

December 14, 2021



Steven V. King, Executive Director and Secretary
 Washington Utilities and Transportation Commission
 1300 S. Evergreen Park Drive S.W.
 Olympia, Washington 98504-7250

RE: Developing a Commission jurisdictional specific cost-effectiveness test for distributed energy resources incorporating CETA, **Docket UE-210804**

Dear Mr. King,

Thank you for the opportunity to comment on development of a Commission jurisdictional specific cost-effectiveness test for distributed energy resources incorporating CETA. The Northwest Energy Efficiency Alliance (NEEA) is funded by more than 140 utilities and energy efficiency organizations working on behalf of more than 13 million energy consumers in the Northwest region. NEEA is dedicated to accelerating both electric and natural gas energy efficiency through market transformation, leveraging its regional partnerships to advance the adoption of energy-efficient products and services.

NEEA does not advocate for a particular outcome in regulatory proceedings. Instead, NEEA offers its subject matter expertise as a technical resource during this proceeding, especially as it relates to regional market transformation efforts. NEEA evaluates the long-term costs and benefits of its market transformation efforts to ensure it maintains a cost-effective portfolio of energy efficiency initiatives providing value to Northwest customers. Market transformation engages a broad set of market actors over an extended timeframe, realizing benefits years or decades after work begins. NEEA works with its Cost-effectiveness and Evaluation Advisory Committee to develop its approach to evaluating initiative costs and benefits. This approach is outlined in NEEA's Cost-Effectiveness Operational Guidelines, which are reviewed with the committee annually and attached to these comments.

NEEA appreciates the Commission's ongoing work and commitment to ensure the acquisition of cost-effective energy efficiency in Washington and looks forward to responding to Commission staff and stakeholders if questions emerge regarding regional market transformation investments to advance efficiency in electric and natural gas end uses.

Sincerely,

A handwritten signature in cursive script that reads "Susan E. Stratton".

Susan E. Stratton
 Executive Director

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NEEA's Electric Cost Effectiveness Operational Guidelines

NEEA MARKET PLANNING

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1. Introduction¹

Evaluating the cost-effectiveness of energy efficiency is essential to identifying how much of our region's potential for energy efficiency resources could be captured. Defining cost-effectiveness helps energy efficiency compete with the broad range of other resource options.

In its simplest form, energy efficiency cost-effectiveness is measured by comparing the benefits of an investment with the costs. Five key cost-effectiveness tests have been used for over 20 years as the principal approaches for energy efficiency program evaluation. These five cost-effectiveness tests are the participant cost test (PCT), the utility/program administrator cost test (PACT), the ratepayer impact measure test (RIM), the total resource cost test (TRC), and the societal cost test (SCT).

The most common primary measurement of energy efficiency cost-effectiveness is the TRC, followed closely by the SCT. A positive TRC result indicates that the program will produce a net reduction in energy costs in the utility service territory over the lifetime of the program. The distributional tests (PCT, PACT, and RIM) can then be used to indicate how different stakeholders are affected. Historically, reliance on the RIM test has limited energy efficiency investment, as it is the most restrictive of the five cost-effectiveness tests.

The choice of where to apply each cost-effectiveness test has a significant impact on the ultimate set of measures offered to customers. In general, there are three places to evaluate the cost-effectiveness test: at the "measure" level, the "initiative" level, and the "portfolio" level.

A key position in any of the cost effectiveness tests is understanding the baseline against which the cost and benefits are measured. What costs and benefits would have been realized absent energy efficiency?

1.1. NEEA's Approach

NEEA's purpose is to look at the total societal impact of transforming a market to ensure that the regional investment is an appropriate use of funds for the long term. Working under this perspective NEEA considers all incremental quantifiable costs and benefits of the total regional savings achieved through transformation, regardless of who accrues them. Ultimately, NEEA, as a regional organization, is attempting to answer the question: "will costs to society be reduced relative to an alternate resource?"

1.2. NEEA's Cost-effectiveness Goal

NEEA's goal is to maintain a portfolio of programs that are cost effective. Its 2020-2024 Business Plan defines cost effective as having a portfolio Benefit-Cost Ratio equal to or greater than one. To maintain a cost-effective portfolio, NEEA evaluates the Benefit-Cost

¹ Understanding Cost-Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers; A RESOURCE OF THE NATIONAL ACTION PLAN FOR ENERGY EFFICIENCY NOVEMBER 2008.

Ratio of its initiatives prior to adding them its portfolio. As part of its due diligence, NEEA also reports Levelized Costs.

2. Core Principles to Estimating Cost Effectiveness

Where possible and sensible, NEEA aligns with the Northwest Power and Conservation Council’s (NWPCC) approach. Key concepts here include valuing efficiency as a resource and alignment with regional policy goals² and objectives. NEEA also applies principles from the National Standard Practice Manual. NEEA makes few adjustments to these principles to better reflect Market Transformation work. Table 2 lists the Core Principals by source.

Table 1: Core Principles

Relevant Principles from the Regional Technical Forum’s 2018 Operative Guidelines	
Baseline	Be incremental to baseline. Costs and benefits should reflect the differences between the efficient and baseline cases.
Lifetime	Represent costs/benefits throughout measure life. The entire stream of costs and benefits associated with the efficient and baseline cases over the measure life should be accounted for. For example, for an early retirement measure, the efficient case capital costs are incurred when the measure is implemented, but baseline replacement costs (assumed to be the full cost of the current practice equipment) are incurred at the end of the Remaining Useful Life (RUL). Use the same baseline as for savings. The same baseline that is used for savings should be used for costs and benefits and may differ during the RUL and balance of measure life periods.
Application	Be specific to measure application. Where possible, costs and benefits should be specific to the measure application, defined by identifiers such as delivery mechanism, geographic region, market sector, building type, and business type.
Discounting	Be discounted to present value. Costs and benefits incurred later than the time of measure delivery should be discounted to the time of measure delivery.
Real Dollars	Be in real dollars for the base year of the current Power Plan. When converting costs in different base years to the base year of the assessment, the national Gross Domestic Product (GDP) deflators published in the SIW should be used.
Use of Averages	Reflect the average for expected participants. Costs and benefits should reflect the average incremental cost for expected participants. Where costs are significantly different across groups of expected participants and data are sufficient to discern this, measure identifiers can be used to differentiate, even if savings are not different.
Regional	Represent a Northwest regional perspective. Costs and benefits should be expressed as net values across the region. Program incentives should not be included as a cost or a benefit because the cost to program is equal to the benefit to the participant (i.e., it is simply a financial transfer).
Calculation Tool	All of the costs and benefits of electricity and natural gas savings (or increases) are computed by ProCost as a function of the measure application’s annual

