2025 CONSERVATION POTENTIAL ASSESSMENT

Clark Public Utilities

October 9, 2025

Prepared by:

LIGHTHOUSE ENERGY CONSULTING

Nauvoo Solutions

Table of Contents

List of Figures

List of Tables

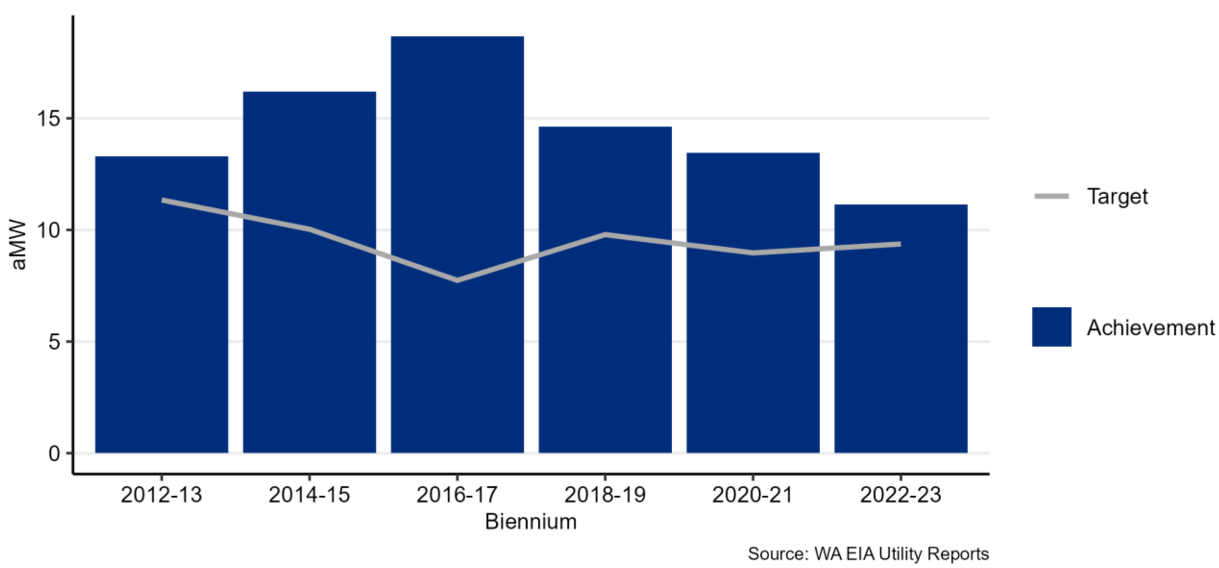
Executive Summary

Overview

This report describes the methodology and results of a conservation potential assessment (CPA) conducted by Lighthouse Energy Consulting and Nauvoo Solutions (the project team) for Clark Public Utilities. The CPA estimated the cost-effective energy savings potential for the period of 2026 to 2045. This report describes the results of the full 20-year period, with additional detail on the 2- and 10-year periods that are the focus of Washington's Energy Independence Act (WA EIA) and the 4-year interim compliance period per the state's Clean Energy Transformation Act (CETA).

Clark Public Utilities provides electricity service to over 230,000 customers in Clark County, Washington. The WA EIA requires that utilities with more than 25,000 customers identify and acquire all cost-effective energy efficiency resources and meet targets set every two years through a CPA. A summary of Clark Public Utilities' program achievements since 2012 is shown in Figure 1, based on WA EIA compliance data reported to Washington's Department of Commerce.

Figure 1: Historic Targets and Achievements (aMW)



The WA EIA specifies the requirements for setting conservation targets in RCW 19.285.040 and WAC 194-37-070 Section (5), parts (a) through (d). The methodology used in this assessment complies with these requirements and is consistent with the methodology used by the Northwest Power and Conservation Council (Council) in the 2021 Power Plan. Appendix III details the requirements of the WA EIA and how this assessment fulfills those requirements. Washington's CETA includes an additional requirement for CPAs; namely, that the assessment of cost-effectiveness use specific values for the social cost of carbon.

This CPA used much of the 2021 Power Plan materials, with customizations to make the results specific to Clark Public Utilities' service territory and customers. Notable changes in this CPA relative to Clark Public Utilities' previous assessment include the following:

- Energy Efficiency Measures
    - Measure savings, costs, and other characteristics were updated based on new information from the Regional Technical Forum (RTF). Multiple measures were updated across the assessment, generally resulting in decreases in the cost-effective potential.
- Avoided Costs
    - The assessment incorporated an updated market prices forecast that is significantly lower than what was used in the 2023 CPA.
- Customer Characteristics
    - Residential equipment saturations were updated with final 2022 Northwest Energy Efficiency Alliance (NEEA) Residential Building Stock Assessment (RBSA) data. The 2023 CPA used an early release version of the 2022 RBSA and was supplemented with Clark Public Utilities' customer information database. After reviewing with Clark Public Utilities, the project team did not incorporate the customer information database data due to potential bias towards electrically heated homes. This update generally increased the saturation of efficient heat pump heating systems relative to the 2023 CPA. Furthermore, the portion of electric water heating systems was lower than in the 2023 CPA.
    - Residential new construction heating and water heating saturations were updated based on NEEA's Washington Residential Post-Code Market Adjustment Research Report. This increased the portion of single family new construction homes with electric water heaters and space heating relative to the 2023 CPA.
    - Clark Public Utilities provided updated customer counts and sales forecast data for all sectors. Final year sales and customer counts in the residential sector were lower than in the 2023 CPA. The commercial sector building square footage and the industrial sector sales forecast were both lower over the entirety of the 20-year study period compared to the 2023 CPA.
- Program Impacts
    - Clark Public Utilities' recent conservation program achievements were incorporated to account for what was already accomplished and inform near-term potential.

Results

Figure 2 and Table 1 show the cost-effective energy efficiency potential by sector over 2-, 4-, 10-, and 20-year periods. Over the 20-year planning period, Clark Public Utilities has nearly 833,000 MWh of cost-effective conservation available, which is approximately 15% of its projected 2045 load. The WA EIA focuses on the 2- and 10-year potential, which are 82,119 MWh and 399,440 MWh, respectively. In the 4-year period covered by Clark Public Utilities' 2025 Clean Energy Implementation Plan (CEIP), there are 136,917 MWh of cost-effective conservation potential available.

Figure 2: Cost-Effective Potential by Sector (aMW)

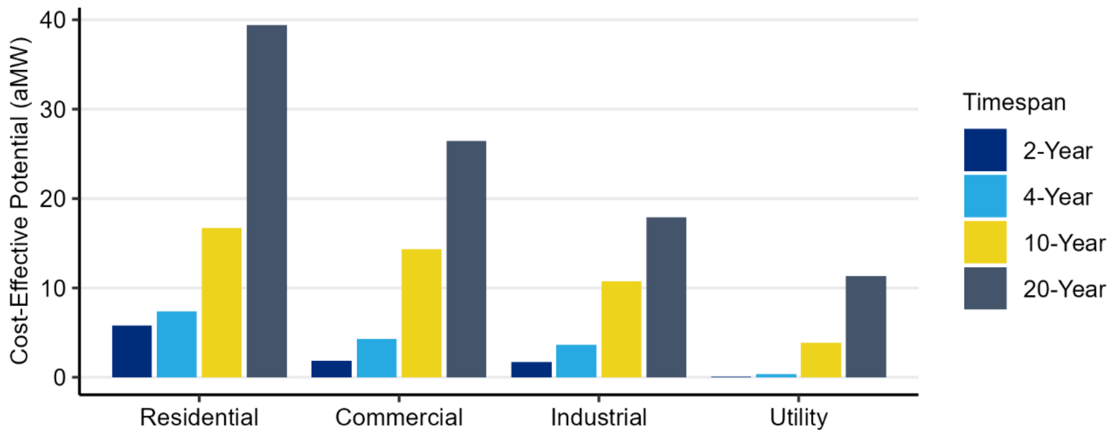


Table 1: Cost-Effective Potential by Sector (aMW)

Sector	2-Year	4-Year	10-Year	20-Year
Residential	5.78	7.38	16.72	39.40
Commercial	1.84	4.28	14.32	26.48
Industrial	1.67	3.62	10.73	17.93
Utility	0.09	0.36	3.83	11.28
Total	**9.37**	**15.63**	**45.60**	**95.09**

Note: In this and all subsequent tables, totals may not match due to rounding.

Consistent with Clark Public Utilities sales distribution, the residential sector had the greatest proportion of cost-effective energy efficiency potential making up 62% of the 2-year potential and 41% of the 20-year potential. Early year savings in the residential sector are largely driven by home energy report savings that are only included in the initial two years of the study. By 2045, commercial savings account for 28% of the total cost-effective potential, followed by industrial (19%), and utility distributions (12%).

This assessment does not specify how the energy efficiency potential will be achieved. Possible mechanisms include Clark Public Utilities' own energy efficiency programs, market transformation driven by the NEEA, state building codes, and state or federal product standards. Often, the savings associated with a measure will be achieved through several of these mechanisms over the course of its technological maturity. For example, heat pump water heaters started as one of NEEA's market transformation initiatives. They subsequently became a regular offering in utility programs across the Northwest and have recently become subject to federal product standards taking effect in 2029.

Energy efficiency also contributes to reductions in peak demand. This assessment used hourly load and savings profiles developed by the Council to identify the demand savings from each measure that would occur at the time of Clark Public Utilities' system peak. The cost-effective energy savings potential identified in this assessment will result in 150.4 MW of winter peak demand savings over the 20-year planning period, as shown in Table 2. This represents approximately 12% of Clark Public

Utilities' projected 2045 peak demand. Energy efficiency savings tend to occur when demand for energy is the greatest, resulting in significant contributions to reductions in peak demand.

Table 2: Peak Demand Savings from Cost-Effective Energy Efficiency Potential by Sector (MW)

Sector	2-Year	4-Year	10-Year	20-Year
Residential	13.2	16.4	35.5	82.8
Commercial	2.7	6.2	19.3	33.3
Industrial	2.0	4.3	12.8	21.5
Utility	0.1	0.4	4.3	12.8
Total	**18.0**	**27.3**	**71.9**	**150.4**

The estimate of annual cost-effective potential by sector is shown in Figure 3. The available potential starts at approximately 4.7 aMW in 2026 and grows to a maximum of nearly 6.1 aMW in 2038. After that point, the available potential diminishes through the remaining years of the planning period. The greater savings in 2026 and 2027 are a result of residential behavioral program savings which were included in the initial two years of the study but excluded after 2027.

Figure 3: Annual Incremental Cost-Effective Energy Efficiency Potential (MWh)

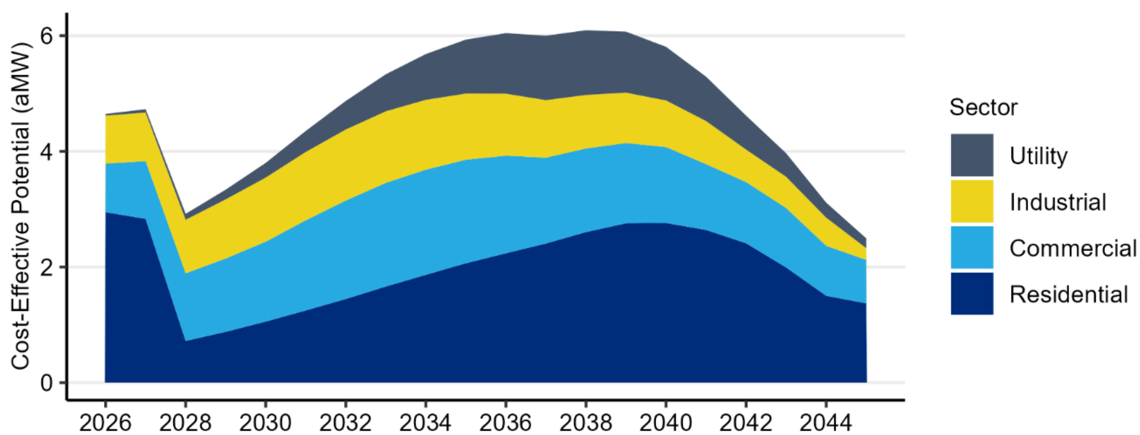
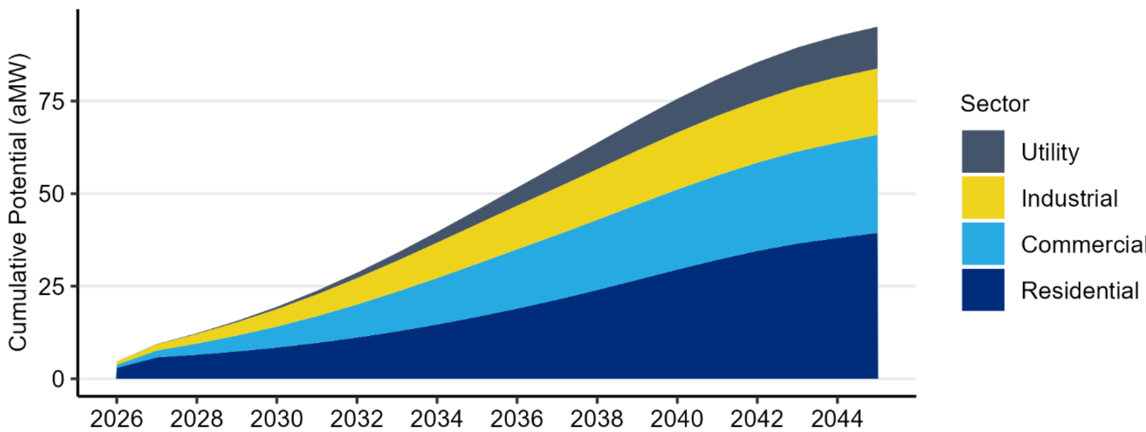


Figure 4 shows how the energy efficiency potential grows on a cumulative basis through the study period, totaling over 95 aMW over the 20-year planning period.

Figure 4: Annual Cumulative Cost-Effective Energy Efficiency Potential (MWh)



The year-by-year estimates of energy efficiency potential are based on ramp rates developed by the Council. Ramp rates identify the share of each measure's available potential that is projected to be acquired in each year based on its market and program maturity. For each measure, the project team applied a ramp rate that would align the near-term potential with Clark Public Utilities' recent program achievements and the savings from NEEA's market transformation initiatives that were estimated to occur in Clark Public Utilities' service territory. Program achievement data was provided by Clark Public Utilities staff and the project team assigned appropriate ramp rates to each measure so that the future acquisition of energy efficiency was aligned with recent program history while ensuring the acquisition of all energy efficiency potential over the 20-year planning period.

Comparison to Previous Assessment

Table 3 shows a comparison of the 2-, 10-, and 20-year cost-effective potential by sector as quantified by the previous 2023 CPA and this 2025 CPA. The 2-year potential increased slightly while there were decreases in the 10- and 20-year potential.

Table 3: Comparison of 2023 and 2025 CPA Results (aMW)

	2-Year Potential			10-Year Potential			20-Year Potential		
Sector	2023 CPA	2025 CPA	% Change	2023 CPA	2025 CPA	% Change	2023 CPA	2025 CPA	% Change
Residential	4.6	5.8	27%	27.4	16.7	-39%	77.5	39.4	-49%
Commercial	2.2	1.8	-18%	16.9	14.3	-15%	35.4	26.5	-25%
Industrial	1.5	1.7	13%	10.7	10.7	0%	16.8	17.9	7%
Utility	0.2	0.1	-42%	3.4	3.8	14%	6.4	11.3	77%
Total	**8.4**	**9.4**	**11%**	**58.4**	**45.6**	**-22%**	**136.2**	**95.1**	**-30%**

In the long term, the cost-effective potential decreased lower market price forecasts, lower customer forecasts, and updated measure assumptions impacting cost-effectiveness outcomes. In the near-term, the increases in potential in the residential and industrial sectors were driven by Clark Public Utilities' recent accomplishments and expectations for future savings. This is the best indicator of what Clark Public Utilities' programs can likely accomplish in the early years of the study period.

Conclusion

This report summarizes the CPA conducted for Clark Public Utilities for the 2026 to 2045 timeframe. The CPA identified a smaller amount of cost-effective potential relative to the previous CPA in the long-term. The cost-effective potential identified in this assessment can reduce Clark Public Utilities' annual energy and peak demand by 15% and 12% in 2045, respectively.

Introduction

Objectives

This report describes the methodology and results of a CPA conducted for Clark Public Utilities. The CPA estimated the cost-effective potential energy savings for the period of 2026 to 2045. This report describes the results of the full 20-year period, with additional detail on the 2- and 10-year periods that are the focus of Washington's EIA as well as the 4-year period covering 2026-2029 that aligns with Clark Public Utilities' 2025 CEIP.

This assessment was conducted in a manner consistent with the requirements of Washington's RCW 19.285, and WAC 194-37. As such, this report is part of the documentation of Clark Public Utilities' compliance with these requirements. The state of Washington's CETA includes an additional requirement for CPAs to use specific values for the social cost of carbon. The required values were incorporated into this analysis.

The results of this assessment can be used to assist Clark Public Utilities in planning its energy efficiency programs by identifying the amount of cost-effective energy savings available in various sectors, end uses, and measures.

