hopefully, new end use load research will eventually help to address some of the data problems for the region. When appropriate data is available, the following equation is used in estimating capacity, in this case an example for HVAC systems:

Equation 1. Basic Demand Savings Equation

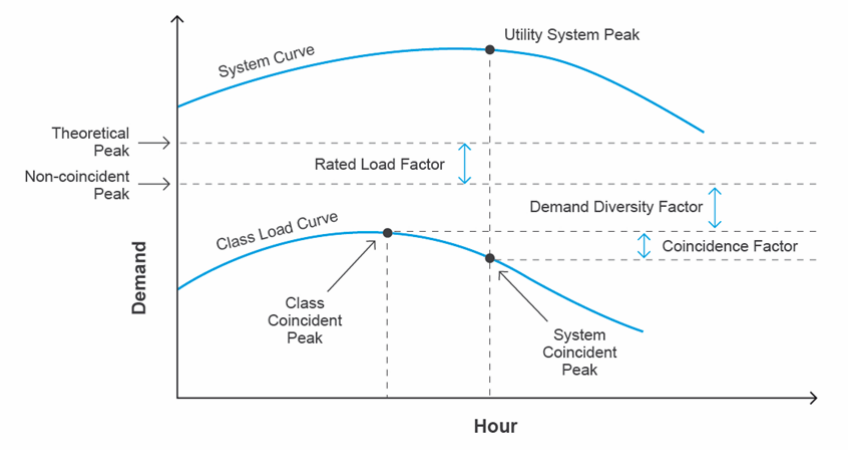
$$\Delta kW_{gross} = units \times RLF \times \left[\left(\frac{kW}{unit}\right)_{base} - \left(\frac{kW}{unit}\right)_{ee}\right] \times DF \times CF \times (1 + HVAC_d)$$

Where:

ΔkW_{gross}	=	gross demand savings
Units	=	units of measure installed in the program
RLF	=	rated load factor
kW/unit	=	unit demand of measure
DF	=	diversity factor
CF	=	coincidence factor
$HVAC_d$	=	HVAC system interaction factor for demand

Figure 1 below shows the relationship of capacity savings from a class of end uses to utility system peak demand. Different end uses can have significantly different impacts upon system peak demand, which can change the total value proposition of energy efficient end uses. A particular end use may not have the highest energy savings, yet when time of use and capacity savings are considered, contributes significantly to reducing peak demand. This can shift both its value and importance within modern energy efficiency and integrated resource planning.

Figure 1. Capacity Savings and Utility System Peak Demand



Definitions for Figure 1:

- **Peak period.** The period during which peak demand savings are estimated. This period can range from one hour per year to several hours per weekday during a season. For most Northwest utilities, winter peaks are highest, but summer peaks are now growing faster than winter peaks.
- **Theoretical peak.** The usage of a population of equipment if all were operating at nameplate capacity.
- **Non-coincident peak.** The sum—at any time—of the maximum demand of a population of equipment that does not peak simultaneously with the utility system peak.
- **Rated load factor (RLF).** The ratio of maximum operating demand of a population of equipment to the nameplate power/capacity. It is the ratio of non-coincident peak to theoretical peak. For example, a building that dims its lamps to 90% of their output has a RLF for lighting of 0.9.
- **Demand diversity factor.** The ratio of the peak demand of a population of units to the sum of the non-coincident peak demands of all individual units. While an individual efficiency technology may save a certain amount of demand, those technologies are not all operating at the same time across all buildings throughout the region. For example, if a maximum of 7 of 10 installed CFLs are on at any given time, then the diversity factor is 0.7.
- **Coincidence factor.** The fraction of the peak demand of a population that is in operation at the time of system peak. The peak demand use for a given building and end use may or may

not be aligned exactly with the utility system peak. For example, if at the time of system peak, only 3 of 7 CFLs mentioned above are on, then the coincidence factor is 3/7.