² The Regional Technical Forum is reviewing treatment of costs and benefits to ensure consistent treatment and align with regional policy goals as stated in the Northwest Power Act. NEEA will monitor this conversation and intends to align with the outcomes.

	savings, load profiles, and measure life, and other financial parameters approved by the RTF for use across all measures.
Relevant Principles from the National Standard Practice Manual ³	
Symmetry of costs and benefits	Cost-effectiveness practices should be symmetrical, where both costs and benefits are included for each relevant type of impact.
Transparency	Cost-effectiveness practices should be completely transparent, and should fully document all relevant sources, inputs, assumptions, methodologies, and results.
Hard-to-Quantify Impacts	Cost-effectiveness practices should account for all relevant, substantive impacts, even those that are difficult to quantify and monetize. Using best-available information, proxies, alternative thresholds, or qualitative considerations to approximate hard-to-monetize impacts is preferable to assuming those costs and benefits do not exist or have no value. These impacts should also be reviewed regularly as some may become easier to quantify over time.
Relevant Principles for Market Transformation	
Market Transformation Approach	NEEA assesses cost and benefit streams throughout the process of transformation. This can include: <ul style="list-style-type: none"> • Declining costs as market barriers are removed • Increasing savings as technology advances
Full Supply Chain Scope	NEEA will include costs and benefits of efficiency that occur anywhere along the supply chain from production to consumption if they impact the NW region.
Market Transformation Admin Costs	NEEA adds the present value of administrative costs to the analysis. NEEA also includes midstream incentives in the administrative costs.

3. NEEA’s Cost-effectiveness Test

NEEA uses the same perspective as the NWPCC. This perspective originates from the Pacific Northwest Electric Power Planning and Conservation Act⁴ passed by Congress on December 5, 1980. While this legislation was written before the terms from the National Standard Practice Manual (such as Total Resource Cost or Societal Cost tests) were in the vernacular, specific sections that establish this perspective include:

3(4)(A). "Cost-effective", when applied to any measure or resource referred to in this chapter, means that such measure or resource must be forecast--

3(4)(A)(i). to be reliable and available within the time it is needed, and

3(4)(A)(ii). to meet or reduce the electric power demand, as determined by the Council or the Administrator, as appropriate, of the consumers of the customers at an estimated incremental

³ National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources. May 2017. https://nationalefficiencyscreening.org/wp-content/uploads/2017/05/NSPM_May-2017_final.pdf.

⁴ Northwest Power Act Summary Webpage. NWPCC. January 2010. <https://www.nwcouncil.org/reports/northwest-power-act>.

system cost no greater than that of the least-cost similarly reliable and available alternative measure or resource, or any combination thereof.

3(4)(B). For purposes of this paragraph, the term "system cost" means an estimate of all direct costs of a measure or resource over its effective life, including, if applicable, the cost of distribution and transmission to the consumer and, among other factors, waste disposal costs, end-of-cycle costs, and fuel costs (including projected increases), and such quantifiable environmental costs and benefits as the Administrator determines, on the basis of a methodology developed by the Council as part of the plan, or in the absence of the plan by the Administrator, are directly attributable to such measure or resource.

Given this, NEEA looks at the total societal impact of transforming a market to ensure that the regional investment is an appropriate use of funds for the long term. Working under this perspective NEEA considers all incremental costs and benefits of the total regional savings achieved through transformation, regardless of who accrues them. Ultimately, NEEA, as a regional organization, is attempting to answer the question: "Will the benefits to society be greater than the costs?"

3.1. Cost-effectives Metrics

NEEA calculates both **Benefit-Cost ratios** and **Levelized Costs**.

3.1.1. Benefit-Cost Ratio

The benefit-cost ratio is the summation of the monetized benefits divided by the monetized costs. The Calculation converts all negative costs to positive benefits and all negative benefits to positive costs before dividing the total benefits in dollars by the total costs in dollars. The conversion means that the CE Index can never be negative. A measure is cost-effective if the ratio is greater than or equal to one. All costs and benefits are incremental values to the non-initiative market alternative products or services. The Benefit-Cost Ratio has the following formula:

$$\text{Benefit-Cost Ratio: } = \frac{\sum_{t=1}^n \frac{\text{Benefits}_{t,m}}{(1+r)^t}}{\sum_{t=1}^n \frac{\text{Costs}_{t,m}}{(1+r)^t}}$$

Where,
 t = year
 n = period of analysis
 r = discount rate
 m = measure within the initiative

The benefits include any monetized benefits associated with the measure.

These include:

- Avoided Cost of Electric Resource

- Carbon Savings
- Deferred Transmission, Distribution, and Generation Capacity Costs
- Other Quantifiable Non-Electric Benefits or Negative Costs

The costs comprise monetized incremental per unit cost associated with measure.