Background

Washington State's EIA defines "qualifying utilities" as those with 25,000 customers or more and requires them to achieve all conservation that is cost-effective, reliable, and feasible. Since Clark Public Utilities serves more than 235,000 customers, it is required to comply with the EIA. The requirements of the WA EIA specify that all qualifying utilities complete the following by January 1st of every even numbered year:[1]

- Identify the achievable cost-effective conservation potential for the upcoming 10 years using methodologies consistent with the Council's latest power plan.
- Establish a biennial acquisition target for cost-effective conservation that is no lower than the utility's pro rata share for that two-year period of its cost-effective conservation potential for the subsequent 10 years.[2]

Appendix III further details how this assessment complies with each of the requirements specified by Washington's EIA.

Study Uncertainties

There are uncertainties inherent in any long-term planning effort. While this assessment makes use of the latest forecasts of customers and loads, it is still subject to remaining uncertainties and limitations. These uncertainties include, but are not limited to:

- <u>Customer Characteristic Data</u>: This assessment used the best available data to reflect Clark Public Utilities' customers. In some cases, however, the assessment relied upon data

[1] Washington RCW 19.285.040

[2] In CA No. 2011-03, the State Auditor's Office defined "pro rata" as "a proportion of an exactly calculable factor" and expects utilities to have analysis and documentation to support their identified targets, which could be more or less than 20% of the 10-year potential.

beyond Clark Public Utilities' service territory due to limitations of adequate sample sizes. There are uncertainties, therefore, related to the extent that this data is reflective of Clark Public Utilities' customer base.

- Measure Data: Measure savings and cost estimates are based on values prepared by the Council and RTF. These estimates will vary across the region due to local climate variations and market conditions. Additionally, some measure inputs such as applicability are based on limited data or professional judgement.
- Market Price Forecasts: This assessment uses an updated market price forecast developed in April of 2025. While this is an up-to-date forecast, market prices and forecasts are continually changing.
- Utility System Assumptions: Measures in this CPA receive cost credits based on their ability to free up transmission and distribution system capacity. The actual value of these credits is dependent on local conditions, which vary across Clark Public Utilities' service territory.
- Load and Customer Growth Forecasts: This CPA uses projections of future customer and load growth over a 20-year period. Any forecast over a similar time period will include a significant level of uncertainty.
- Policy Changes: The CPA reflects policies currently in effect at the time of its development. Future changes to the policy environment are difficult to predict and could lead to significant changes to loads, cost effectiveness of measures, or other study outcomes.

Due to these uncertainties and the continually changing planning environment, the WA EIA requires qualifying utilities to update their CPAs every two years to reflect the best available data and latest market conditions.

Report Organization

The remainder of this report is organized into the following sections:

- Methodology
- Customer Characteristics
- Recent Conservation Achievement
- Results
- Savings Shape
- Sensitivity Results
- Summary
- References & Appendices

Methodology

This section provides an overview of the methodology used to develop the estimate of cost-effective conservation potential for Clark Public Utilities.

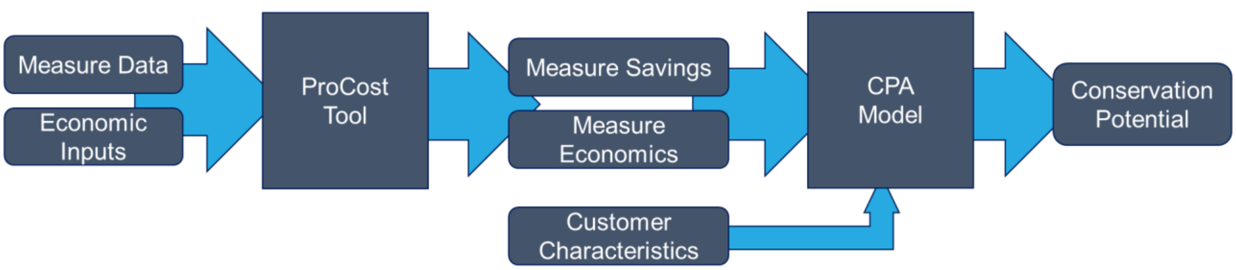
Washington's requirements for CPAs are spelled out in RCW 19.285.040 and WAC 194-37-070, Section 5 parts (a) through (d). Additional requirements are specified in the rules of Washington's CETA. The methodology used to produce this assessment is consistent with these requirements and follows much of the methodology used by the Council in developing its regional power plans, including the 2021 Power Plan.

Appendix III provides a detailed breakdown of the requirements of the WA EIA and how this assessment complies with those requirements.

High-level Methodology

The methodology used for this assessment is illustrated in Figure 5. At a high level, the process combines data on individual energy efficiency measures and economic assumptions using the Council's ProCost tool. This tool calculates a benefit-cost ratio using the Total Resource Cost (TRC) test, which is used to determine whether a measure is cost-effective. The TRC test considers all of the costs and benefits of energy efficiency measures, regardless of who receives the benefit or pays the cost. The measure savings and economics are then combined with customer data in Lighthouse's CPA model, which quantifies the number of remaining implementation opportunities. The CPA model aggregates the savings associated with each of these opportunities to determine the overall potential.

Figure 5: Conservation Potential Assessment Methodology



Economic Inputs

The project team worked closely with Clark Public Utilities staff to define the economic inputs that were used in this CPA, including avoided energy costs, carbon costs, transmission and distribution capacity costs, and generation capacity costs. Each of these are discussed below. A full discussion of the avoided costs is included in Appendix IV.

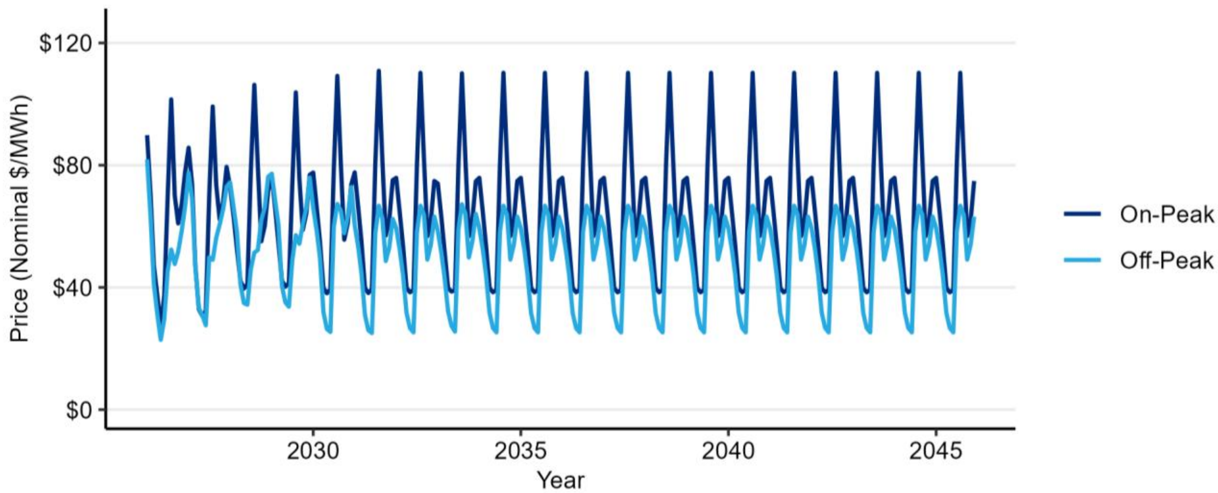
Avoided Energy Costs

Avoided energy costs represent the cost of energy purchases that are avoided through energy efficiency savings. Washington's EIA requires utilities to "set avoided costs equal to a forecast of regional market prices."[3] For this CPA, Clark Public Utilities provided a forecast of on- and off-peak

[3] WAC 194-37-070

market prices at the Mid-Columbia trading hub that served as the basis for this forecast. Figure 6 below shows the market price forecast that was used for the base case of this assessment. High and low sensitivity price forecasts were developed based on this forecast and are discussed in Appendix IV.

Figure 6: Avoided Energy Costs



Social Cost of Carbon

In addition to avoiding purchases of energy, energy efficiency measures can avoid emissions of greenhouse gases like carbon dioxide. The WA EIA requires that CPAs include a social cost of carbon, which the US EPA defines as "a measure of the long-term damage done by a ton of carbon dioxide emissions in a given year." It includes, among other things, changes in agricultural productivity, human health, property damages from increased flood risk, and changes in energy system costs, including increases in the costs of cooling and decreases in heating costs.[4] In addition to this requirement, Washington's CETA requires that utilities use the social cost of carbon values developed by the federal Interagency workgroup using a 2.5% discount rate.[5]

Renewable Portfolio Standard Compliance Costs

By reducing Clark Public Utilities' overall load, energy efficiency reduces the cost of complying with Washington's requirements for renewable and carbon-neutral energy. In 2026, Clark Public Utilities is required to source 15% of its sales from renewable energy. With a 15% requirement for renewable energy, Clark Public Utilities can avoid the purchase of 15 Renewable Energy Credits (RECs) with every 100 MWh of energy savings. In 2030, CETA requires all sales to be greenhouse gas neutral, while allowing up to 20% of the requirement to be met through REC purchases through 2044. Based on this requirement, it is assumed that after 2030 every unit of energy savings results in an equivalent reduction in REC purchases. In 2045, CETA requires 100% clean energy, so the project team assumed that market prices plus REC costs would represent the cost of clean energy.

---

[4] See https://www.epa.gov/sites/production/files/2016-12/documents/social_cost_of_carbon_fact_sheet.pdf

[5] WAC 194-40-100

Deferred Transmission and Distribution System Costs

Unlike supply-side resources, energy efficiency does not require capacity from transmission and distribution infrastructure. Instead, it frees up capacity by reducing the peak demands on these systems and can help defer future capacity expansions and the associated capital costs.

In the development of the 2021 Power Plan, the Council developed a standard methodology for calculating these values and surveyed Northwest utilities to update the values associated with these cost deferrals. This CPA uses the values developed by the Council through that process. The resulting values are $3.54 and $7.82 per kW-year (in 2016 dollars) for transmission and distribution capacity, respectively.[6] These values are applied to the demand savings coincident with the timing of the respective system peaks.

Program Administration Costs

In its past power plans, the Council has assumed that program administrative costs are equal to 20% of the cost of each measure. This CPA uses that assumption, which is also consistent with Clark Public Utilities' previous CPAs.

Risk Mitigation

Investing in energy efficiency can reduce the risks that utilities face by the fact that it is made in small increments over time, rather than the large, singular sums required for generation resources.

This CPA follows the process used in Clark Public Utilities' previous CPAs. A sensitivity analysis is used to account for uncertainty, where present, in avoided cost values. The variation in inputs covers a range of possible outcomes and the amount of cost-effective energy efficiency potential is presented under each sensitivity. In selecting its biennial target based on this range of outcomes, Clark Public Utilities is selecting its preferred risk strategy and the associated risk credit.

Northwest Power Act Credit

The WA EIA requires that a 10% cost credit be given to energy efficiency measures. This benefit is specified in the Northwest Electric Power Planning and Conservation Act and is included by the Council in their power planning work.

Other Financial Assumptions

In addition, this assessment makes use of an assumed discount rate to convert future costs and benefits to present values so that values occurring in different years can be compared. This assessment uses a real discount rate of 4.50%. Energy efficiency's benefits accrue over the lifetime of the measure, so a lower discount rate results in higher present values for benefits occurring in future years.

Assumptions about finance costs are applied to measures as well. The cost of each measure is assumed to be split across various entities, including Bonneville Power Administration (BPA), Clark Public Utilities, and end use customers. For each of these entities, additional assumptions are made about whether the measure costs are financed, and if so, the cost of that financing. This assessment uses the finance cost assumptions that were used in the 2021 Power Plan.

[6] These values reflect updates from the Council as the 2021 Power Plan was finalized.

Measure Characterization

Measure characterization is the process of defining each individual measure, including the savings at the meter as well as the cost, lifetime, non-energy impacts, and a load or savings shape that defines when the savings occur. The Council's 2021 Power Plan materials are the primary source for this information, although the project team incorporated updated information from the RTF for many measures. Appendix V contains the full list of energy efficiency measures considered the source(s) of information used for each.

Measure savings are typically defined via a "last in" approach. With this methodology, each measure's savings is determined as if it was the last measure installed. For example, savings from home weatherization measures are determined based on the assumption that the home's heating system has already been upgraded. Similarly, the heating system measures are quantified based on the assumption that the home has already been weatherized. This approach is conservative but prevents double counting savings over the long term as homes are likely to install both measures.

Measure savings also consider measure interaction. Interaction occurs when measures in one end use impact the energy use of other end uses. Examples of this include energy efficient lighting and other appliances. The efficiency of these appliances results in less wasted energy released as heat, which impacts the demands on heating and cooling systems.

These measure characteristics, along with the economic assumptions, are used as inputs to the Council's ProCost tool. This tool determines the savings at the generator, factoring in line losses, as well as the demand savings that occur coincident with Clark Public Utilities' system peak. The outputs of ProCost are used to calculate each measure's levelized cost and benefit-cost ratio, the latter of which is used to determine whether the measure is cost-effective.

Customer Characteristics

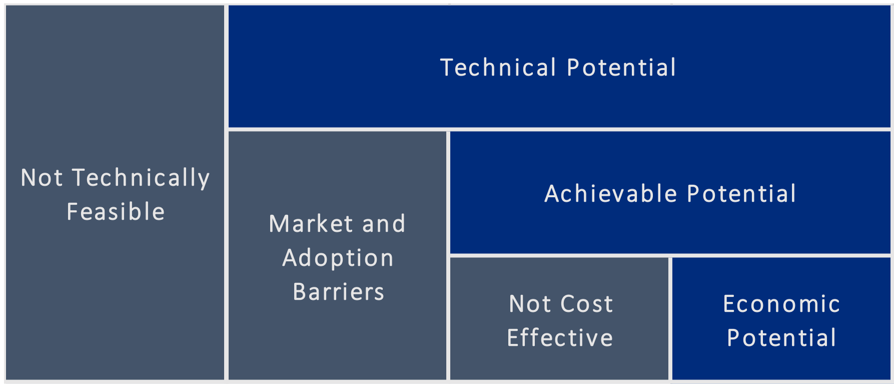
The assessment of customer characteristics is used to determine the number of remaining measure installation opportunities for each measure. This requires identifying the number of opportunities overall as well as the share that has already been completed. The characterization of Clark Public Utilities' customer base was completed primarily using data provided by Clark Public Utilities, NEEA's commercial and residential building stock assessments, and US Census data. Additional data sources and further details by sector are described subsequently in this report.

This CPA used baseline measure saturation data from the Council's 2021 Power Plan. This data was developed from NEEA's stock assessments, market research, and other studies. This data was supplemented with Clark Public Utilities' conservation achievements, where applicable. This achievement is discussed in the next section.

Energy Efficiency Potential

The energy efficiency measure data and customer characteristics are combined in Lighthouse's CPA model. The model estimates the economic (or cost-effective) energy efficiency savings potential as a subset of the technical and achievable potential based on the process shown in Figure 7. Each type of potential is discussed in further detail below.

Figure 7: Types of Energy Efficiency Potential



First, technical potential is the theoretical maximum of energy efficiency available, regardless of cost or market constraints. It is determined by multiplying the measure savings by the number of remaining feasible installation opportunities.

The model then applies several filters that incorporate market and adoption barriers to estimate the achievable potential. These filters include assumptions about the maximum potential adoption and the pace of annual achievements. Energy efficiency planners generally assume that not all measure opportunities will be installed; some portion of the technically possible measure opportunities will remain unavailable due to unsurmountable barriers. In the Northwest, energy efficiency planners typically assume that 85% of all measure opportunities can be achieved. This assumption comes from a pilot study conducted in Hood River, Oregon, where home weatherization measures were offered at no cost. The pilot was able to reach over 90% of homes and complete 85% of identified measure opportunities.[7] In the 2021 Power Plan, the Council has taken a more nuanced approach to this assumption. Measures that are likely to be subject to future codes or product standards have higher maximum achievability assumptions. This CPA follows the Council's new approach.

In addition, ramp rates are used to identify the portion of the available potential that can be acquired each year. The selection of ramp rates incorporates the different levels of program and market maturity as well as the practical constraints of what utility programs can accomplish in a given year.

Finally, economic potential is determined by limiting the achievable potential to those measures that pass an economic screen. Per Washington's EIA, this assessment uses the TRC test to determine economic potential. The TRC test considers all measure costs and benefits, regardless of who pays the cost or receives the benefit. The costs and benefits include the full incremental capital cost of the measure, any operations and maintenance costs, program administrative costs, avoided energy and carbon costs, deferred capacity costs, and quantifiable non-energy impacts. Because the TRC test considers the full cost of energy efficiency measures, Clark Public Utilities could pay up to the full cost of measures with its incentives without impacting the cost effectiveness. However, practical constraints such as annual program budgets and rate impacts may limit this.

[7] See https://eta-publications.lbl.gov/sites/default/files/lbnl-3960e-hrcp.pdf

Customer Characteristics

This section describes the characterization of Clark Public Utilities' customers, which is an essential component of a CPA. It includes defining the makeup and characteristics of each sector, which determines the type and quantity of opportunities to implement energy efficiency measures. Additional information about the local climate and population of the service territory is used to characterize some measures. This information is summarized in Table 4.

Table 4: Service Territory Characteristics

Heating Zone	Cooling Zone	Total Homes (2024)	Total Population (2024)
1	1	217,653	527,269

The number of homes was provided by Clark Public Utilities and is nearly a 5% increase over the initial value used in Clark Public Utilities' 2023 CPA. The number of homes was projected to grow at 1.75%, based on the long-term trend of customer growth. This is a decrease from the growth rate assumption used in the 2023 CPA, 2.5%.