ProCost

ProCost is a model developed by the Northwest Power & Conservation Council. It is used by NEEA in estimating energy efficiency savings and cost-effectiveness. NEEA began to use ProCost in 2016, with discussions about ProCost continuing into 2017 with the Cost-effectiveness Advisory Committee (CEAC). ProCost contains hourly load shapes for electric end uses. In figure 1 above, equation 1, there is a diversity factor, which is separately defined from a coincidence factor. However, the coincidence factor may be defined in a way that it accounts for both the coincidence factor and the diversity factor. For example, if 1 out of 3 LED bulbs were on at the time of system peak, then the coincidence factor was 0.33 and the diversity factor is already accounted for by this number – it is sufficient to define peak savings.

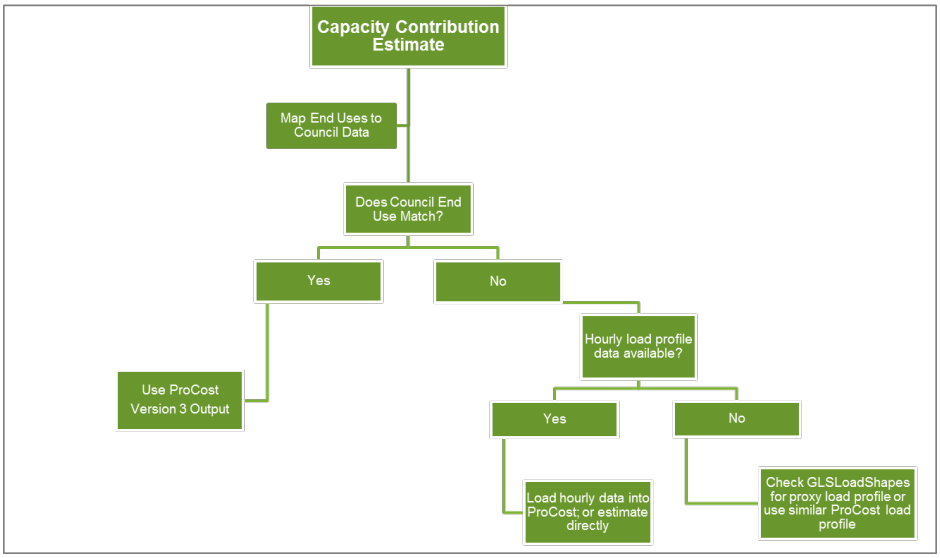
ProCost uses generalized load savings shapes (a database called GLSShapes in the model) to identify the capacity savings. The generalized load savings shapes are constructed by the Regional Technical Forum and are typically used to determine the value of implementing energy efficiency measures. These savings shapes are calculated by subtracting the time-differentiated (usually hourly) energy use of the efficient measure from that of the baseline measure. The difference is the load savings shape, an hourly time-series of energy savings throughout the year. The hourly savings is then cross-referenced to the assumed regional peak demand hour, providing a measure of the generation capacity that can be avoided by implementing the energy efficiency measure.
In the few cases where NEEA cannot find the appropriate end use definition identified within ProCost, NEEA selects a proxy hourly load shape from existing end uses that are most similar. This end use load shape must then be entered into ProCost to estimate the capacity value. The Northwest Power & Conservation Council has defined the regional system peak as occurring at 6 PM on a weekday evening, for both winter and summer peaking. The coincidence factor and diversity factor inherent in the load shape within the ProCost model are in relation to this 6 PM regional, weekday peak. To estimate capacity savings for the region, NEEA does a batch run in ProCost for residential, commercial, and industrial end uses. The output supplies estimates from relevant end uses for each sector.

Some utilities, because of their customer mix, do not peak at 6 PM on a weekday. A 6 PM weekday peak is typically driven by the electricity usage patterns of residential customers. Yet, commercial, industrial, or agricultural customers can also drive a utility's system peak, often at a different time of day. For utilities with a significantly different system peak than the region, the Council's (and NEEA's) calculated peak capacity savings may not be the best possible representation for the capacity contribution of an energy efficiency measure. NEEA does not attempt to estimate capacity value for each utility because the load factor, time of peak, and coincidence factor can be unique to individual utilities. For NEEA, the focus of capacity savings is at the regional level. Should the utility be interested, they can apply their own peak hour and

energy efficiency as appropriate to tailor the estimated capacity savings and value to their own system.

Below is depiction of the process to estimate capacity value for NEEA, utilizing the ProCost model.