These include:

- Incremental Capital Cost
- Replacement Costs
- Operation and Maintenance Cost
- Local Program Administrative Costs
- NEEA Initiative Implementation and Evaluation Costs
- Other Quantifiable Incremental Costs

3.1.2. Levelized Cost

The Levelized Cost is the net present value of all the costs (capital, O&M, and negative non-energy benefits) annualized over the initiative life and divided by the annual electricity savings in kWh. The value is often used to compare the cost of efficiency to other generating resources.

$$\text{Levelized Cost (Cents/kWh)} = \frac{\sum_{t=1}^n \frac{NetCosts_{t,m}}{(1+r)^t}}{\sum_{t=1}^n \frac{EBenefits_{t,m}}{(1+r)^t}}$$

Where,

$t = \text{year}$

$n = \text{period of analysis}$

$r = \text{discount rate}$

$m = \text{measure within the initiative}$

The Net Costs comprise monetized incremental per unit cost associated with initiative less the monetized non-electric benefit.

These include:

- Incremental Capital Cost
- Replacement Costs
- Operation and Maintenance Cost
- Local Program Administrative Costs
- NEEA Initiative Implementation and Evaluation Costs
- Other quantifiable incremental costs such
- Less:
 - Deferred transmission, distribution, and generation capacity costs

- Other quantifiable non-electric benefits or negative costs such as gas savings or a decrease in Operation and Maintenance cost.

The Electricity Benefit is the average incremental per-unit savings (kWh)⁵ at busbar associated the initiative over the period of analysis.

$$UES * (1 + Bulk\ T\&D\ Loss\ Factor) * (1 + Local\ Distribution\ Loss\ Factor)$$

Where UES=Unit Energy Savings in kWh per Year

The Bulk System T&D Loss Factor and the Local System Distribution Loss Factor comes from the current Power Plan.

4. Inputs

This section describes how NEEA calculates each of the inputs.

- [Avoided Cost of Electric Resource](#)
- [Carbon Savings](#)
- [Regional Act Credit](#)
- [Deferred Transmission, Distribution, and Generation Capacity Costs](#)
- [Incremental Capital Cost](#)
- [Replacement Costs](#)
- [Operation and Maintenance Cost](#)
- [Local Program Administrative Costs](#)
- [NEEA Initiative Implementation and Evaluation Costs](#)
- [Other Quantifiable Non-Electric Benefits or Negative Costs](#)
- [Period of Analysis](#)
- [Discount Rate and Dollar Value](#)

4.1. Avoided Cost of Electric Resources

The 7th Power Plan defines avoided cost as:

An investment guideline, describing the value of conservation and generation resource investments in terms of the cost of more expensive resources that would otherwise have to be acquired.⁶

Deterred electricity consumption is one of the main components of the benefits portion of the Benefit-Cost Ratio. The value of the energy conservation by time segment depends upon the energy price by time segment. NEEA's uses the NWPCC's electric energy price forecasts by time

⁵ The difference between the amount of energy savings acquired or planned to be acquired as a result of energy efficiency activities in one year, and the amount of energy savings acquired or planned to be acquired as a result of the energy efficiency activities in the prior year.

⁶ 7th Plan Final Appendix P: Glossary.

segment to estimate the values of electric savings. These values are available on the RTF's website <https://rtf.nwcouncil.org/work-products/supporting-documents/procost>.

4.2. Carbon Savings

The reduction in energy consumption can also reduce carbon emissions. The Council has a carbon price forecast (\$/MWh) that it adds to the avoided cost forecast.

The carbon values are available on the RTF's website <https://rtf.nwcouncil.org/work-products/supporting-documents/procost>.

4.3. Regional Act Credit

NEEA includes the Council's application of the Regional Act Credit in its calculations. For the 7th Power Plan, the credit is:

Used in the act to give economic preference to conservation resources. When estimating incremental cost of an energy-efficiency measure, this cost is reduced by 10% of the value of the energy system benefits.

4.4. Deferred transmission, distribution, and generation capacity costs

In addition to the value of electricity conservation, savings occur because of the elimination of line losses. If utilities produced the equivalent power as opposed to conserved, then that electricity would have moved across power lines resulting in power line losses.

Measures can also reduce peak demand. NEEA's uses the Council's definition of peak. For the 7th Power Plan, the definition is:

The winter period is roughly defined as the months of October through March. The summer period runs from April through September. However, the most important months with respect to resource planning are December, January and February.

Similarly, the most critical summer months for resource planning are July and August.

The 7th Power Plan assumes a winter peak.

These values are available on the RTF's website <https://rtf.nwcouncil.org/work-products/supporting-documents/procost>.

4.5. Incremental Capital Costs

Incremental costs are a key assumption that drives cost effectiveness, and therefore is evaluated by third party evaluations. The RTF defines the Incremental Capital Costs as:

The upfront costs required to deliver the measure. They include the costs of equipment, ancillary materials, labor related to installation, design and engineering, permitting/licensing, mark-ups, disposal, and shipment.

Capital Costs should represent the cost of efficiency gains and not non-energy value.

4.5.1. Pre-Conditions

For retrofits, NEEA uses the full cost of the device plus installation costs. The incremental cost of Ductless heat Pumps, for example, is the full cost of installation and equipment. The data often comes from NEEA or utility programs.

For early replacements, the full costs are adjusted based on the remaining present value of the old device.

4.5.2. Current Practice⁷/Initial Capital Cost

For replacements or new construction/lost opportunity measures, the cost should reflect the incremental cost of increased efficiency. This approach is not the same as comparing the difference between the cost of an efficient product and a non-efficient option. The measurement should control for key product attributes that also influence price.

NEEA uses three approaches for this analysis.

- **Component analysis:** determine which technology options enable a product to improve EE, then find cost data for the necessary components.
- **Hedonic pricing model:** collect online retail products data and fit a regression model to the data.
- **External Estimates:** use estimates already completed by external parties such as the Department of Energy (mostly used for initiatives prior to Market Development).