Additionally, a demolition rate, based on assumptions for Washington State from the Council's 2021 Power Plan, was also used. The demolition rate quantifies the number of existing homes that are converted to new homes through demolition or major renovations, where building codes for new homes apply.

The population is based on census estimates for Clark County, Washington.

Residential

Within the residential sector, the key characteristics are the number and type of homes as well as the saturation of end use appliances such as space and water heating equipment. Table 5 and Table 6 summarize the characteristics that were used for this assessment for existing and new homes, respectively.

Table 5: Residential Existing Home Characteristics

	Single Family	Low Rise Multifamily	High Rise Multifamily	Manufactured
Share of Homes	79%	8%	9%	4%
HVAC Equipment				
Electric Forced Air Furnace	3%	0%	1%	48%
Air Source Heat Pump	34%	0%	12%	19%
Ductless Heat Pump	10%	4%	4%	14%
Electric Zonal/Baseboard	8%	84%	60%	8%
Central Air Conditioning	43%	2%	0%	18%
Room Air Conditioning	13%	31%	15%	21%
Other Appliances				
Electric Water Heater	49%	90%	100%	95%
Refrigerator	133%	99%	100%	104%
Freezer	44%	6%	4%	51%
Clothes Washer	96%	35%	40%	98%
Electric Clothes Dryer	80%	34%	40%	85%
Dishwasher	99%	68%	47%	85%

Electric Oven	81%	71%	77%	98%
Desktop	74%	21%	19%	31%
Laptop	88%	75%	70%	66%
Monitor	123%	50%	52%	34%

Table 6: Residential New Home Characteristics

	Single Family	Low Rise Multifamily	High Rise Multifamily	Manufactured
HVAC Equipment				
Electric Forced Air Furnace	0%	0%	1%	48%
Air Source Heat Pump	59%	0%	12%	19%
Ductless Heat Pump	29%	4%	4%	14%
Electric Zonal/Baseboard	0%	84%	60%	8%
Central Air Conditioning	43%	2%	0%	18%
Room Air Conditioning	13%	31%	15%	21%
Other Appliances				
Electric Water Heater	87%	90%	100%	95%
Refrigerator	133%	99%	100%	104%
Freezer	44%	6%	4%	51%
Clothes Washer	96%	35%	40%	98%
Electric Clothes Dryer	80%	34%	40%	85%
Dishwasher	99%	68%	47%	85%
Electric Oven	81%	71%	77%	98%
Desktop	74%	21%	19%	31%
Laptop	88%	75%	70%	66%
Monitor	123%	50%	52%	34%

In these tables, numbers greater than 100% imply an average of more than one appliance per home. For example, the single family refrigerator saturation of 133% means that single family homes average 1.33 refrigerators per home.

For this assessment, the project team used a combination of data sources to estimate existing and new construction saturations. For existing homes, the project team utilized NEEA's 2022 Residential Building Stock Assessment (RBSA) in conjunction with the most recent American Community Survey (ACS) data for Clark County. The ACS data was used to determine heating saturations by building type, and the RBSA was utilized to determine the distribution of electric heating systems by building type. For single family homes, the project team was able to use RBSA observations specific to Clark Public Utilities customers. The updated data sources reflected a shift toward more efficient heat pump heating systems and lower electric water heating saturations compared to the 2023 CPA.

Furthermore, the project team incorporated NEEA's post-code market research in Washington to inform electric water heating and space heating equipment saturations in new construction single family homes.

Commercial

In the commercial sector, the building floor area is the primary variable in determining the number of conservation opportunities, as many of the commercial measures are quantified based on the applicable amount of floor area. To estimate the commercial floor area in Clark Public Utilities' service territory, the project team used the 2024 sales by building type provided by Clark Public Utilities. The project team then converted these sales to estimates of floor area using average energy use intensities from the 2019 Commercial Building Stock Assessment.

Table 7 summarizes the resulting floor area estimates for each of the 18 commercial building segments. The total commercial floor area was estimated to be approximately 95 million square feet, a 2% decrease from the baseline floor area used in the 2023 CPA.

Table 7: Commercial Floor Area by Segment

Building Type	2024 Floor Area (square feet)
Large Office	6,042,639
Medium Office	6,111,607
Small Office	8,876,643
Extra Large Retail	6,684,233
Large Retail	1,703,507
Medium Retail	3,013,742
Small Retail	5,428,595
School (K-12)	13,896,599
University	1,418,528
Warehouse	3,783,608
Supermarket	1,255,492
Mini Mart	618,648
Restaurant	2,016,463
Lodging	7,284,947
Hospital	2,427,923
Residential Care	900,126
Assembly	12,146,333
Other Commercial	10,958,862
Total	**94,568,493**

Clark Public Utilities provided a growth rate of 0.9% which is a decrease relative to the 2023 CPA commercial growth rate assumption of 1.6%.

Industrial

The methodology used to estimate potential in the industrial sector is different from the residential and commercial sectors. Instead of building a bottom-up estimate of the savings associated with individual measures, potential in the industrial sector is quantified using a top-down approach that uses the annual energy consumption within individual industrial segments, which is then further disaggregated into end uses. Savings for individual measures are calculated by applying an assumed savings percentage to the applicable end use consumption within each industrial segment.

Clark Public Utilities provided the 2024 industrial sales by industrial segment. The total 2024 industrial consumption totaled nearly 950,000 MWh, a 7% decrease from the 2023 CPA, as summarized in Table 8.

Consistent with the 2023 CPA, the project team assumed no load growth in this sector. Therefore, the 20-year forecasted sales in the industrial sector is lower in the 2025 CPA compared to the 2023 CPA.

Table 8: Industrial Sector Sales by Segment

Segment	2024 Sales (MWh)
Water Supply	49,643
Sewage Treatment	41,641
Frozen Food	-
Other Food	67,962
Wood - Lumber	9,863
Wood - Panel	-
Wood - Other	9,208
Pulp and Paper Mills (TMP)	-
Pulp and Paper Mills (Kraft)	2,247
Paper Conversion Plants	14,078
Refinery	620
Chemical Manufacturing	118,036
Silicon Growing/Manufacturing	1,272
Cement/Concrete Products	2,046
Primary Metal Manufacturing	3,964
Fabricated Metal Manufacturing	36,008
Semiconductor Manufacturing	446,245
Transportation Equipment	896
Misc. Manufacturing	115,685
Refrigerated Warehouse	7,919
Fruit Storage	8,668
Indoor Agriculture	13,226
Total	**949,226**

Utility Distribution System

The 2021 Power Plan used a new approach for quantifying the potential energy savings in measures that improve the efficiency of utility distribution systems. The Council's new approach estimated savings potential from the 2018 sales within each sector as reported to the US Energy information Administration (US EIA) and based costs on the estimated number of distribution substations and feeders for each utility. Table 9 summarizes the assumptions used for this sector.

Table 9: Utility Distribution System Efficiency Assumptions

Characteristic	Count
Distribution Substations	42
Residential/Commercial Substations	35
Urban Feeders	68
Rural Feeders	29
2018 Residential Sales (MWh)	2,364,873
2018 Commercial Sales (MWh)	1,335,558
2018 Industrial/Other Sales (MWh)	764,602

**Note that these are estimates from the Council and may not reflect Clark Public Utilities' actual system*

Recent Conservation Achievement

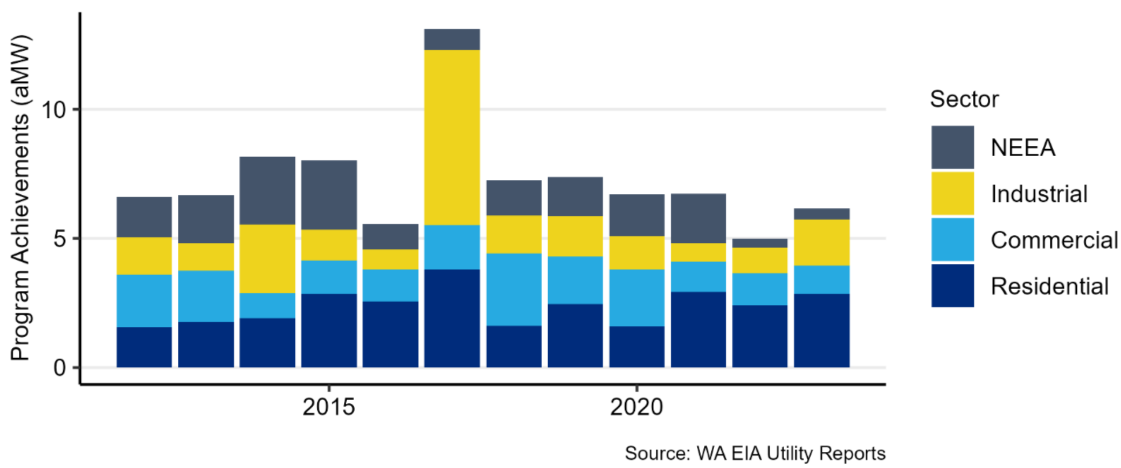
Clark Public Utilities has a long history of energy efficiency achievement and, according to the RTF's Regional Conservation Progress Report, has achieved annual savings equal to 1.2% of its retail sales on average over the 2016-2023 timeframe.

Clark Public Utilities currently offers programs for its residential, commercial, and industrial customers. In addition to these programs, Clark Public Utilities receives credit for the market transformation initiatives of NEEA that accrue within its service territory. NEEA's work has helped to bring energy efficient emerging technologies, like ductless heat pumps and heat pump water heaters, to the Northwest.

Overall

Figure 8 summarizes Clark Public Utilities' 2012-2023 conservation achievement by sector as well as the savings attributed to NEEA, as reported under Washington's EIA.

Figure 8: Past Conservation Achievements by Sector (aMW)



The average annual savings over this 12-year period is approximately 6.4 aMW per year. Savings from NEEA's market transformation initiatives are primarily in the residential sector. Savings from NEEA decreased in 2022 when the baselines that are used to quantify its market transformation efforts were reset to align with the 2021 Power Plan. A similar adjustment happened in 2016.

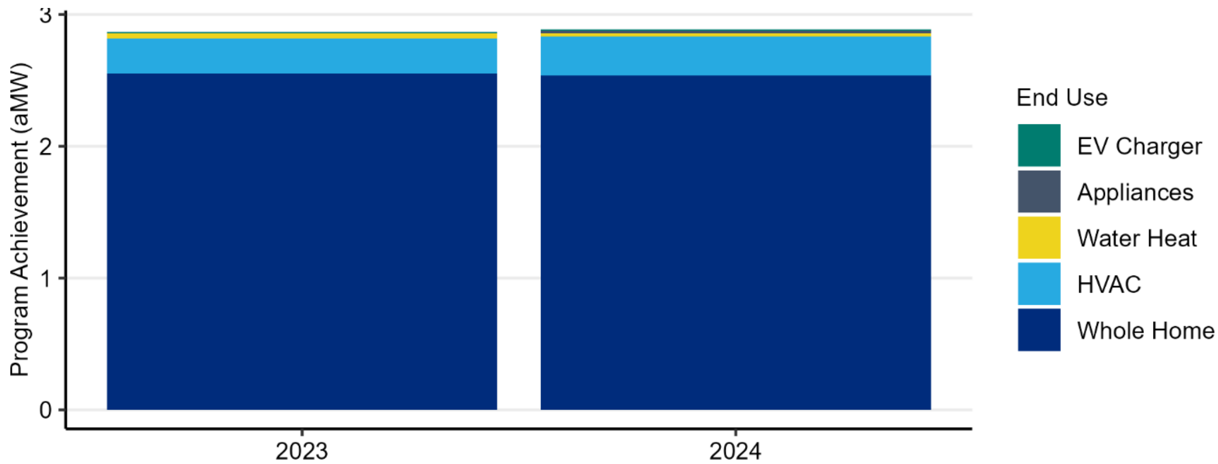
Clark Public Utilities provided detailed program achievement data for 2023 and 2024. The sections below summarize these recent achievements. Note that discrepancies may exist between the reported WA EIA values and the following more detailed accomplishment data due to differences in reporting timelines, differences in sector definitions, and the exclusion of certain measures reported under Washington's EIA that are not included in this CPA.

Residential

The recent residential program achievements by end use are shown in Figure 9. The savings total to over 5.7 aMW over the two years. Much of the historical savings are in the whole home end use which includes Clark Public Utilities' behavior program. This end use makes up approximately 88% of the historic 2023 and 2024 savings. Beyond that, the HVAC end use accounts for almost 10% of savings.

This end use includes both weatherization measures as well as heating system equipment. Outside of the HVAC and whole home end uses, less than 2% of Clark Public Utilities achieved savings are in the electric vehicle (EV) chargers, water heating, and appliances end uses.

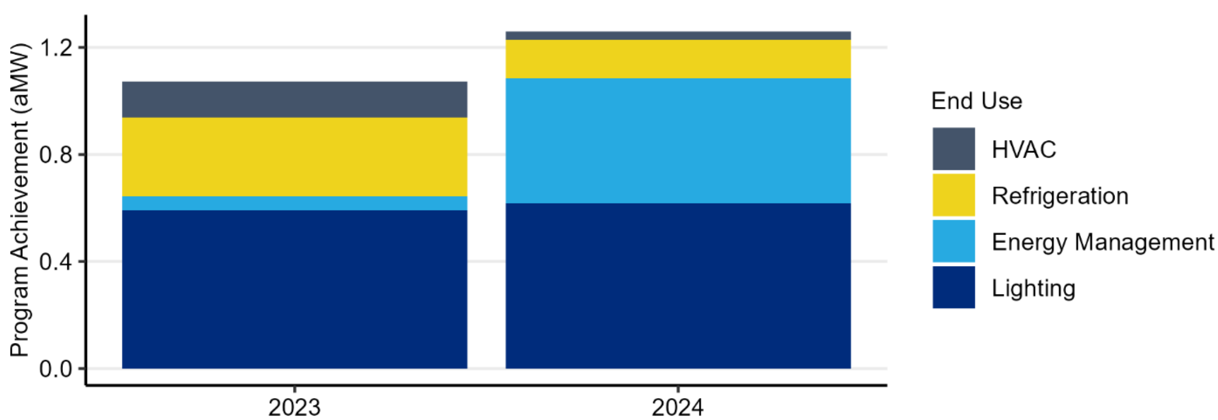
Figure 9: Recent Residential Program Achievements by End Use (aMW)



Commercial

Clark Public Utilities' commercial savings are from the lighting (52%), energy management (22%), refrigeration (19%), and HVAC (7%) programs, as shown in Figure 10. In total, commercial savings were more than 2.2 aMW over the two-year period.

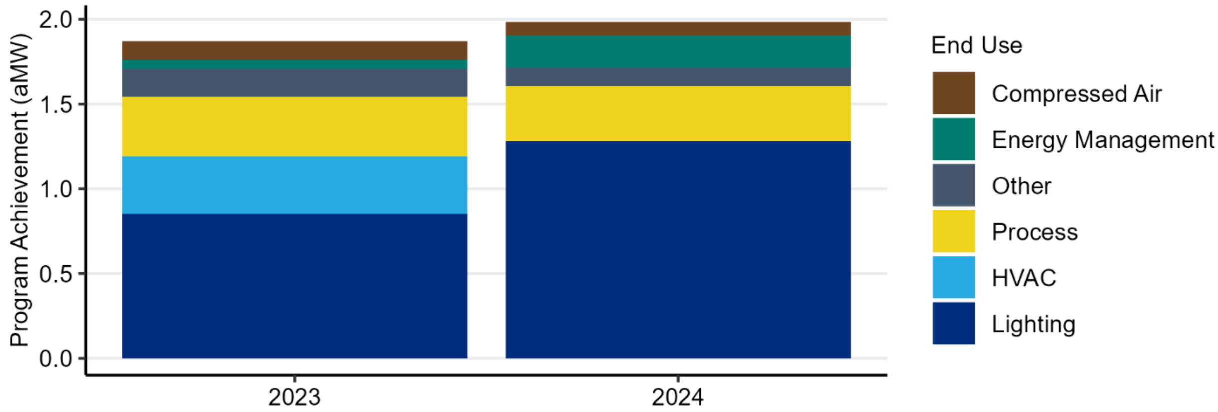
Figure 10: Recent Commercial Program Achievements by End Use (aMW)



Industrial

In 2023 and 2024, Clark Public Utilities achieved over 3.7 aMW of savings in the industrial sector. Those savings are shown in Figure 11, where the makeup of the savings across end uses is fairly consistent between the two years. Lighting projects make up the greatest amount of recent savings at 56% with other large contributes from HVAC, process, and energy management projects and programs.

Figure 11: Recent Industrial Program Achievements by End Use (aMW)



Results

This section discusses the results of the 2025 CPA. It begins with a discussion of the high-level achievable conservation potential and then covers additional detail on the cost-effective potential within the individual sectors and end uses.

Achievable Conservation Potential

The achievable technical conservation potential is the amount of energy efficiency that can be saved without considering the cost-effectiveness of measures. It considers market barriers and the practical limits of acquiring energy savings through efficiency programs.

Figure 12 shows the supply curve of achievable potential over the 20-year study period. A supply curve depicts the cumulative potential against the levelized cost of energy savings, with the measures sorted in order of ascending cost. No economic screening is applied. Levelized costs are used to make the costs comparable between measures with different lifetimes as well as with supply-side resources. The costs include credits for deferred transmission and distribution system costs, avoided periodic replacements, and non-energy impacts to make them comparable with other resources. With these credits, some of the lowest cost measures have a net levelized cost that is negative, meaning the credits exceed the measure costs.