Figure 2. Decision Tree for Estimating the Capacity Contribution of Energy Efficiency



Valuing Capacity from Energy Efficiency

Wholesale power market prices are unsuitable for valuing capacity from energy efficiency. They are short-term in nature and usually reflect only the marginal cost of generating electricity. Energy efficiency provides long-term capacity, which is more accurately valued by deferred generation capital costs, including any carrying costs.

Utilities measure capacity in megawatts (MW). One megawatt is often said to be enough electricity potential to serve 1,000 homes, but this varies by region and climate. Within the energy efficiency context, capacity is usually measured in kilowatts (kW), or one-thousandth of a megawatt. In valuing energy efficiency, NEEA has traditionally worked with kilowatt-hours. For valuing capacity, the commonly-used measure is dollars per kilowatt-year ($/kW-yr.), representing the capacity value of one kilowatt over the course of an entire year.

Capacity can be expensive to acquire when it is from new generating resources. Within utility integrated resource plans, new capacity is usually valued for the long run as equivalent to the cost of a new, simple-cycle, combustion turbine (SCCT). In reality, the cost of a SCCT varies with

its location because of differing costs for land, permitting, construction, interconnection to the transmission system, and operating performance at different elevations. For sake of simplicity, the Northwest Power & Conservation Council has assumed a single, regional value for the SCCT to represent the capacity value of energy efficiency. In the 7th Plan, the Council used a deferred generation capacity levelized cost avoided of $115/kW-year. Please note, this does not reflect the total value of energy efficiency, which can also include:

- Avoided transmission and distribution losses
- Deferred transmission and distribution capital costs and carrying costs
- Reduced need for generation reserves
- Reduced environmental externalities
    - Emissions of CO_2, CO_4, NO_x, SO_x, VOCs, PM10
- Non-energy benefits (e.g. reduced water and/or soap usage, improved indoor air quality)
- Demand reduction induced price effects (DRIPE)
    - California has previously estimated this for electricity as approximately an 8% reduction in price.

NEEA uses ProCost for valuing the deferred generation capacity, as it contains the same valuation logic used in the Northwest Power & Conservation Council's 7th Plan. For valuing generation capacity savings outside ProCost (Equation 1, page 2), the capacity savings in kilowatts (adjusted for the diversity factor and coincidence factor) is multiplied by $115 per kilowatt each year.

Appendix E: Memorandum Sunset Savings Proposal

Purpose

The purpose of this memo is to review NEEA's proposal for the sunset of select initiatives in the Long-Term Monitoring and Tracking (LTMT) phase and to communicate that both NEEA's tracking of units and the reporting of associated energy savings will cease for these initiatives should they sunset.

Background

In the LTMT phase, NEEA continues to monitor the market progress of initiatives after having ceased to actively engage the market. NEEA continues to track and report units and associated aMW energy savings as long as there is notable market progress and the tracking of this data is cost effective for NEEA and the region. Once an initiative is believed to be approaching the end of the Market Transformation process, NEEA reviews whether it is appropriate to continue tracking its units and savings data.

Sunset Criteria

NEEA periodically reviews initiatives in the LTMT phase of the portfolio to determine if they have met one or more of the following criteria for sunset.

1. Retirements: Retirements have exceeded current units, and this trend is not forecast to reverse.
2. Baseline: Baseline is at or near maximum market penetration in combination with one or more of the other criteria listed here. Meeting this criterion indicates NEEA has successfully tracked savings for the full process of Market Transformation.
3. Data: The acquisition of reliable data is difficult and/or no longer cost-effective to obtain.
4. Market Shift: The organization offering the product or service is no longer reporting unit sales and is not forecast to report future unit sales.

Results

NEEA staff has examined a pair of initiatives in the LTMT phase believed to be approaching the end of the Market Transformation process – Building Operator Certification and Building Operator Certification Expansion – to determine the value in continued monitoring. With respect to NEEA baseline savings reporting (though not 7th Power Plan baseline savings reporting), retirements have exceeded current units, which is the first sunset criteria. However, NEEA staff are reviewing the retirement schedule for this initiative, which could result in an extension of NEEA baseline savings reporting, and are therefore **not** recommending the sunsetting of these initiatives at this time. NEEA staff will revisit the sunsetting criteria once this retirement schedule review is completed and will update CEAC if the decision to sunset one or both initiatives is made.