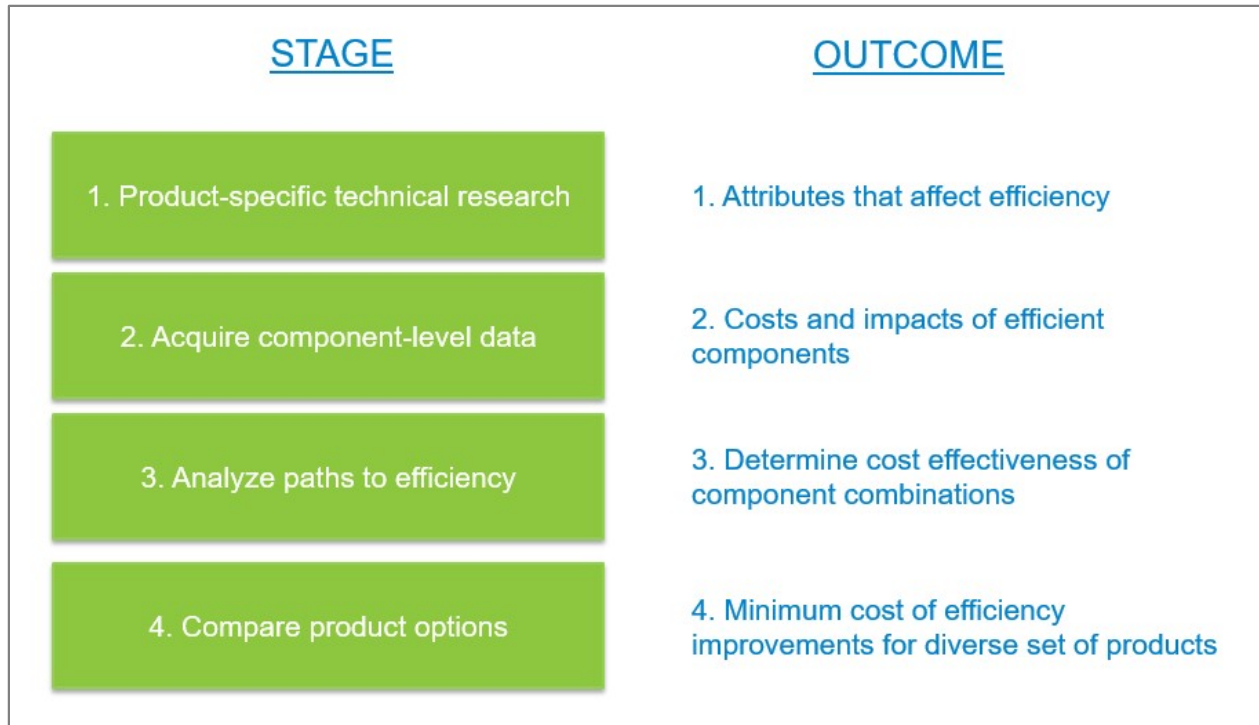
The biggest difference between the component analysis and Hedonic model is that one is measuring the cost to the manufacturer and the other—Hedonic Model—is measuring the cost to the consumer. NEEA will use either approach; but the approach should best represent the capital cost to the region.

4.5.2.1. Component Analysis

Component analysis measures the incremental measure cost (IMC) based on the component within the product that makes it more efficient. Figure 1 shows the steps. NEEA has used this approach with televisions and new construction measures. For televisions, NEEA identified that the cost of backlighting was a proxy for the IMC. The Televisions initiative purchased industry data on component costs and linked the components to its efficiency measures, which were a function of the ENERGY STAR versions and the screen size. Finally, NEEA compared the lighting options to estimate the IMC.

⁷ The baseline is defined by the typical choices of eligible end users in purchasing new equipment and services.

Figure 1: Method to Estimate Component Costs



Options for acquiring the cost data:

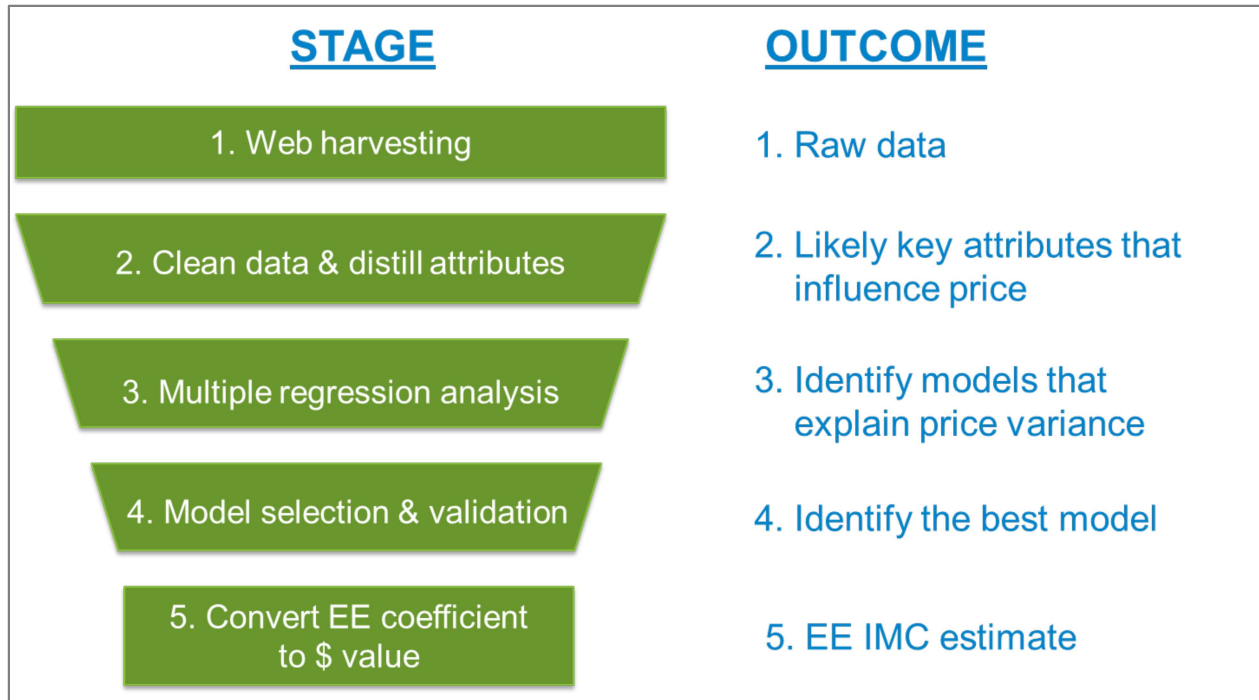
- Search for available component-level data
- Contact manufacturers
- Perform teardown analysis
- Purchase teardown analysis data
- Contact installers for installation
- Field tests for installation.
- Research (lab and/or field) for operations and maintenance