Figure 12: 20-Year Supply Curve

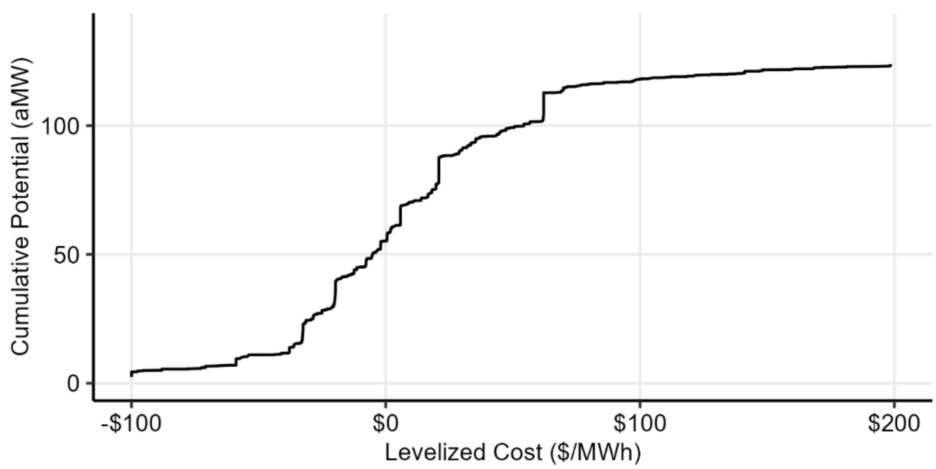


Figure 12 shows that approximately 53 aMW of potential are available at a cost at or below $0/MWh. Roughly 95 aMW of achievable potential are available for costs below $50/MWh. At approximately $75/MWh the curve begins to flatten, indicating that the majority (84%) of the savings can be obtained below this price point. In total, there is more than 131 aMW of achievable technical potential available in Clark Public Utilities' service territory over the 20-year study period, but only potential below $200/MWh is shown.

Supply curves based on levelized cost are limited in that not all energy savings are equally valued. For example, two measures could have the same levelized cost but provide different reductions in peak demand or deliver energy savings when energy costs are more or less valuable. An alternative to the supply curve based on levelized cost is one based on the benefit cost ratio. This is shown below in Figure 13.

Figure 13: 20-Year Benefit-Cost Ratio Supply Curve

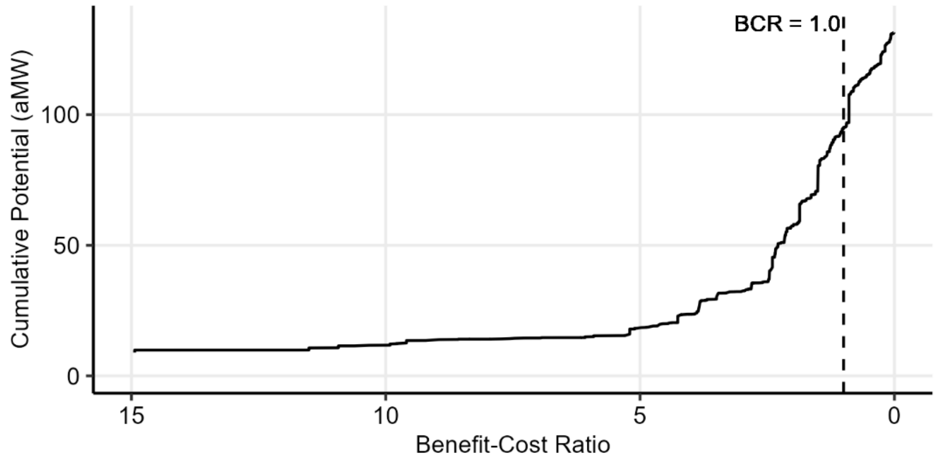


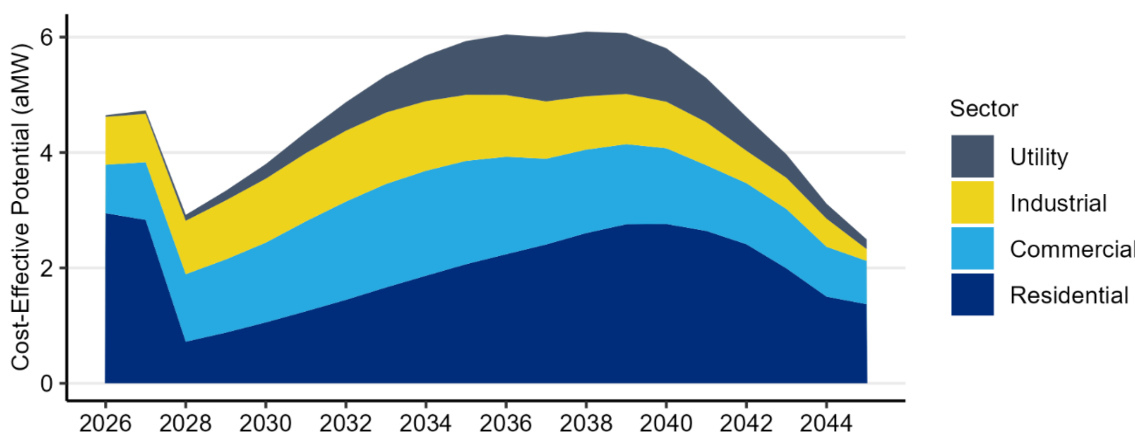
Figure 13 shows that approximately 18 aMW of savings are available with a benefit-cost ratio of 5 or more. These measures deliver benefits that are 5 times their cost over their lifetime. The figure includes a dashed line where the benefit-cost ratio is equal to one. There is over 95 aMW of cost-effective savings potential to the left of this line, reflecting the 20-year cost-effective potential. The supply curve features a vertical step just to the right the line where the benefit cost ratio is equal to 1. This suggests that the long-term cost-effective potential would increase significantly with a small increase in avoided costs, which would effectively shift the dashed line to the right.

The economic or cost-effective potential is described below.

Cost-Effective Conservation Potential

Figure 14 shows the cost-effective potential by sector on an annual basis. Over the 20-year period, most of the potential is in Clark Public Utilities' residential sector.

Figure 14: Annual Cost-Effective Potential by Sector



The project team used the ramp rates from the 2021 Power Plan to establish reasonable rates of acquisition for all measures and sectors. The project team assigned ramp rates to individual measures in order to align the near-term potential with recent and expected savings in each sector. Appendix VII has more detail on the alignment of ramp rates with program expectations.

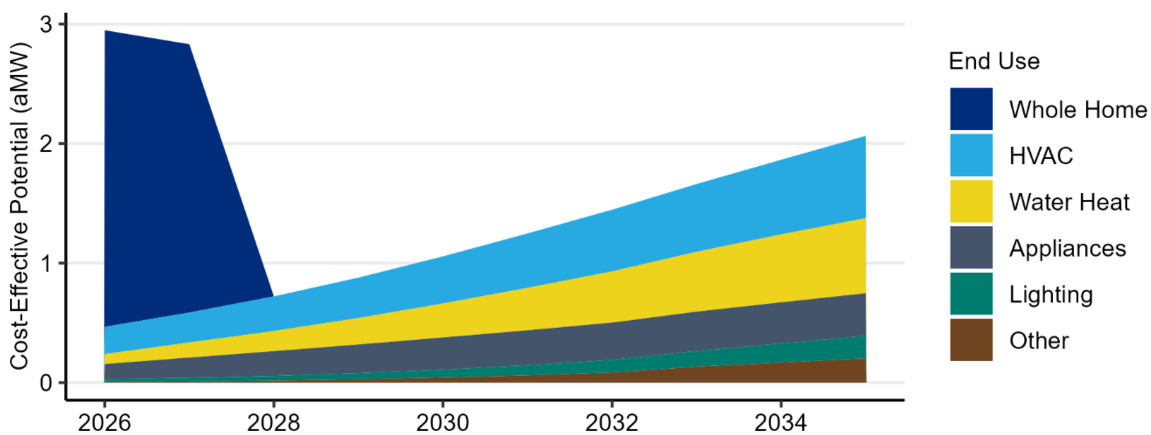
The sections below describe the achievable potential within each sector.

Residential

Relative to the 2023 CPA, the cost-effective potential in the residential sector has decreased in the long-term but is greater in the near-term. The near-term increase in potential is driven by strong recent program activity and large amounts of anticipated behavior program savings. The 20-year potential is lower due to a variety of factors, including lower avoided costs and fewer homes with electric resistance space and electric water heating.

Figure 15 shows the cost-effective potential by end use for the first 10 years of the study period. As previously mentioned, there is a large chunk of savings from Clark Public Utilities' behavior program expected in the near term, which are part of the "whole home" end use. In conservation potential modeling, only the first implementation of a measure is counted so only the initial implementation of behavior savings is included in the CPA study period. This may differ from programmatic savings claims. Over the 10-year period, HVAC measures (including weatherization) make up 26% of the potential in the sector, followed by water heating (20%), appliances (16%), lighting (5%), and electronics (4%). In Figure 15, the other end use category primarily includes cooking measures.

Figure 15: Annual Residential Potential by End Use



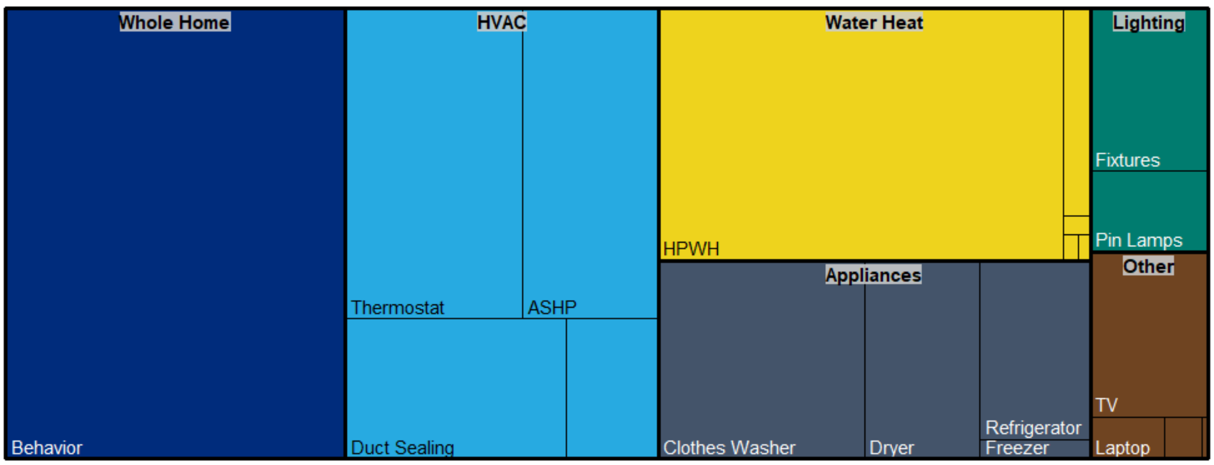
After whole building savings are excluded in 2028, the savings potential in all other end uses grows as the expected market share of efficient equipment and adoption of other energy efficiency measures increases.

Figure 16 shows how the 10-year potential breaks down into end uses and measure categories. The area of each block represents the share of the total 10-year residential potential. Air source heat pumps (ASHP), smart thermostats, and duct sealing make up most of the potential in the HVAC end use, while heat pump water heaters (HPWH) are the key measure in the water heating end use. The appliance category includes clothes washers, dryers, refrigerators, and freezers.

The project team included incentives from IRA programs in the ASHP costs, improving the cost-effectiveness of this measure, especially relative to prior CPAs. Ductless heat pumps were not cost-effective after updating the measure with the latest RTF assumptions.

Beginning in 2029, heat pump water heaters are subject to a federal standard that will require the technology for many common tank sizes. As there are questions on possible loopholes that leave the future role of utility programs in question, the project team kept the savings potential for these measures after 2029 to show the savings that are possible and will be seen on Clark Public Utilities' system, whether they are achieved through Clark Public Utilities' programs or the federal standard. The state of this market can be re-evaluated in Clark Public Utilities' 2027 CPA.

Figure 16: Residential Potential by End Use and Measure Category



Note that some residential measures, such as smart thermostats and heat pump water heaters can provide benefits as both energy efficiency and demand response resources. Demand response benefits were not included in this CPA. The decision to use them as demand response resources was treated as an incremental decision and included in Clark Public Utilities' Demand Response Potential Assessment, although energy efficiency programs can help build a stock of flexible equipment that could be called upon in the future through demand response programs.

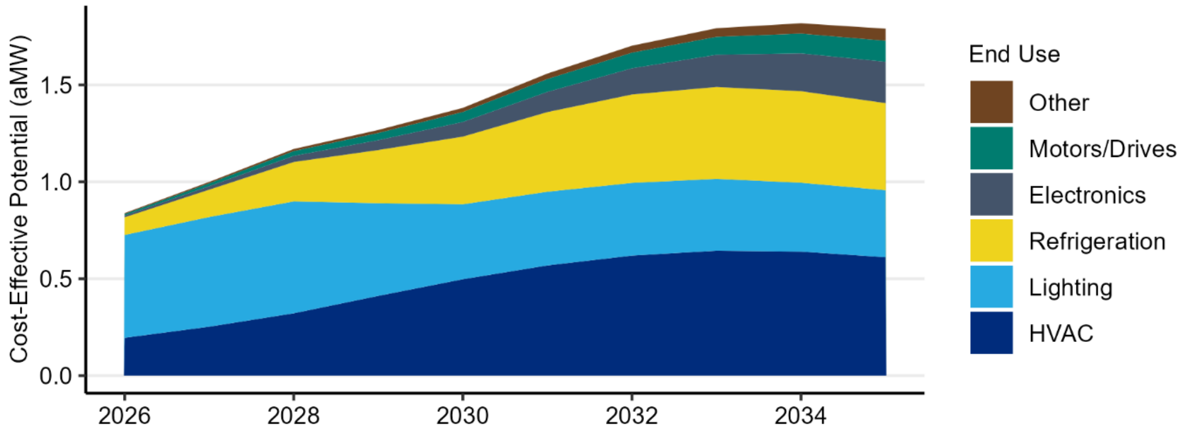
Commercial

In commercial sector, HVAC and lighting measures are the end uses with the highest potential. These two end uses comprise 33% and 30% of the 10-year potential, respectively. The lighting end use includes measures applicable to both interior and exterior lighting.

Like the residential sector, the potential in the commercial sector has declined in the long-term relative to the 2023 CPA. This is primarily driven by the decrease in estimated commercial floor area. In addition, the savings potential in the lighting end use is subject to a state law banning mercury in lighting beginning in 2029. In effect, this will raise the baseline for commercial lighting programs to LED products. The project team reduced the lighting savings beginning in 2029 to reflect this change. In addition, the potential remaining in this end use is limited after accounting for Clark Public Utilities' previous achievements.

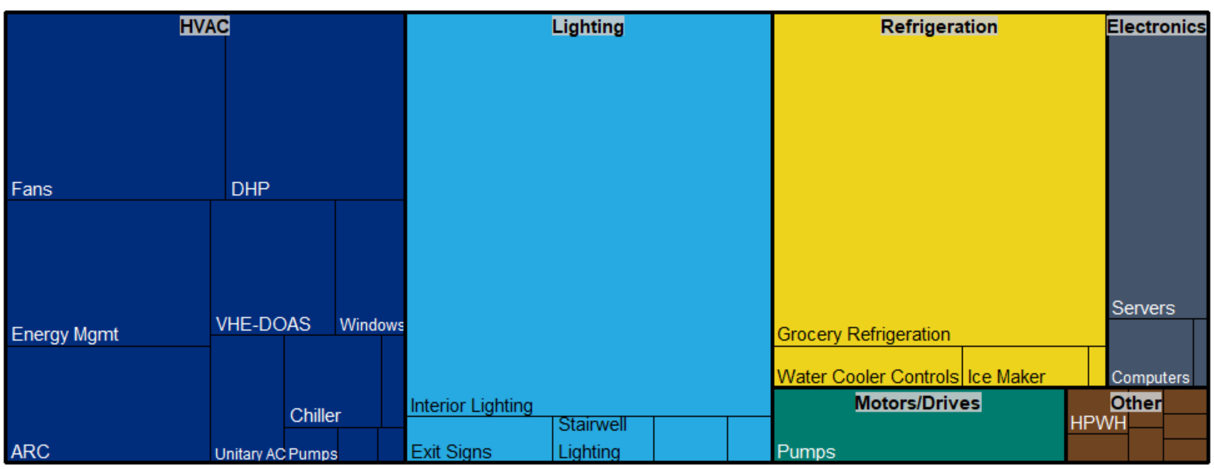
In Figure 17, the other end use category includes measures in the compressed air, food preparation, process loads, and water heating end uses.

Figure 17: Annual Commercial Potential by End Use



Key end uses and measure categories within the commercial sector are shown in Figure 18. The area of each block is proportional to its share of the 10-year commercial potential. The commercial sector includes a variety of building types with different end uses. This is apparent in the range of measures included in Figure 18, especially the different types of HVAC equipment.