Memorandum *– Agenda item (Tier 1)*

April 1, 2019

TO: Cost-effectiveness and Evaluation Advisory Committee (CEAC)

FROM: Jonathan Belais, Stakeholder Relations Specialist, NEEA

SUBJECT: Incorporating Natural Gas Recommendations into CEAC Charter

Background

As previously discussed with this committee during the Q1 2019 CEAC meeting, NEEA staff recently convened a work group for the purpose of advising on NEEA's calculation approach and governance regarding natural gas cost effectiveness. During the Q1 2019 CEAC meeting, committee members were given the opportunity to ask questions and provide recommendations regarding the draft methodology. A key component of the discussion was the extent to which this set of responsibilities would be integrated with CEAC as the existing body advising NEEA regarding its electric cost-effectiveness portfolio.

Based on the draft methodology and the feedback received during the CEAC discussion, NEEA staff has developed a draft recommendation for changes to the CEAC charter. These changes reflect a desire to:

(1) incorporate natural gas cost-effectiveness and evaluation considerations into the existing CEAC structure, and

(2) maintain the ability to have electric, gas, or dual fuel conversations with the correlating committee members through an appropriately delineated advisory committee agenda

Related adjustments to the scope and responsibilities of the CEAC may require revision of the charter. Due to time constraints related to NEEA's business planning process, the most recent revision of the CEAC charter has not yet been approved by the NEEA board. This means any additional changes can be reviewed simultaneously by the board governance committee later this year. For reference, here is the current CEAC charter.

For the Meeting

NEEA staff will facilitate a discussion with CEAC members to discuss the proposed changes, identify any questions or concerns, and outline next steps for the natural gas cost-effectiveness methodology.

The Ask

Please review the draft revisions to the CEAC charter and send any questions or comments prior to the meeting to Jonathan Belais at jbelais@neea.org.

neea.org portal and advisory committee hub

What's new on neea.org?

neea.org has been updated with new features intended to support regional collaboration and convening, including a secure portal and a public advisory committee resource hub.

What is the neea.org portal?

The neea.org portal is a password-protected landing page that connects advisory committee members and other utility, Bonneville Power and Energy Trust staff to the NEEA resources they need all from one centralized location. The goal of the neea.org portal is to make it easier and faster to access NEEA information and tools.

Who can access the neea.org portal and the advisory committee resource hub?

The portal is not open to the public. It is a tool for NEEA stakeholders, including advisory committee members and other funder staff. The advisory committee resource hub is open to the public and not password protected. However, advisory committee members will be required to log in to the portal to view any documents that are considered confidential.

What resources are available through the neea.org portal?

Resources on the portal currently include:

- Funder savings reports
- Funder-specific content
- Operations and Business Plans
- Marketing resources
- Upcoming events
- Quick links to tools, resources and external websites

What is not available through the portal?

Documents related to NEEA's Board of Directors will continue to be shared with Board members via NEEA's intranet (NEEAnet). Board members may choose to make their portal password the same as their NEEAnet password for ease of use.

How do I create an account?

Visit neea.org/portal/sign-up to create an account (you must use your employee email address). Once you have entered your information, you will receive a verification email from neea.org to finish creating your account. The first time you log in, you will be invited to take a quick tour to familiarize yourself with the portal and its content.

What if I forget my password?

If you forget your password, visit neea.org/portal and click on 'Forget your password?'

Who can access funder savings reports?

Access to funder savings reports is restricted to staff from those organizations.

Is neea.org replacing Conduit?

No, neea.org is not replacing Conduit. Some resources that were formerly posted on Conduit, such as advisory committee documents, will now be shared through neea.org. Other key Conduit features, such as the emerging technology database, workgroup pages and the Efficiency Exchange site will remain on Conduit. NEEA staff are currently working with BPA staff to determine the plan for these resources post 2019.

Not finding something?

Let us know! Contact Kyle Billeci (kbilleci@neea.org).