4.5.2.2. Hedonic Price Model

Hedonic Price modeling uses pricing data and regression analysis to isolate the IMC. NEEA uses this approach for most consumer products. Steps to estimate IMC include web-harvesting, data cleaning, multiple regression analysis, and model selection and verification (Figure 2). Some advantages to this approach are:

1. Measures consumer price differences, not manufacturer cost
2. Yields insights about which product features most strongly influence price
3. Less expensive than component analysis
4. Over time, more data leads to more precise IMC estimates
5. New products can be added as needed

Figure 2: Method to Create a Hedonic Price model



Some limitations to consider with Hedonic Price Models are:

1. The price is not tied to the specific technology pathways for efficiency
2. Price to the consumer does not always reflect cost to the manufacturer
3. Online product selection could differ from brick and mortar store selection
4. The regression can only control for product features that are listed online

As a result, cross-checking the results with market data is important.

4.5.2.3. External Estimates

NEEA also uses external incremental costs estimates. The most common source is the Department of Energy's Technical Support documents. Other sources include the Regional Technical Forum, consulting firms, and/or staff's best professional judgment. This approach is limited because the information is often dated and difficult to align with initiative baselines.

4.6. Replacement Costs

Because NEEA looks at cost effectiveness over a 20-year period, NEEA considers how the capital costs could decline over time; thus, affecting the cost to replace the measure over the analysis period.

Replacement costs can account for economies of scales. An example of economies of scale would be the declining average cost of an ENERGY STAR product as manufacturers switch production.

It is important to note that the cost should still be incremental to the initial baseline. As a result, the replacement cost does not go to zero because the measure becomes a code or standard.

4.7. Operation and Maintenance Cost (O&M)

The RTF defines the O&M costs as:

The ongoing and periodic incremental costs required to operate and maintain the measure affected building components or equipment over the measure life. Operation and Maintenance includes costs for fuels (except electricity and gas) and water. Other materials or services that may be required for operation and maintenance should be valued if the incremental cost or benefit is expected to be substantial.

O&M Costs should represent the annualized maintenance for the efficient measure compared with the baseline option. The value can be either positive or negative. For example, the longer life of CFLs led NEEA to use a negative O&M estimate based on cost savings from not needing to replace the bulb with an incandescent.

NEEA generally uses third-party research or RTF assumptions for O&M inputs. Initiative data can also support O&M estimates.

4.8. Initiative Administrative Costs

The RTF 2018 Operative Guidelines defines Initiative administration costs as:

The administrative costs (such as audits, design services, marketing and overhead) incurred by the initiative operator... incentives are not included as they are transfer payments and do not impact regional cost-effectiveness.

NEEA estimates these costs incurred by utilities, the Bonneville Power Administration and the Energy Trust and governments using the following approach.

- **Market Transformation Administrative Cost:** Utilities, the BPA and the Energy Trust incur additional costs to oversee NEEA's initiative. NEEA estimates this cost as 3%-20% of the NEEA's direct costs. The percentage depends on the level of involvement that the local programs have with the initiative. Generally, if the utilities do not have a local program for the measure, the cost would be 3%.
- **Local Program Administrative Costs:** NEEA's partners incur a cost to administer its initiatives. Generally, NEEA estimates the value is 20% of the incentive cost. NEEA tracks the incentives costs through its initiative team or its Annual Local Programs survey. The 20% is a standard percentage that NEEA uses to estimate administrative costs that utilities incur for their incentive programs.

- Government: Tax credits and rebates are a payment transfers to the consumer. As a result, NEEA only includes the administrative costs. Generally, NEEA assumes that the administrative cost is 20% of state rebates and credits and 5% of federal tax credits.⁸

4.9. NEEA Initiative Implementation and Evaluation Costs

NEEA costs comprise the implementation and contracts costs, upstream incentives, evaluation, and overhead costs.

- Implementation and Contracts: The implementation and contracts costs comprise payments to contractors, marketing efforts and website enhancements.
- Incentives: The costs should include incentives as part of the TRC if the incentives are upstream and not included in the consumer's cost.
- Evaluation: NEEA evaluates currently and previously funded initiatives. NEEA includes these and other evaluation costs in its cost-effectiveness calculation as well as its budget forecasts.

Historical costs come from NEEA's accounting department. The forecasts come from the initiative team.

4.10. Other Quantifiable Non-Electric Benefits or Negative Costs

NEEA attempts to quantify all other non-energy benefits that result from a measure including such items as environmental costs and benefits directly tied to the measure such as wastewater and water savings.

NEEA includes these benefits and costs if it has supporting research and is transparent about its deviation from the RTF approach.

4.11. Period of Analysis

From initiative-level analysis, NEEA assesses the benefits and costs over a 20-year period starting from the inception of the initiative. The length of time aligns with the length of time the Northwest Power and Conservation Council uses for power planning purposes.