Figure 18: Commercial Potential by End Use and Measure Category

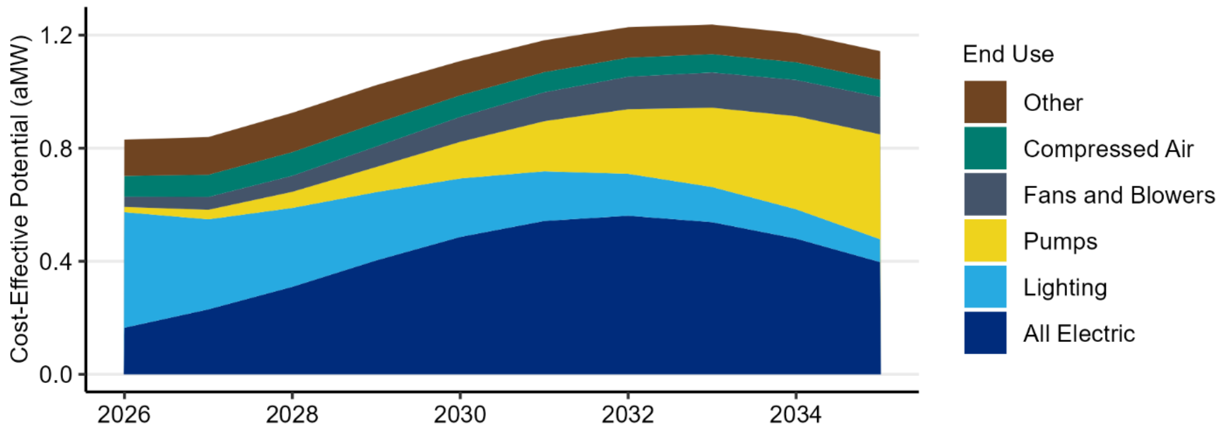


Industrial

The annual industrial sector potential is shown in Figure 19. The "all electric" and lighting end uses are the largest areas of potential, comprising 38% and 19% of the 10-year potential, respectively. The "all electric" end use category includes measures applicable to all end uses, such as strategic energy management programs, forklift chargers, and measures applicable to the water and wastewater segments. After these end uses, the key end uses include pumps (16%), and fans and blowers (8%). The other category in Figure 19 includes a variety of end uses, including compressed air, material handling and processing, motors, and several other smaller end uses.

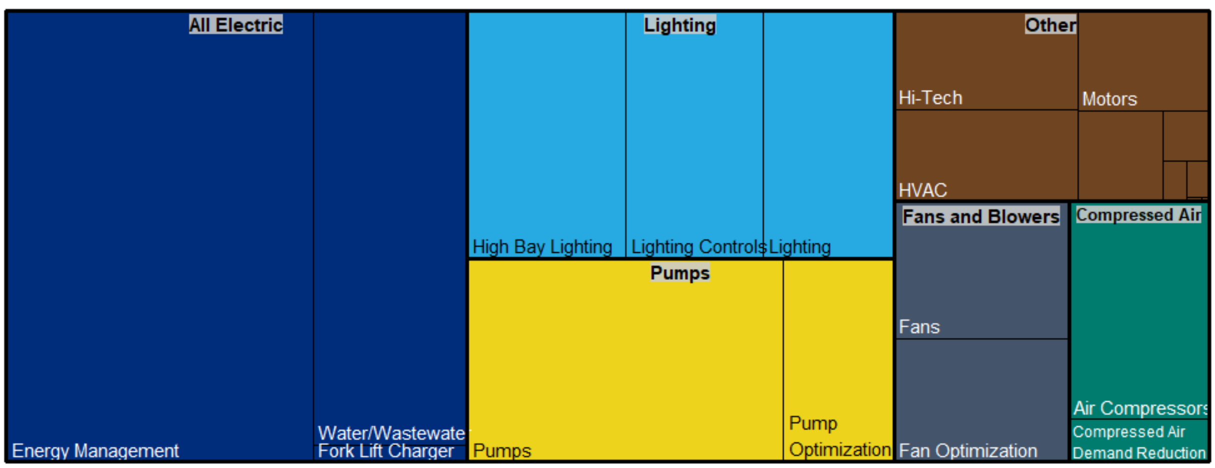
The industrial potential increased slightly relative to Clark Public Utilities' 2023 CPA after updating the distribution of industrial loads and incorporating the latest RTF assumptions for pumps.

Figure 19: Annual Industrial Potential by End Use



The breakdown of 10-year industrial potential into end uses and measure categories is shown in Figure 20.

Figure 20: Industrial Potential by End Use and Measure Category

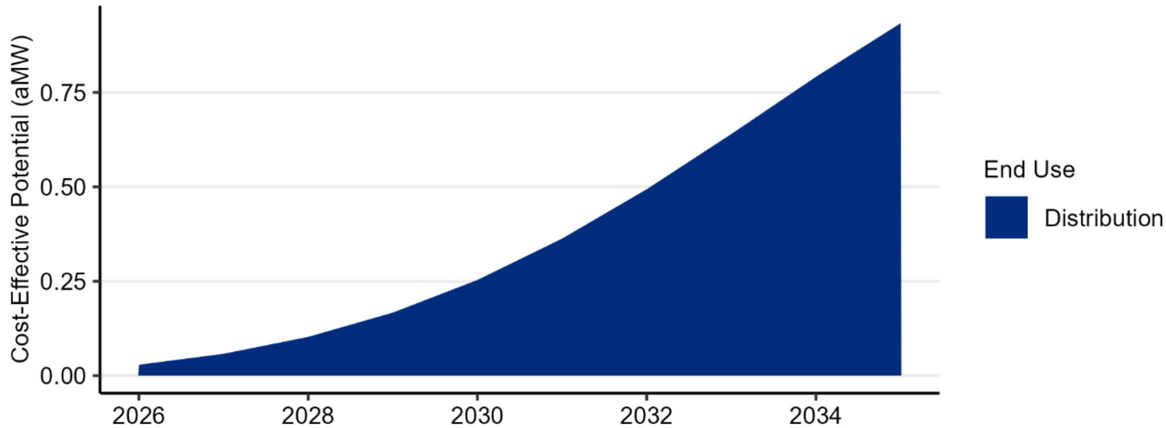


Utility Distribution System

The measures in the distribution efficiency sector involve the regulation of voltage to improve the efficiency of utility distribution systems. This analysis includes the measures characterized in the 2021 Power Plan, which includes several levels that use increasingly sophisticated control systems.

The annual distribution system potential is shown in Figure 21.

Figure 21: Annual Distribution System Potential



Savings Shape

This section provides further details on the shape of the cost-effective potential identified in this CPA, including breakdowns of energy savings by on- and off-peak periods and month, as well as further detail on the peak demand savings.

Methodology

Each of the measures included in this CPA have one or more savings components. While most measures have just a single savings component, numerous measures have more than one. Efficient heat pumps, for example, can provide both heating and cooling savings, each of which are quantified as a separate savings component. Water-saving measures often have two distinct savings components: the reduction of water heating loads in homes and buildings, and the reduced loads at wastewater treatment plants through the reduction of wastewater influent. Each measure savings component was assigned a load profile and a ratio that allocated the total measure savings to each savings component. These ratios and load profiles were applied to the annual potential results, enabling the calculation of more detailed breakdowns in the savings potential. The project team used the load shapes that were developed by the Council for the 2021 Power Plan for this analysis.

Results

Figure 22 shows the shape of the monthly savings for on- and off-peak energy savings. Like the annual results discussed above, most of the savings in each period are in the residential sector. This sector also contributes a larger share of its savings during the winter months, while the savings from other sectors are more consistent throughout the months of the year.

Figure 22: On- and Off-Peak Savings by Month and Sector

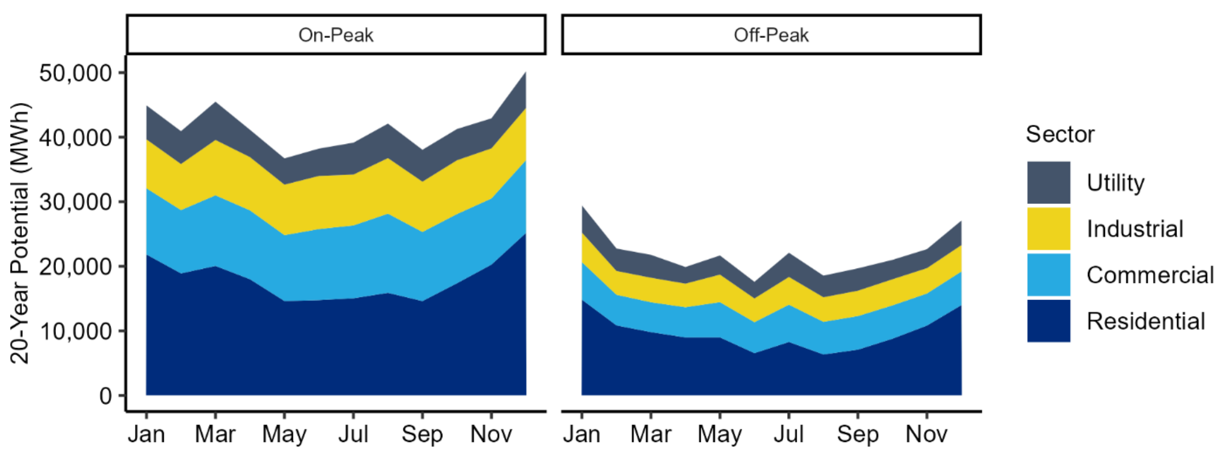


Figure 23 shows a similar breakdown as above, only by end use instead of sector. While each of the end use categories contributes more on-peak savings, the HVAC end use contributes more of its on-peak savings in the winter months while the savings from other end uses are more evenly spread across the year.

Figure 23: On- and Off-Peak Savings by Month and End Use

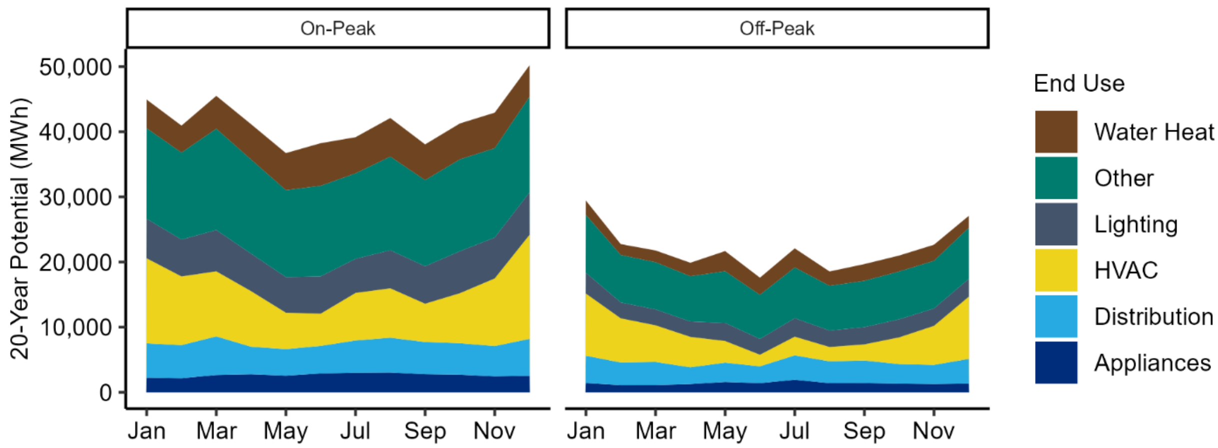


Figure 24 and Figure 25 show the monthly peak demand savings by sector and end use, respectively. Like above, the residential sector and HVAC end use contribute the most to reductions in peak demand. For this breakdown, the project team assumed morning peaks in the winter and shoulder season months with evening peaks in the summer.

Figure 24: Monthly Peak Savings by Sector

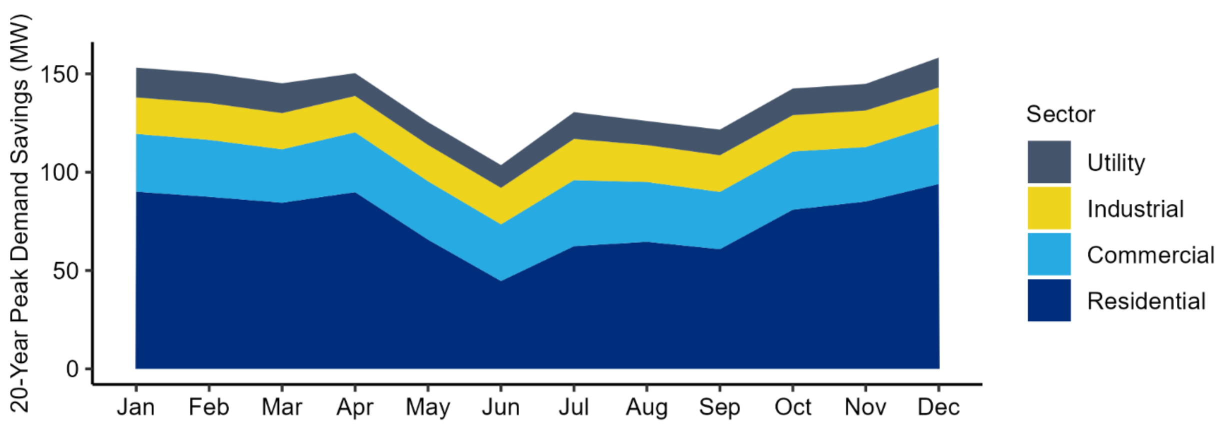


Figure 25: Monthly Peak Savings by End Use

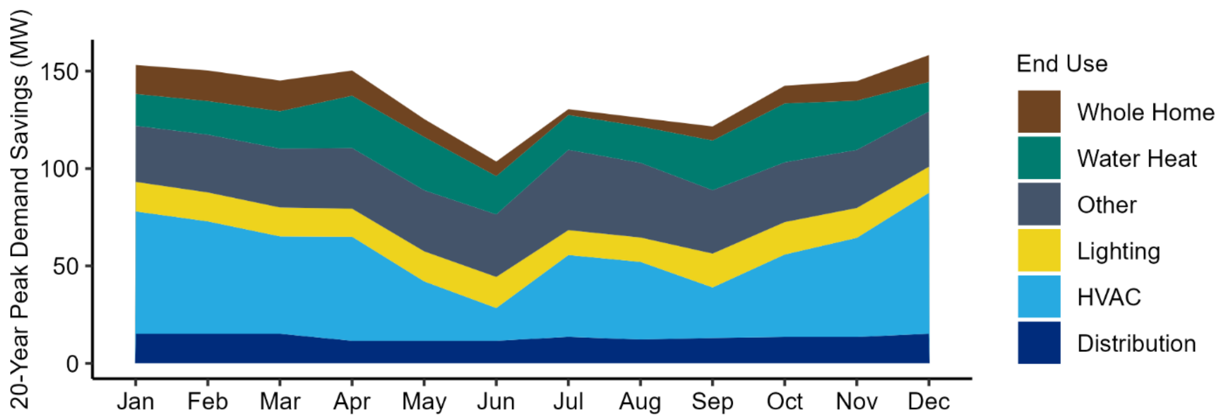
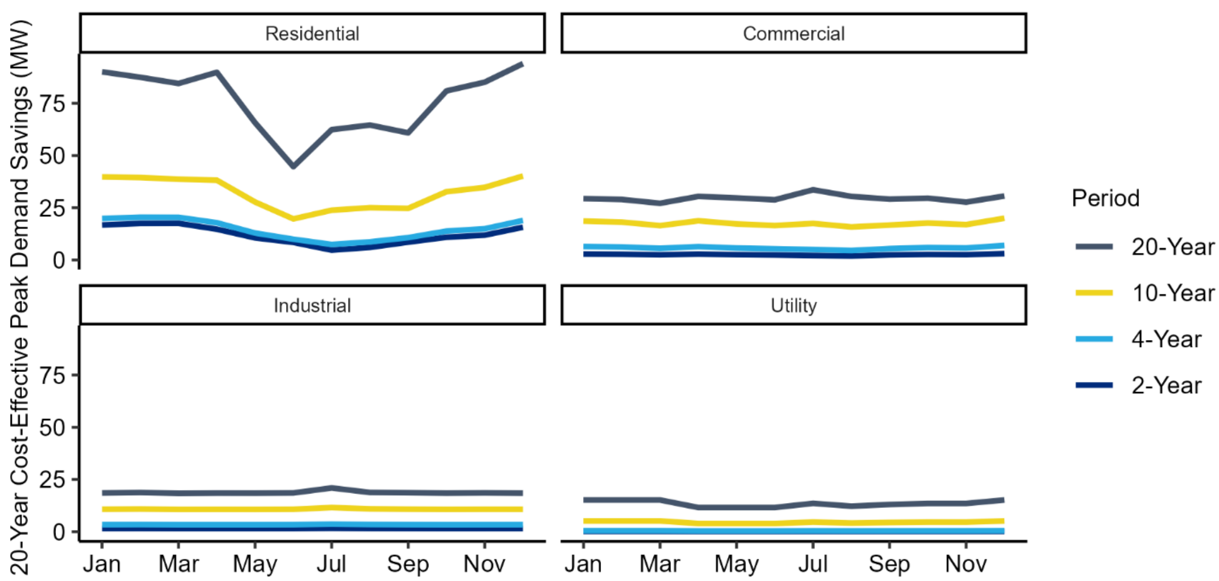


Figure 26 shows the monthly peak demand savings by sector, month, and time period. Like the figures above, the residential sector shows the highest levels of peak demand savings, but the month-to-month shape of the residential begins fairly flat but takes on a more seasonal profile over time, including a more pronounced increase in summer peak demand savings. This highlights the fact that much of the peak demand savings in the residential sector are in measures that were given slower ramp rates and are projected to be acquired more slowly. In the commercial sector, the savings take on a slightly more summer-oriented savings shape over time.

Figure 26: Monthly Peak Demand Savings by Sector, Month, and Time Period



Sensitivity Results

This section discusses the results of two sensitivity analyses that were evaluated in addition to the base case results described in the preceding sections. These sensitivities examined low and high variations of the avoided costs values to provide a range of possible outcomes given the uncertainty inherent in estimating these costs over a 20-year period. This allows Clark Public Utilities to understand how the cost-effective potential varies with changes in the avoided cost. All other inputs were held constant.

Table 10 summarizes the avoided cost assumptions used in each sensitivity, which are discussed further in Appendix IV.

Table 10: Avoided Cost Assumptions by Sensitivity

		Low Sensitivity	Base Case	High Sensitivity
Energy Values	**Avoided Energy Costs (20-Year Levelized Price, 2016$/MWh)**	Market Forecast minus 20%-80% ($22)	Market Forecast ($39)	Market Forecast plus 20%-80% ($57)
	Social Cost CO_2	Federal 2.5% Discount Rate Values	Federal 2.5% Discount Rate Values	Federal 2.5% Discount Rate Values
	RPS Compliance	WA EIA & CETA Requirements	WA EIA & CETA Requirements	WA EIA & CETA Requirements
Capacity Values	**Distribution Capacity (2016$)**	$7.82/kW-year	$7.82/kW-year	$7.82/kW-year
	Transmission Capacity (2016$)	$3.54/kW-year	$3.54/kW-year	$3.54/kW-year
	Generation Capacity (2016$)	$65/kW-year	$75/kW-year	$123/kW-year
	Implied Risk Adder (2016$)	-$12/MWh -$10/kW-year	N/A	$12/MWh $48/kW-year
	NW Power Act Credit	10%	10%	10%

Instead of using a single risk adder applied to each unit of energy, these two sensitivities consider potential futures with higher and lower values for the avoided cost inputs with larger degrees of uncertainty: the value of avoided energy and generation capacity.

Table 11 summarizes the variation in cost-effective potential across each avoided cost sensitivity. As foreshadowed by the benefit cost ratio supply curve shown in Figure 13, increases in avoided cost produce more significant changes in cost-effective potential relative to the base case, especially in the mid- to long-term periods.

Table 11: Cost Effective Potential (aMW) by Avoided Cost Sensitivity

Sensitivity	2-Year	4-Year	10-Year	20-Year
Low Sensitivity	8.80	14.44	41.95	87.36
Base Case	9.37	15.63	45.60	95.09
High Sensitivity	10.20	17.76	53.41	110.31

Summary

This report summarized the results of the 2025 CPA conducted for Clark Public Utilities. The assessment provided estimates of the cost-effective energy savings potential for the 20-year period beginning in 2026, with details on the first two and ten years per the requirements of Washington State's EIA. The assessment considered a wide range of measures that are reliable and available during the study period.

Compared to Clark Public Utilities' 2023 CPA, the long-term cost-effective potential has decreased. While aligning the near-term potential with Clark Public Utilities' recent and expected achievements resulted in greater amounts of cost-effective potential over the initial two-year period, there were decreases in the long-term potential driven by updated customer forecasts, lower avoided costs, updated measure assumptions, incorporation of the state's mercury lighting ban, and adjustments to account for Clark Public Utilities' recent achievements.

Compliance with State Requirements

The methodology used to estimate the cost-effective energy efficiency potential described in this report is consistent with the methodology used by the Council in determining the potential and cost-effectiveness of conservation resources in the 2021 Power Plan. Appendix III provides a list of Washington's EIA requirements and a description of how each was implemented. In addition to using a methodology consistent with the Council's 2021 Power Plan, the assessment used assumptions from the 2021 Power Plan where utility-specific inputs were not used. Utility-specific inputs covering customer characteristics, previous conservation achievements, and some economic inputs were used. The assessment included the measures considered in the 2021 Power Plan materials, updated with new information from the RTF made available since its publication.

References

Cadmus Group. (2020). Commercial Building Stock Assessment 4 (2019) Final Report. Portland, OR: Northwest Energy Efficiency Alliance. https://neea.org/data/commercial-building-stock-assessments

Evergreen Economics. (2024). 2022 Residential Building Stock Assessment. Portland, OR: Northwest Energy Efficiency Alliance. https://neea.org/data/residential-building-stock-assessment

Northwest Power and Conservation Council. (December 11, 2020). 2021 Power Plan Technical Information and Data. https://www.nwcouncil.org/2021-power-plan-technical-information-and-data

Northwest Power and Conservation Council. (1980). Pacific Northwest Electric Power Planning and Conservation Act. https://www.nwcouncil.org/reports/northwest-power-act/

Oak Ridge National Laboratory. (1987). Electricity Use and Savings in the Hood River Conservation Project. https://www.osti.gov/biblio/6880640

Regional Technical Forum. Unit Energy Savings Measures Library. https://rtf.nwcouncil.org/measures/

Regional Technical Forum. (2023). Regional Conservation Progress Report. https://rtf.nwcouncil.org/about-rtf/conservation-achievements/2023/

TRC. (May 26, 2022). Washington Residential Post-Code Market Research Report. https://neea.org/wp-content/uploads/2025/03/Washington-Residential-Post-Code-Adoption-Market-Research.pdf

US Census Bureau. American Community Survey. https://www.census.gov/programs-surveys/acs

Appendix I: Acronyms

aMW	Average Megawatt
BPA	Bonneville Power Administration
CETA	Clean Energy Transformation Act
CPA	Conservation Potential Assessment
EUI	Energy Use Intensity
HPWH	Heat Pump Water Heater
HVAC	Heating, Ventilation, and Air Conditioning
kW	kilowatt
kWh	kilowatt-hour
LED	Light-Emitting Diode
MW	Megawatt
MWh	Megawatt-hour
NEEA	Northwest Energy Efficiency Alliance
O&M	Operations and Maintenance
RPS	Renewable Portfolio Standard
RTF	Regional Technical Forum
SEM	Strategic Energy Management
TRC	Total Resource Cost
US EIA	United State Energy Information Administration
WA EIA	Washington State Energy Independence Act

Appendix II: Glossary

Achievable Technical Potential	Conservation potential that includes considerations of market barriers and programmatic constraints but not cost effectiveness. This is a subset of technical potential.
Average Megawatt (aMW)	An average hourly usage of electricity, measured in megawatts, across the hours of a day, month, or year
Avoided Cost	The costs avoided through the acquisition of energy efficiency
Cost Effective	A measure is described as cost effective when the present value of its benefits exceeds the present value of its costs
Economic Potential	Conservation potential that passes a cost-effectiveness test. This is a subset of achievable potential. Per the WA EIA, a Total Resource Cost (TRC) test is used.
Levelized Cost	A measure of costs when they are spread over the life of the measure, similar to a car payment. Levelized costs enable the comparison of resources with different useful lifetimes.
Megawatt (MW)	A unity of demand equal to 1,000 kilowatts (kW)
Renewable Portfolio Standard	A requirement that a certain percentage of a utility's portfolio come from renewable resources. In 2020, Washington utilities with more than 25,000 customers are required to source 15% of their energy from renewable resources
Technical Potential	The set of possible conservation savings that includes all possible measures, regardless of market or cost barriers
Total Resource Cost (TRC) Test	A test for cost-effectiveness that considers all costs and benefits, regardless of who they accrue to. A measure passes this test if the present value of all benefits exceeds the present value of all costs. The TRC test is required by Washington's Energy Independence act and is the predominant cost effectiveness test used throughout the Northwest and US.

Appendix III: Compliance with State Requirements

This Appendix details the specific requirements for Conservation Potential Assessments listed in WAC 194-37-070. The table below lists the specific section and corresponding requirement along with a description of how the requirement is implemented in the model and where the implementation can be found.

Table 12: CPA Compliance

WAC 194-37-070 Section	Requirement	Implementation
(5)(a)	**Technical potential.** Determine the amount of conservation that is technically feasible, considering measures and the number of these measures that could physically be installed or implemented, without regard to achievability or cost.	The model calculates technical potential by multiplying the quantity of stock (number of homes, building floor area, industrial load) by the measure savings that could be installed per each unit of stock. The model further constrains the potential by the share of measures that have already been completed. See calculations in the "Units" tabs within each of the sector model files.
(5)(b)	**Achievable technical potential**. Determine the amount of the conservation technical potential that is available within the planning period, considering barriers to market penetration and the rate at which savings could be acquired.	The model applies maximum achievability factors based on the Council's 2021 Power Plan assumptions and ramp rates to identify how the potential can be acquired over the study period. See calculations in the "Units" tabs within each of the sector model files. The complete set of the ramp rates used is on the "Ramp Rates" tab.
(5)(c)	**Economic achievable potential**. Establish the economic achievable potential, which is the conservation potential that is cost-effective, reliable, and feasible, by comparing the total resource cost of conservation measures to the cost of other resources available to meet expected demand for electricity and capacity.	The project team used the benefit-cost ratio approach described in (5)(c)(ii), using the Council's ProCost model to calculate TRC benefit-cost ratios for each measure after updating ProCost with utility-specific inputs. The ProCost results are collected through an Excel macro in the "ProCost Measure Results-[sensitivity name].xlsx" files and brought into the CPA models through Excel's Power Query. See Appendix IV for further discussion of the avoided cost assumptions.
(5)(d)	**Total resource cost**. In determining economic achievable potential as provided in (c) of this subsection, perform a life-cycle cost analysis of measures or	A life-cycle cost analysis was performed using the Council's ProCost tool, which the project team configured with utility-specific inputs. Costs and benefits were included consistent with the TRC test.

WAC 194-37-070 Section	Requirement	Implementation
	programs to determine the net levelized cost, as described in this subsection:	The measure files within each sector contain the ProCost results. These results are then rolled up into the ProCost Measure Results file, which is linked to each sector model file.
(5)(d)(i)	Conduct a total resource cost analysis that assesses all costs and all benefits of conservation measures regardless of who pays the costs or receives the benefits;	The costs considered in the levelized cost include measure capital costs, O&M costs, periodic replacement costs, and any non-energy costs. Benefits included avoided energy, T&D capacity costs, avoided generation capacity costs, non-energy benefits, O&M savings, periodic replacement costs. Measure costs and benefits can be found in the individual measure files as well as the "ProCost Measure Results" file.
(5)(d)(ii)	Include the incremental savings and incremental costs of measures and replacement measures where resources or measures have different measure lifetimes;	Assumed savings, cost, and measure lifetimes are based on 2021 Power Plan and subsequent RTF updates, where applicable. Measure costs and benefits can be found in the individual measure files as well as the "ProCost Measure Results" files.
(5)(d)(iii)	Calculate the value of the energy saved based on when it is saved. In performing this calculation, use time differentiated avoided costs to conduct the analysis that determines the financial value of energy saved through conservation	The project team used a 20-year forecast of monthly on- and off-peak market prices and the load shapes developed for the 2021 Power Plan as part of the economic analysis conducted in ProCost. "MC and Loadshape" files contain both the market price forecast and the library of load shapes. Individual measure files contain the load profile assignments.
(5)(d)(iv)	Include the increase or decrease in annual or periodic operations and maintenance costs due to conservation measures	Measure analyses include changes to O&M costs as well as periodic replacement costs, where applicable. Measure assumptions can be found in the individual measure files.
(5)(d)(v)	Include avoided energy costs equal to a forecast of regional market prices, which represents the cost of the next increment of available and reliable power supply	The project team incorporated a 20-year forecast of on- and off-peak market prices at the mid-Columbia trading hub based on

WAC 194-37-070 Section	Requirement	Implementation
	available to the utility for the life of the energy efficiency measures to which it is compared	available forward prices. Further discussion of this forecast can be found in Appendix IV. See the “MC and Loadshape” file for the market prices. These prices include the value of avoided REC purchases as applicable.
(5)(d)(vi)	Include deferred capacity expansion benefits for transmission and distribution systems	Deferred transmission and distribution system benefits are based on the values developed by the Council for the 2021 Power Plan. These values can be found on the “ProData” tab of the ProCost files, cells C50 and C54.
(5)(d)(vii)	Include deferred generation benefits consistent with the contribution to system peak capacity of the conservation measure	Deferred generation capacity expansion benefits are based on monthly demand costs, which represents the utility cost of capacity. The development of these values is discussed in Appendix IV. These values can be found on the “ProData” tab of the ProCost files, cells C60.
(5)(d)(viii)	Include the social cost of carbon emissions from avoided non-conservation resources	This assessment uses the social cost of carbon values determined by the federal Interagency Workgroup using a 2.5% discount rate, as required by the Clean Energy Transformation Act. The carbon costs can be found in the MC and Loadshape file.
(5)(d)(ix)	Include a risk mitigation credit to reflect the additional value of conservation, not otherwise accounted for in other inputs, in reducing risk associated with costs of avoided non-conservation resources	This analysis uses a sensitivity analysis to consider risk. Avoided cost values with uncertain future values were varied across three different sensitivity and the resulting variation and risk were analyzed. The Sensitivity Results section of this report discusses the inputs used and the implicit risk adders used in the analysis.
(5)(d)(x)	Include all non-energy impacts that a resource or measure may provide that can be quantified and monetized	All quantifiable non-energy benefits were included where appropriate, based on values from the Council’s 2021 Power Plan materials and updates from the RTF. Measure assumptions can be found in the individual measure files.

WAC 194-37-070 Section	Requirement	Implementation
(5)(d)(xi)	Include an estimate of program administrative costs	This assessment uses the Council's assumption of administrative costs equal to 20% of measure capital costs. Program admin costs can be found in the "ProData" tab of the ProCost file, cell C29.
(5)(d)(xii)	Include the cost of financing measures using the capital costs of the entity that is expected to pay for the measure	This assessment utilizes the financing cost assumptions from the 2021 Power Plan materials, including the sector-specific cost shares and cost of capital assumptions. Financing assumptions can be found in the ProData tab of the ProCost batch runner files, cells C37:F46.
(5)(d)(xiii)	Discount future costs and benefits at a discount rate equal to the discount rate used by the utility in evaluating non-conservation resources	This assessment uses a real discount rate of 4.5% to determine the present value of all costs and benefits. This represents the utility's long-term cost of capital. The discount rate used in this analysis can be found in the ProCost file, on cell C27 of the ProData tab.
(5)(d)(xiv)	Include a ten percent bonus for the energy and capacity benefits of conservation measures as defined in 16 U.S.C. § 839a of the Pacific Northwest Electric Power Planning and Conservation Act	A 10% bonus is applied consistent with the NW Power Act. The 10% credit used in the measure analyses can be found in the ProCost files, on cell C29 of the ProData tab.

Appendix IV: Avoided Costs

The methodology used to conduct conservation potential assessments for electric utilities in the State of Washington is dictated by the requirements of the Energy Independence Act (WA EIA) and the Clean Energy Transformation Act (CETA). Specifically, WAC 194-37-070 requires utilities to determine the economic, or cost-effective, potential by "comparing the total resource cost of conservation measures to the total cost of other resources available to meet expected demand for electricity and capacity."[8] The CPA will determine the cost-effectiveness of conservation measures through a benefit-cost ratio approach, which uses the avoided costs of energy efficiency to represent the costs avoided by acquiring efficiency instead of other resources. Washington's EIA specifies that these avoided costs applied to energy efficiency measures include the following components:

- Time-differentiated energy costs equal to a forecast of regional market prices
- Deferred capacity expansion costs for the transmission and distribution system
- Deferred generation capacity costs consistent with each measure's contribution to system peak capacity savings
- The social cost of carbon emissions from avoided non-conservation resources
- A risk mitigation credit to reflect the additional value of conservation not accounted for in other inputs
- A 10% bonus for energy and capacity benefits of conservation measures, as defined by the Pacific Northwest Electric Power Planning and Conservation Act

In addition to these requirements, Washington's CETA requires the use of specific values for the social cost of carbon.[9] The project team has also included the value of avoided renewable portfolio standard compliance costs as energy efficiency can reduce these costs.

The CETA requirements for demand response potential assessments are less specific but do clarify that utilities must assess potential for demand response that is "cost-effective, reliable, and feasible"[10], and targets should be consistent with the utility's resource plan for distributed resources (such as energy efficiency). Therefore, the project team relied on the same avoided cost inputs for the DRPA as the CPA when the values were applicable.

This memo discusses each of these inputs in detail in the following sections.

Avoided Energy Costs

Avoided energy costs are the energy costs avoided by Clark Public Utilities through the acquisition of energy efficiency instead of supply-side resources. For every megawatt-hour of conservation achieved, Clark Public Utilities can avoid the purchase of one megawatt-hour of energy or sell one additional megawatt-hour of excess energy.

[8] WAC 194-37-070. Accessed January 20, 2021. https://app.leg.wa.gov/wac/default.aspx?cite=194-37-070
[9] WAC 194-40-100. Accessed March 7, 2023. https://app.leg.wa.gov/WAC/default.aspx?cite=194-40-100
[10] WAC 194-40-330. Accessed May 7, 2025. https://app.leg.wa.gov/wac/default.aspx?cite=194-40-330

For this CPA, Clark Public Utilities provided a forecast of monthly on- and off-peak energy prices at the Mid-Columbia trading hub from The Energy Authority (TEA). The forecast was prepared in April 2025, and the prices cover a period extending to December of 2035.

To benchmark these prices, the project team compared them to monthly on- and off-peak price futures for the Mid-Columbia trading hub reported by the Intercontinental Exchange on April 4, 2025. Comparisons of the two sources are shown in Figure 27 and Figure 28. While there are some small differences, the prices are nearly identical. The small differences are expected based on the small difference in the date on which the forecasts were prepared.