4.12. Discount Rate and Dollar Value

NEEA discounts the costs and savings based on the most recent Power Plan discount rate assumption. Additionally, the dollar values are in the Plan Power's base year. For the 7th Power Plan, the year was 2012.

⁸ The admin cost for the federal level tax credits is 5% based on a recommendation by Tom Eckman, NWPCC, Nov. 25, 2009. He said that 5% allows for the reality that not everyone will apply for the credit. Moreover, Alex Allan, NEEA products manager in the Residential Sector, said that not all the units qualify for the tax credit (Nov. 24, 2009 meeting on the DHP ACE Model assumptions).

5. Aggregating the measure-level Results

NEEA evaluates cost effectiveness at both the initiative and portfolio level, however; to do this the values are first calculated at the individual measure-level. When possible, measures are disaggregated if components of the measure are subject to different benefits, costs or load shapes. Measures are aggregated to the initiative and then portfolio level based on the relative 20-year Total Regional Savings.

6. Managing Cost Effectiveness Across NEEA's Portfolio

NEEA uses a management framework called the Initiative Lifecycle (Figure 1) to progress initiatives from concept development, to initiative development and finally full-scale market development.

Figure 3: NEEA's Initiative Lifecycle



The goal is always to have a benefit cost ratio greater than or equal to 1 for both the initiative and the portfolio, but NEEA manages cost effectiveness calculations differently for initiatives depending upon the phase they are in. NEEA-developed cost effectiveness metrics are only fully generated for initiatives in the Market Development⁹ phase because it is at this point when the transformation objectives and associated costs and benefits are more clearly defined. The cost effectiveness metric should be one criterion considered by the Regional Portfolio Advisory Committee when voting to advance an initiative through the Scale-Up Approval stage gate.

For initiatives in phases prior to Market Development, NEEA generates a preliminary cost effectiveness metric and runs sensitivity analysis on uncertain variables to determine the likelihood that it will be a cost effective. Initiatives without a viable pathway to cost effectiveness are unlikely to advance in the initiative lifecycle framework.

NEEA uses the benefits and costs of initiatives in Market Development to assess its portfolio. NEEA also adds the remaining Business Plan budget to the costs. The goal is to have a portfolio with a Benefit-Cost Ratio greater than 1.

⁹ Market Development is a phase of NEEA's Initiative Lifecycle management framework. This is the phase in which the products, markets and interventions are clearly defined and NEEA is actively engaged in transforming the market.

7. Cost-effectiveness Review Process

NEEA vets and receive advice on cost-effectiveness topics through the Cost-effectiveness and Evaluation Advisory Committee. NEEA provides the information to the Committee for review on an annual basis and at any time upon request.

NEEA's Natural Gas Cost Effectiveness Operational Guidelines

NATURAL GAS COST EFFECTIVENESS WORK GROUP

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1. Introduction

NEEA has a goal to maintain a portfolio of market transformation initiatives that are cost effective. For electric market transformation NEEA follows the Northwest Power and Conservation Council's (NWPCC) approach wherever possible, however; this type of regional guidance does not currently exist for valuing the costs and benefits of natural gas efficiency. This documentation explains the approach NEEA will use for assessing cost effectiveness of natural gas market transformation efforts. This approach has been developed in coordination with the Natural Gas Cost Effectiveness Work Group in 2018 and 2019.

2. NEEA's Cost-effectiveness Goal

NEEA's goal is to maintain a portfolio of initiatives that are cost effective. Its 2020-2024 Business Plan defines cost effective as having a portfolio Benefit-Cost Ratio equal to or greater than one. To maintain a cost-effective portfolio, NEEA evaluates the Benefit-Cost Ratio of its initiatives prior to adding them its portfolio. As part of its due diligence, NEEA also reports Levelized Costs.

3. Core principles

Core Principles	
Alignment with the Northwest Power and Conservation Council	Where possible and sensible, NEEA aligns with the Northwest Power and Conservation Council's (NWPCC) approach. Key concepts here include valuing efficiency as a resource and alignment with regional policy goals ¹ and objectives.
Regional Analysis	NEEA uses a regional approach to determining inputs. Inputs at a service territory level will differ. For this reason and other fundamental measurement differences outlined in these core principles NEEA cost effectiveness metrics should not be compared to individual utility program metrics.
Market Transformation Approach	NEEA assesses cost and benefit streams throughout the process of transformation. This can include: <ul style="list-style-type: none">• Declining costs as market barriers are removed• Increasing savings as technology advances
Incrementality	All costs and benefits are incremental values to the less efficient market alternative products or services.
Full Supply Chain Scope	NEEA will include costs and benefits of efficiency that occur anywhere along the supply chain from production to consumption if they impact our region.
Relevant Principles from the National Standard Practice Manual²	
Symmetry of costs and benefits	Cost-effectiveness practices should be symmetrical, where both costs and benefits are included for each relevant type of impact.
Transparency	Cost-effectiveness practices should be completely transparent, and should fully document all relevant sources, inputs, assumptions, methodologies, and results.

¹ The Regional Technical Forum is reviewing treatment of costs and benefits to ensure consistent treatment and align with regional policy goals as stated in the Northwest Power Act. NEEA will monitor this conversation and intends to align with the outcomes.