Figure 27: Benchmarking of On-Peak Prices

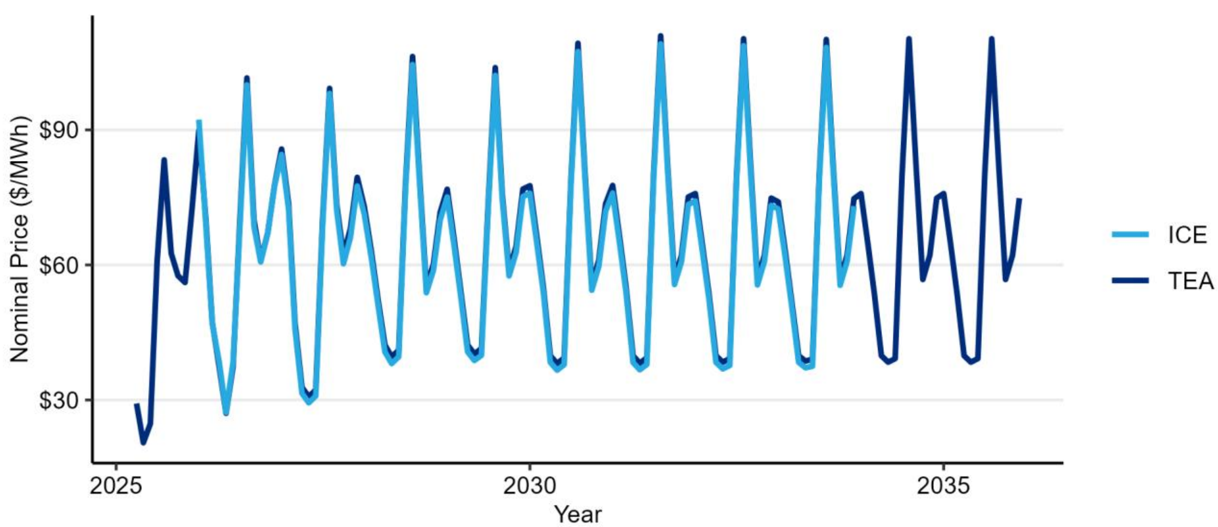
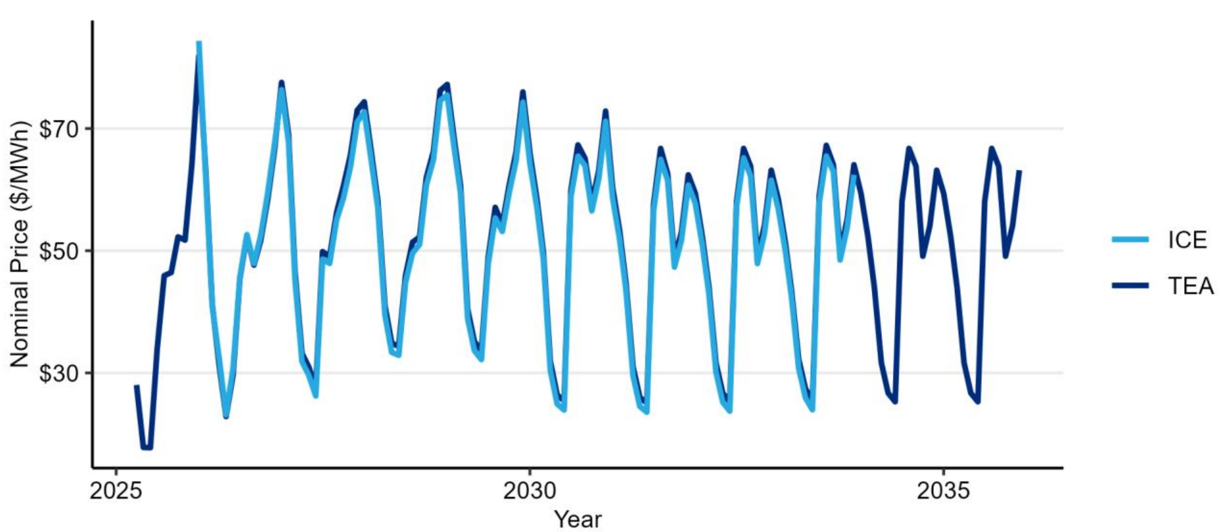


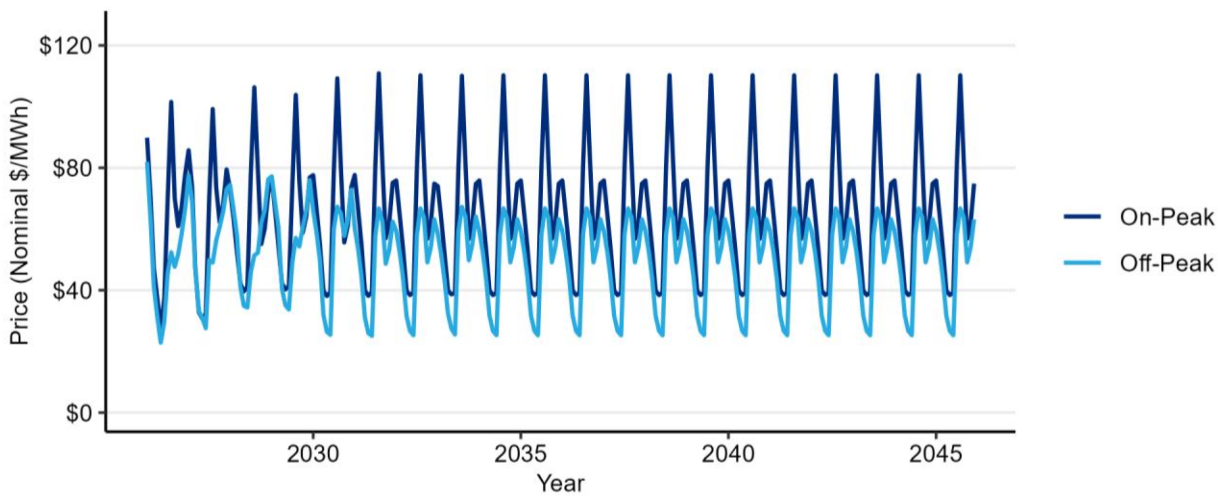
Figure 28: Benchmarking of Off-Peak Prices



To develop a forecast that covers the full 20-year study period of this CPA, the project team extended the forecast through 2045. After reviewing market price forecasts from other utilities, including Puget

Sound Energy[11], Pacific Power[12], and the market prices used for energy efficiency in Oregon[13], the project team extended the forecast by extending the values from 2035. Figure 29 shows the resulting on- and off-peak prices resulting from this process.

Figure 29: On- and Off-Peak Price Forecast



These values will ultimately be converted to 2016 dollars for consistency with the measure cost assumptions used in the 2021 Power Plan, which are also expressed in 2016 dollars. The levelized value of the 20-year price forecast is $39/MWh (2016$), down significantly from the $52/MWh (2016$) levelized value from Clark Public Utilities' 2023 CPA.

The project team also created high and low variations of this forecast to be used in a sensitivity analysis, since the actual future values of these prices are uncertain. To develop the forecast, the project team assumed that the high and low prices would vary by approximately 20% in the near term and 80% in the long term, relative to the base case price forecast. A similar approach was used in Clark Public Utilities' prior CPA, which was based on the variation observed in price forecasts in the 2021 Power Plan. The project team applied this variation to the forecast described above to create high and low forecasts. The resulting forecasts for on- and off-peak prices are shown in

[11] https://www.pse.com/-/media/PDFs/IRP/2023/electric/chapters/05_EPR23_Ch5_Final.pdf
[12] https://www.pacificorp.com/energy/integrated-resource-plan/support.html
[13] https://edocs.puc.state.or.us/efdocs/HAU/um1893hau334281025.pdf

Figure 30 and

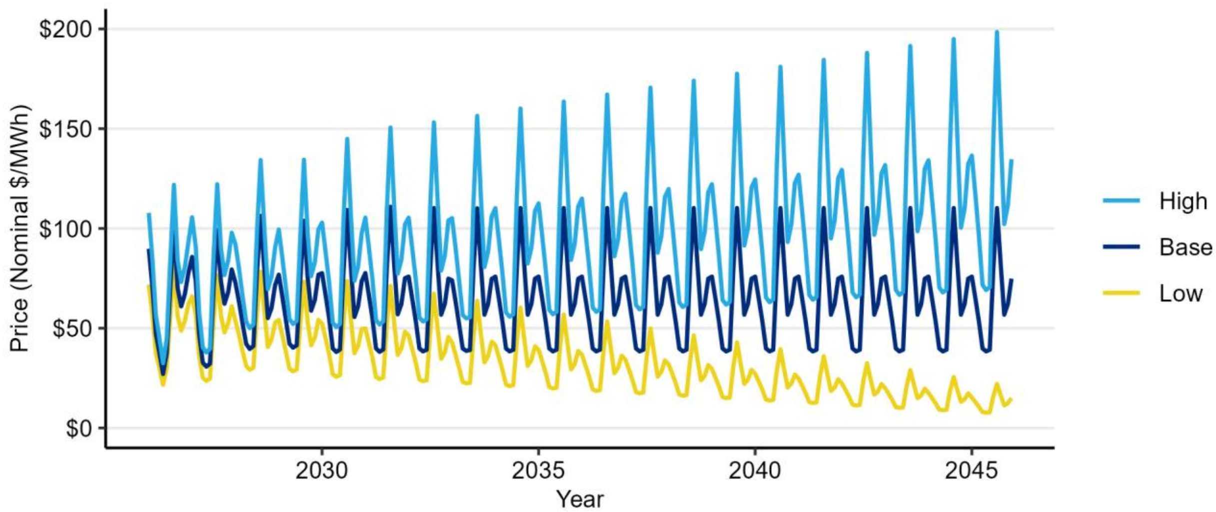


Figure 31 below.

Figure 30: Comparison of On-Peak Price Sensitivities

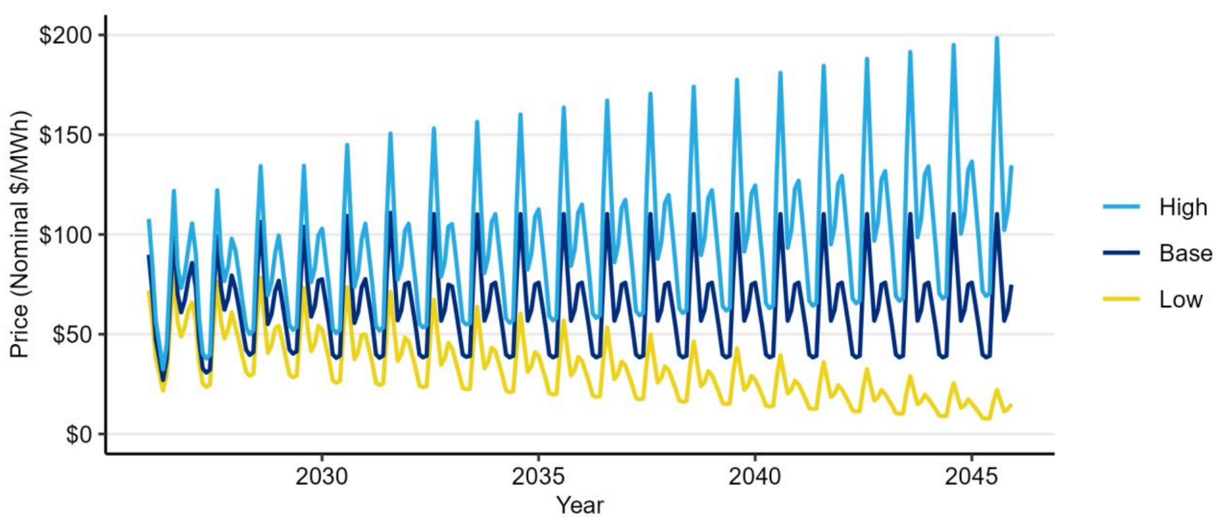
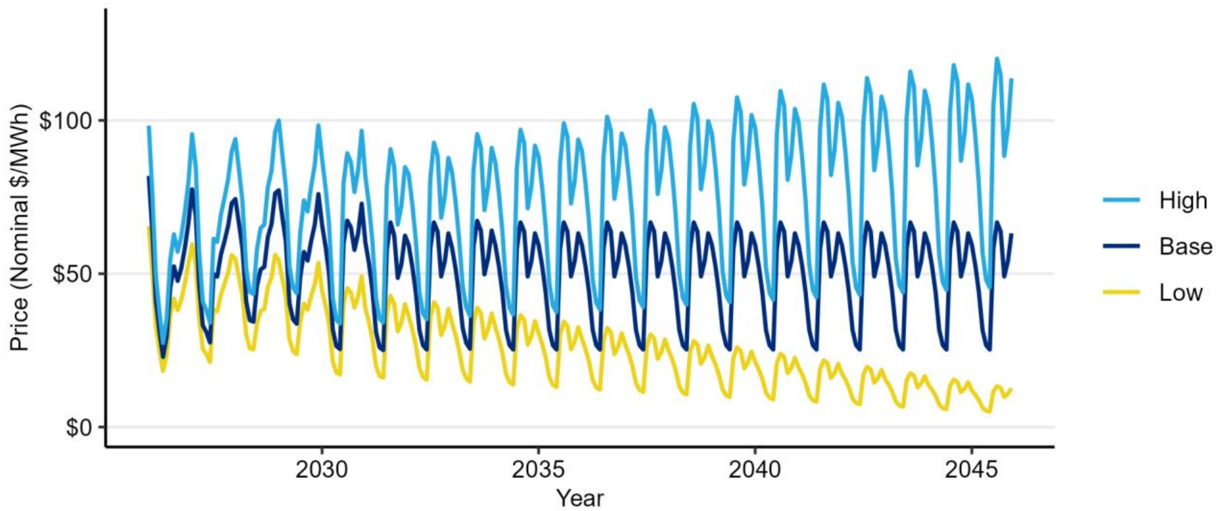


Figure 31: Comparison of Off-Peak Price Sensitivities



Deferred Transmission and Distribution Capacity Costs

Unlike supply-side resources, energy efficiency and demand response do not require transmission and distribution infrastructure. Instead, these resources free up capacity in these systems by reducing the peak demands and, over time, can help defer or avoid future capacity expansions and the associated capital costs.

In the development of the 2021 Power Plan, the Council developed a standardized methodology and surveyed the region to calculate these values. This CPA and DRPA use the values developed by the Council through that process: $3.54 and $7.82 per kW-year (2016$) for transmission and distribution capacity, respectively. These values were used in Clark Public Utilities' 2023 CPA.

While the Council has prepared draft updates to these values as part of the 9th Power Plan, the draft values are based on utility provided data that is heavily weighted by several larger utilities with transmission and distribution infrastructure needs that may not be representative of Clark Public Utilities. Given this, Clark Public Utilities is electing to continue using the 2021 Plan values until the 9th plan values are finalized, or additional Clark Public Utilities specific data can be used to inform this assumption.

These values are applied to energy efficiency and demand response measures based on each measure's reduction in demand that is coincident with the timing of the transmission and distribution system peaks.

Deferred Generation Capacity Costs

Similar to the transmission and distribution systems discussed above, acquiring energy efficiency and demand response resources can also defer or eliminate the costs of new generation resources needed to meet peak demands for electricity.

In this CPA, Clark Public Utilities value of capacity has changed as the utility is now a load following customer of BPA. Accordingly, the project team used BPA's monthly demand charges as proxy costs for the value of capacity and converted the monthly demand charges to an annual generation capacity value using assumptions about energy efficiency capacity contributions by month.

In the base case, the project team assumed that these demand charges would increase by 1.6% each year, consistent with the growth rate observed in recent years, and calculated a 20-year series of annual generation capacity values which were then levelized to calculate the single value that is required for the Council's ProCost model. This resulted in a base case value of $75/kW-year (2016$). For the low case, no price escalation was assumed, resulting in a value of $65/kW-year. In the high case, the project team used Council's 2021 Power Plan value, which is $123/kW-year. This value reflects the levelized cost of capacity for a battery storage system and includes expected future cost decreases.

In the DRPA, BPA's monthly values for generation capacity were used directly and applied during the months in which demand response events were likely to be called.