² National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources. May 2017. https://nationalefficiencyscreening.org/wp-content/uploads/2017/05/NSPM_May-2017_final.pdf

Hard-to-Quantify Impacts	Cost-effectiveness practices should account for all relevant, substantive impacts (as identified based on regional policy goals), even those that are difficult to quantify and monetize. Using best-available information, proxies, alternative thresholds, or qualitative considerations to approximate hard-to-monetize impacts is preferable to assuming those costs and benefits do not exist or have no value. These impacts should also be reviewed regularly as some may become easier to quantify over time.
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4. The perspective

NEEA uses the same perspective in our calculation as the NWPCC. This perspective originates from the Pacific Northwest Electric Power Planning and Conservation Act³ passed by Congress on December 5, 1980. While this legislation was written before the terms from the National Standard Practice Manual (such as Total Resource Cost or Societal Cost tests) were in the vernacular, specific sections that establish this perspective include:

3(4)(A). "Cost-effective", when applied to any measure or resource referred to in this chapter, means that such measure or resource must be forecast--

3(4)(A)(i). to be reliable and available within the time it is needed, and

3(4)(A)(ii). to meet or reduce the electric power demand, as determined by the Council or the Administrator, as appropriate, of the consumers of the customers at an estimated incremental system cost no greater than that of the least-cost similarly reliable and available alternative measure or resource, or any combination thereof.

3(4)(B). For purposes of this paragraph, the term "system cost" means an estimate of all direct costs of a measure or resource over its effective life, including, if applicable, the cost of distribution and transmission to the consumer and, among other factors, waste disposal costs, end-of-cycle costs, and fuel costs (including projected increases), and such quantifiable environmental costs and benefits as the Administrator determines, on the basis of a methodology developed by the Council as part of the plan, or in the absence of the plan by the Administrator, are directly attributable to such measure or resource.

Given this, NEEA looks at the total societal impact of transforming a market to ensure that the regional investment is an appropriate use of funds for the long term. Working under this perspective NEEA considers all incremental costs and benefits of the total regional savings achieved through transformation, regardless of who accrues them. Ultimately, NEEA, as a regional organization, is attempting to answer the question: "Will the benefits to society be greater than the costs?"

5. The Calculation

NEEA's primary cost effectiveness metric for portfolio decision-making is the regional **benefit-cost ratio**, however NEEA will also calculate and report a levelized cost per therm as needed.

5.1. Benefit-Cost Ratio

The benefit-cost ratio is the summation of the monetized benefits divided by the monetized costs. The Benefit-Cost Ratio has the following formula:

³ Northwest Power Act Summary Webpage. NWPCC. January 2010.
<https://www.nwcouncil.org/reports/northwest-power-act>

$$\text{Benefit-Cost Ratio:} = \frac{\sum_{t=1}^n \frac{Benefits_{t,m}}{(1+r)^t}}{\sum_{t=1}^n \frac{Costs_{t,m}}{(1+r)^t}}$$

Where,
t = year
n = period of analysis
r = discount rate
m = measure within the initiative

5.2. Net Levelized Cost per Therm

Net Levelized Cost is the net present value of a lifetime of benefits and costs per unit of a conservation resource. The value is often used to compare the cost of efficiency to other generating resources.

$$\text{Levelized Cost (cents/therm):} = \frac{\sum_{t=1}^n \frac{NetCosts_{t,m}}{(1+r)^t}}{\sum_{t=1}^n \frac{EBenefits_{t,m}}{(1+r)^t}}$$

Where,
t = year
n = period of analysis
r = discount rate
m=measure within the initiative

5.2.1. EBenefits

EBenefits are the energy benefits (savings) from the measure expressed in therms. Also known as the savings rate.

5.2.2. NetCosts

The Net Costs comprise monetized incremental per unit cost associated with initiative, less the monetized non-gas and non-energy impacts. This differs from the costs component of the benefit-cost ratio in that some of what we would traditionally call benefits are factored in to the numerator.

5.3. Benefits

The benefits include any monetized benefits associated with the initiative.

Regional Benefit		Definition	Source or Assumption
Energy benefit	Commodity price of resource	Cost of acquiring the resource on the market.	Align with NWPCC natural gas forecast. This is a wholesale price ⁴ forecast weighted from several sources, regionally vetted and reviewed every 2-3 years
	Risk mitigation regarding supply adequacy	The value of conservation in reducing risk across all the future unknowns	Weighted average of risk mitigation values included in stakeholder Integrated Resource Plans or rate case filings
	Deferred transmission, distribution, and generation capacity costs	Contribution of conservation to reduce peak load (currently defined as a winter peak)	Weighted average of deferred build out of transmission and distribution from stakeholder Integrated Resource Plans ⁵ Use the cost of a marginal gas purchase contract as an analogy for deferred generation
Avoided greenhouse gas emissions		The benefit associated with the avoiding the societal impacts of additional greenhouse gas emissions This should account for the emissions from combustion and lost and unaccounted-for gas separately and not double count the impact	All supply chain (from production to combustion) fugitive GHGs converted to CO ₂ -equivalent and valued at Interagency Working Group's estimate of the social cost of carbon. Sources include: <ul style="list-style-type: none"> US EPA GHG Inventory for Natural Gas Supply Chain

⁴ The wholesale nature of the forecast may mean that other elements of a delivered cost could be missing from the calculation such as contract costs for local distribution companies.

⁵ At the time of this draft Oregon Public Utility Commission is gathering information and having conversations with utilities about capacity benefits of conservation (among other cost-effectiveness-related items) as part of Docket UM 1893. NEEA will track the outcomes of this docket and may seek to revise this methodology if a relevant alternative approach is arrived at.

Regional Benefit	Definition	Source or Assumption
		<ul style="list-style-type: none"> EIA published CO₂ emissions from combustion of various fuels
Production, storage, transmission and distribution Loss	Factor applied to conservation for lost and unaccounted-for gas	Environment Defense Fund coordinated studies over 5 years with 140 researchers in collaboration with 50 oil and gas companies. The synthesis report estimates a 2.3% lost and unaccounted-for rate ⁶ .
Quantified non-gas impacts (such as electricity and supplemental fuel savings)	Conservation of other fuels	Dependent on the measure, best available sources utilized and reviewed periodically by a third party.
Other quantified non-energy impacts⁷ (such as water savings)	Other quantified and monetizable societal impacts associated with the measure	Dependent on the measure, best available sources utilized and reviewed periodically by a third party.
Regional Act Credit	Economic preference given to conservation resources over power generating resources in the Northwest Power Act.	<p>NEEA does <u>not</u> include this benefit for natural gas conservation because the Act was not written to address gas specifically.</p> <p>NEEA to review this assumption with the Cost Effectiveness and Evaluation Advisory Committee.</p>

⁶ This study primarily assessed the supply chain in the United States, not Canada where the majority of NW region gas is sourced from. NEEA to request any region-specific data that stakeholders can provide.

⁷ As noted under the core principles, NEEA will stay in alignment with the treatment of non-energy impacts to be determined by the Regional Technical Forum.

5.4. Costs

The Costs comprise monetized incremental per unit cost associated with initiative. Key concepts when accounting for costs include:

- **Transfer payments:** A transfer payment is defined as any incentive or rebate that reduces the first cost for an end user. Due to NEEA’s total societal perspective, NEEA does not include incentives or rebates that are determined to be a transfer payment. These are covered by consumer first costs.
- **Negative costs:** In some cases, such as replacement or O&M cost the measure can provide a benefit (ex. less maintenance than inefficient alternative). This benefit would be accounted for as a negative cost.

Regional Cost	Definition	Source or Assumption
Incremental first cost	Initial cost to consumer for the efficiency measure (net of competing alternative and before any incentives or rebates)	Dependent on the measure, best available sources utilized and reviewed periodically by a third party <ul style="list-style-type: none"> • Incentives or rebates that buy down the first cost are considered a transfer and included in first cost • Where applicable, NEEA assumes reduction in costs over time as market barriers are removed
Incremental replacement cost	Cost to replace at end of life if measure retires during analysis period	
Incremental Operations & Maintenance cost	Ongoing and periodic incremental costs required to operate and maintain the measure (net of the competing alternative’s O&M cost)	Dependent on the measure, best available sources utilized and reviewed periodically by a third party
Local program administrative costs	Costs associated with delivering a local program aside from the rebate itself	Assume that admin costs are 20% ⁸ of the estimated total rebates paid
NEEA direct costs	NEEA budget spent to transform the market	NEEA Finance System

⁸ 20% of rebates paid seemed low to some NEEA stakeholders. NEEA to review and confirm with our Cost Effectiveness and Evaluation Advisory Committee.

Regional Cost	Definition	Source or Assumption
(ex. upstream incentives, research)		
NEEA administrative costs	Indirect NEEA costs (ex. labor, G&A)	Assume that NEEA admin costs are 20% the total direct initiative spending
Other costs associated with market change	Placeholder for measures with additional cost considerations (ex. Government administrative costs for tax benefits)	Dependent on the measure, best available sources utilized and reviewed periodically by a third party Assume that government admin costs are 20% of the estimated tax benefits given

6. Period of Analysis

NEEA assesses the benefits and costs over a 20-year period starting from the inception of the initiative. Due to the long-term nature of market transformation, NEEA uses a time horizon that will cover both the upfront investment and the long-term benefit stream associated with that investment. This length of time aligns with the length of time the Northwest Power and Conservation Council uses for power planning purposes.

7. Discount Rate

NEEA discounts the savings based on the most recent Power Plan's discount rate assumption⁹ (4% for the 7th Power Plan). This value is meant to represent a societal discount rate and is expressed in real terms (accounting for inflation). Additionally, the dollar values are represented in the Plan Power's base year.

8. Weighting the measure level results

NEEA looks at cost effectiveness at both the initiative and portfolio level, however; to do this the values are first calculated at the individual measure-level. When possible, measures are disaggregated if components of the measure are subject to different benefits, costs or load shapes. Measures are then weighted to the initiative and then portfolio level based on the relative 20-year Total Regional Savings.

9. Managing Cost Effectiveness Across NEEA's Portfolio

NEEA uses a management framework called the Initiative Lifecycle (Figure 1) to progress initiatives from concept development, to initiative development and finally full-scale market development.

Figure 1: NEEA's Initiative Lifecycle



The goal is always to have a benefit cost ratio greater than or equal to 1 for both the initiative and the portfolio, but NEEA manages cost effectiveness calculations differently for initiatives depending upon the phase they are in. NEEA-developed cost effectiveness metrics are only fully generated for initiatives in the Market Development¹⁰ phase since it is not until this point that the transformation objectives and associated costs and benefits are more clearly defined. The cost effectiveness metric should be one

⁹ The rate is not updated in between Power Plans and could be out of alignment with current economic conditions.

¹⁰ Market Development is a phase of NEEA's Initiative Lifecycle management framework. This is the phase in which the products, markets and interventions are clearly defined and NEEA is actively engaged in transforming the market.

criterion considered by the Natural Gas Advisory Committee¹¹ when voting to advance an initiative through the Scale-Up Approval stage gate.

For initiatives in phases prior to Market Development, NEEA will generate a preliminary cost effectiveness metric and run sensitivity analysis on uncertain variables to determine the likelihood that it will be a cost effective. Initiatives without a viable pathway to cost effectiveness are unlikely to advance in the initiative lifecycle framework.

NEEA uses the benefits and costs of initiatives in Market Development to assess its portfolio. NEEA also adds the remaining Business Plan budget to the costs. The goal is to have a portfolio with a Benefit-Cost Ratio greater than 1.

10. Cost-effectiveness Review Process

NEEA vets and receive advice on cost-effectiveness topics through the Cost-effectiveness and Evaluation Advisory Committee. NEEA provides the information to the Committee for review on an annual basis and at any time upon request.

¹¹ Figure 1 indicates that the vote is by the Regional Portfolio Advisory Committee, which is true for NEEA's electric portfolio, however this responsibility currently lies with the Natural Gas Advisory Committee. It is possible this governance structure will change as NEEA's Natural Gas and Electric structures are more fully integrated.