Social Cost of Carbon

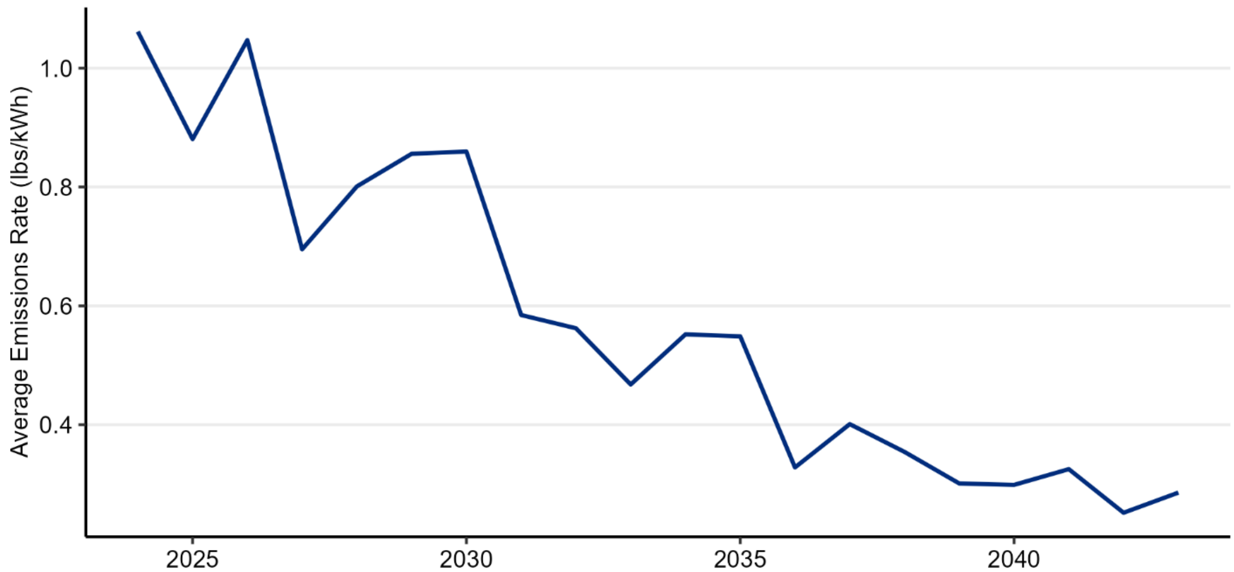
In addition to avoiding purchases of energy and capacity, energy efficiency measures can avoid emissions of greenhouse gases like carbon dioxide. Washington's EIA requires that CPAs include the social cost of carbon, which the US EPA defines as a measure of the long-term damage done by a ton of carbon dioxide emissions in a given year. The EPA describes it as including, among other things, changes in agricultural productivity, human health, property damage from increased flood risk, and changes in energy system costs, including increases in the costs of cooling and decreases in heating costs.[14] In addition to this requirement, Washington's CETA requires that utilities use the social cost of carbon values developed by the federal Interagency workgroup using a 2.5% discount rate.

Washington's Climate Commitment Act (CCA) requires all electricity imported into the state, including energy purchased from the Mid-Columbia trading hub, to be carbon-free or include emissions allowances. Based on this, the price forecasts discussed above may already include some cost of carbon embedded in the prices. Electric utilities also receive no cost allowances under the CCA based on their forecasted emissions. These no cost allowances could be considered to offset any carbon costs included in the market prices. Because the CCA made no changes to CETA's requirement to include specific social cost of carbon values, this CPA used the CETA-required values in all scenarios.

To implement the cost of carbon emissions, additional assumptions must be made about the intensity of carbon emissions per unit of energy. This assessment uses an updated forecast of marginal emissions rates developed by the Council in 2024.[15] The average annual values from this analysis are shown in Figure 32 below. The values start near 1, which is approximately the emissions rate from natural gas turbines and declines over time as the generation resource pool shifts to clean resources over time.

[14] https://www.epa.gov/sites/production/files/2016-12/documents/social_cost_of_carbon_fact_sheet.pdf. Accessed January 21, 2021.
[15] https://nwcouncil.app.box.com/s/m2877jpsigx2m3mv0u401wtfle0t5z8y

Figure 32: Council Marginal Emissions Rate Forecast



Renewable Portfolio Standard Compliance Costs

The renewable portfolio standard established under Washington's EIA requires that Clark Public Utilities source 15% of retail sales from renewable resources. The subsequently passed CETA furthers these requirements, mandating that 100% of sales be greenhouse gas neutral in 2030, with an allowance that up to 20% of the requirement can be achieved through other options, such as the purchase of Renewable Energy Credits (RECs).

Energy efficiency can reduce the cost of complying with these requirements by reducing Clark Public Utilities' overall load. In 2026, a reduction in load of 100 MWh through energy efficiency would reduce the number of RECs required for compliance by 15. Therefore, one megawatt-hour of energy savings is equal to 15% of the cost of a REC. In 2030, it was assumed that marginal energy purchases would also include the purchase of a REC, thus the full price of a REC was added to the energy price after 2030. In 2045, the last year of the study period, CETA's requirements change, and unbundled RECs are no longer allowed for compliance. However, the combination of market prices and RECs represents a reasonable proxy for clean energy resources.

The project team developed a forecast of REC prices based on input from several Washington utility clients.

Risk Mitigation Credit

Any purchase of a resource involves risk. The decision to invest is based on uncertain forecasts of loads and market conditions. Investing in energy efficiency can reduce the risks that utilities face by the fact that it is made in small increments over time, rather than the large, singular sums required for generation resources. A decision not to invest in energy efficiency could result in exposure to higher market prices than forecast, an unneeded infrastructure investment, or one that cannot economically dispatch due to low market prices. While over-investments in energy efficiency are possible, the small and discrete amounts invested in energy efficiency limit the scale of any exposure to this risk.

In its power planning work, the Council develops a risk mitigation credit to account for this risk. This credit accounts for the value of energy efficiency not explicitly included in the other avoided cost values, ensuring that the level of cost-effective energy efficiency is consistent with the outcomes of the power planning process. The credit is determined by identifying the value that results in a level of cost-effective energy efficiency potential that is equivalent to the regional targets set by the Council.

In the 2021 Power Plan, the Council determined that no risk credit was necessary after including carbon costs and a generation capacity value in its avoided cost.

This CPA follows the process used in Clark Public Utilities' previous CPAs and is similar to the process followed by the Council. A sensitivity analysis is used to account for uncertainty in the avoided cost values applied to energy efficiency measures, where present. The variation in energy and capacity values covers a range of possible outcomes and the sensitivity of the cost-effective energy efficiency potential is identified by comparing the outcomes of each sensitivity. In selecting its biennial target based on this range of outcomes, Clark Public Utilities is selecting its preferred risk strategy and the associated risk credit.

Northwest Power Act Credit

Finally, this CPA includes a 10% cost credit for energy efficiency. This credit is specified in the Pacific Northwest Electric Power Planning and Conservation Act for regional power planning work completed by the Council and by Washington's EIA for CPAs completed for Washington utilities. This credit is applied as a 10% bonus to the energy and capacity benefits described above.

Summary

Table 13 summarizes the energy efficiency avoided cost assumptions used in each of the sensitivities in this CPA update.

Table 13: Energy Efficiency Avoided Cost Assumptions by Sensitivity

		Low Sensitivity	Base Case	High Sensitivity
Energy Values	**Avoided Energy Costs (20-Year Levelized Price, 2016$/MWh)**	Market Forecast minus 20%-80% ($22)	Market Forecast ($39)	Market Forecast plus 20%-80% ($57)
	Social Cost CO_2	Federal 2.5% Discount Rate Values	Federal 2.5% Discount Rate Values	Federal 2.5% Discount Rate Values
	RPS Compliance	WA EIA & CETA Requirements	WA EIA & CETA Requirements	WA EIA & CETA Requirements
Capacity Values	**Distribution Capacity (2016$)**	$7.82/kW-year	$7.82/kW-year	$7.82/kW-year
	Transmission Capacity (2016$)	$3.54/kW-year	$3.54/kW-year	$3.54/kW-year

Generation Capacity (2016$)	$65/kW-year	$75/kW-year	$123/kW-year
Implied Risk Adder (2016$)	-$12/MWh -$10/kW-year	N/A	$12/MWh $48/kW-year
NW Power Act Credit	10%	10%	10%

Appendix V: Measure List

This appendix provides a list of the measures that were included in this assessment and the data sources that were used for any measure characteristics. The assessment used all measures from the 2021 Power Plan that were applicable to Clark Public Utilities. The project team customized these measures to make them specific to Clark Public Utilities' service territory and updated many with new information available from the Regional Technical Forum. The RTF continually updates estimates of measure savings and cost. This assessment used the most up to date information available when the CPA was developed.

This list is high-level and does not reflect the thousands of variations for each individual measure. Instead, it summarizes measures by category. Many measures include variations specific to different home or building types, efficiency level, or other characterization. For example, attic insulation measures are differentiated by home type (e.g., single family, multifamily, manufactured home), heating system (e.g., heat pump or furnace), baseline insulation level (e.g., R0, R11, etc.) and maximum insulation possible (e.g., R22, R30, R38, R49). This differentiation allows for savings and cost estimates to be more precise.

The measure list is grouped by sector and end use. Note that all measures may not be applicable to an individual utility service territory based on the characteristics of individual utilities and their customer sectors.

Table 14: Residential End Uses and Measures

End Use	Measure Category	Data Source(s)
Appliances	Air Cleaner	2021 Power Plan, RTF
	Clothes Washer	2021 Power Plan, RTF
	Clothes Dryer	2021 Power Plan, RTF
	Freezer	2021 Power Plan, RTF
	Refrigerator	2021 Power Plan, RTF
Cooking	Electric Oven	2021 Power Plan
	Microwave	2021 Power Plan
Electronics	Advanced Power Strips	2021 Power Plan, RTF
	Desktop	2021 Power Plan
	Laptop	2021 Power Plan
	Monitor	2021 Power Plan
	TV	2021 Power Plan
EVSE	EVSE	2021 Power Plan
HVAC	Air Source Heat Pump	2021 Power Plan, RTF
	Central Air Conditioner	2021 Power Plan, RTF
	Cellular Shades	2021 Power Plan
	Circulator	2021 Power Plan
	Circulator Controls	2021 Power Plan
	Ductless Heat Pump	2021 Power Plan, RTF
	Duct Sealing	2021 Power Plan, RTF
	Ground Source Heat Pump	2021 Power Plan
	Heat Recovery Ventilator	2021 Power Plan
	Room Air Conditioner	2021 Power Plan
	Smart Thermostats	2021 Power Plan, RTF
	Weatherization	2021 Power Plan, RTF
	Whole House Fan	2021 Power Plan
Lighting	Fixtures	2021 Power Plan, RTF
	Lamps	2021 Power Plan, RTF
	Pin Lamps	2021 Power Plan, RTF
Motors	Well Pump	2021 Power Plan
Water Heat	Aerators	2021 Power Plan, RTF
	Circulator	2021 Power Plan
	Circulator Controls	2021 Power Plan
	Dishwasher	2021 Power Plan
	Gravity Film Heat Exchanger	2021 Power Plan
	Heat Pump Water Heater	2021 Power Plan, RTF
	Pipe Insulation	2021 Power Plan
	Showerhead	2021 Power Plan
	Thermostatic Restrictor Valve	2021 Power Plan, RTF
Whole Home	Behavior	2021 Power Plan

Table 15: Commercial End Uses and Measures

End Use	Measure Category	Data Source(s)
Compressed Air	Air Compressor	2021 Power Plan
Electronics	Computers	2021 Power Plan
	Power Supplies	2021 Power Plan
	Smart Power Strips	2021 Power Plan, RTF
	Servers	2021 Power Plan
Food Preparation	Combination Ovens	2021 Power Plan, RTF
	Convection Ovens	2021 Power Plan, RTF
	Fryers	2021 Power Plan, RTF
	Griddle	2021 Power Plan, RTF
	Hot Food Holding Cabinet	2021 Power Plan, RTF
	Overwrapper	2021 Power Plan, RTF
	Steamer	2021 Power Plan, RTF
HVAC	Advanced Rooftop Controller	2021 Power Plan, RTF
	Chiller	2021 Power Plan
	Circulation Pumps	2021 Power Plan, RTF
	Ductless Heat Pump	2021 Power Plan, DHP
	Energy Management	2021 Power Plan
	Fans	2021 Power Plan
	Heat Pumps	2021 Power Plan
	Package Terminal Heat Pumps	2021 Power Plan, RTF
	Pumps	2021 Power Plan, RTF
	Smart Thermostats	2021 Power Plan
	Unitary Air Conditioners	2021 Power Plan
	Very High Efficiency Dedicated Outside Air System	2021 Power Plan
	Variable Refrigerant Flow Dedicated Outside Air System	2021 Power Plan
	Windows	2021 Power Plan, RTF
Lighting	Exit Signs	2021 Power Plan
	Exterior Lighting	2021 Power Plan
	Garage Lighting	2021 Power Plan
	Interior Lighting	2021 Power Plan
	Stairwell Lighting	2021 Power Plan
	Streetlights	2021 Power Plan
Motors & Drives	Pumps	2021 Power Plan, RTF
Process Loads	Elevators	2021 Power Plan
	Engine Block Heater	2021 Power Plan, RTF
Refrigeration	Freezer	2021 Power Plan
	Grocery Refrigeration	2021 Power Plan, RTF
	Ice Maker	2021 Power Plan, RTF
	Refrigerator	2021 Power Plan, RTF
	Vending Machine	2021 Power Plan, RTF
	Water Cooler Controls	2021 Power Plan
Water Heating	Commercial Clothes Washer	2021 Power Plan, RTF
	Heat Pump Water Heater	2021 Power Plan, RTF
	Pre-Rinse Spray Valve	2021 Power Plan, RTF
	Pumps	2021 Power Plan, RTF
	Showerheads	2021 Power Plan

Table 16: Industrial End Uses and Measures

End Use	Measure Category	Data Source(s)
All Electric	Energy Management	2021 Power Plan
	Forklift Charger	2021 Power Plan
	Water/Wastewater	2021 Power Plan
Compressed Air	Air Compressor	2021 Power Plan
	Air Compressors	2021 Power Plan
	Compressed Air Demand Reduction	2021 Power Plan
Fans and Blowers	Fan Optimization	2021 Power Plan
	Fans	2021 Power Plan, RTF
HVAC	HVAC	2021 Power Plan
Lighting	High Bay Lighting	2021 Power Plan
	Lighting	2021 Power Plan
	Lighting Controls	2021 Power Plan
Low Temp Refer	Motors	2021 Power Plan
	Refrigeration Retrofit	2021 Power Plan
Material Handling	Motors	2021 Power Plan
	Paper	2021 Power Plan
	Wood Products	2021 Power Plan
Material Processing	Hi-Tech	2021 Power Plan
	Motors	2021 Power Plan
	Paper	2021 Power Plan
	Pulp	2021 Power Plan
	Wood Products	2021 Power Plan
Med Temp Refer	Food Storage	2021 Power Plan
	Motors	2021 Power Plan
	Refrigeration Retrofit	2021 Power Plan
Melting and Casting	Metals	2021 Power Plan
Other	Pulp	2021 Power Plan
Other Motors	Motors	2021 Power Plan
Pollution Control	Motors	2021 Power Plan
Pumps	Pulp	2021 Power Plan
	Pump Optimization	2021 Power Plan
	Pumps	2021 Power Plan, RTF

Table 17: Utility Distribution End Uses and Measures

End Use	Measure Category	Data Source
Distribution	Line Drop Control with no Voltage/VAR Optimization	2021 Power Plan
	Line Drop Control with Voltage Optimization & AMI	2021 Power Plan

Appendix VI: Cost-Effective Energy Efficiency Potential by End Use

Table 18: Cost-Effective Residential Potential by End Use (aMW)

End Use	2-Year	4-Year	10-Year	20-Year
Appliances	0.30	0.74	2.65	5.54
Cooking	0.00	0.01	0.06	0.33
Electronics	0.01	0.05	0.69	2.31
EVSE	0.00	0.00	0.00	0.00
HVAC	0.48	1.11	4.35	11.68
Lighting	0.05	0.15	0.88	3.74
Motors	0.00	0.00	0.00	0.00
Water Heat	0.21	0.60	3.36	11.08
Whole Home	4.73	4.73	4.73	4.73
Total	**5.78**	**7.38**	**16.72**	**39.40**

Table 19: Cost-Effective Commercial Potential by End Use (aMW)

End Use	2-Year	4-Year	10-Year	20-Year
Compressed Air	0.00	0.00	0.05	0.23
Electronics	0.03	0.11	1.00	1.42
Food Preparation	0.01	0.02	0.09	0.22
HVAC	0.45	1.18	4.76	10.35
Lighting	1.10	2.15	4.37	6.58
Motors/Drives	0.02	0.08	0.59	1.58
Process Loads	0.00	0.00	0.00	0.00
Refrigeration	0.23	0.71	3.32	5.47
Water Heat	0.00	0.02	0.14	0.62
Total	**1.84**	**4.28**	**14.32**	**26.48**

Table 20: Cost-Effective Industrial Potential by End Use (aMW)

End Use	2-Year	4-Year	10-Year	20-Year
All Electric	0.39	1.11	4.11	5.09
Compressed Air	0.15	0.32	0.72	1.05
Fans and Blowers	0.08	0.21	0.90	2.35
HVAC	0.10	0.20	0.33	0.36
Lighting	0.73	1.25	2.09	2.36
Low Temp Refer	0.00	0.01	0.10	0.25
Material Handling	0.02	0.05	0.14	0.29
Material Processing	0.13	0.25	0.46	0.61
Med Temp Refer	0.01	0.02	0.13	0.30
Melting and Casting	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00
Other Motors	0.00	0.00	0.02	0.06
Pollution Control	0.00	0.00	0.00	0.01
Pumps	0.05	0.20	1.72	5.21
Total	**1.67**	**3.62**	**10.73**	**17.93**

Table 21: Cost-Effective Utility Distribution Efficiency by End Use (aMW)

End Use	2-Year	4-Year	10-Year	20-Year
LDC with no VVO	0.01	0.05	0.50	1.49
LDC with VVO & AMI	0.08	0.31	3.33	9.79
Total	**0.09**	**0.36**	**3.83**	**11.28**

Appendix VII: Ramp Rate Alignment Documentation

This appendix documents the application of ramp rates in Clark Public Utilities' 2025 Conservation Potential Assessment (CPA), developed by Lighthouse Energy Consulting and Nauvoo Solutions (the project team). Ramp rates are annual values that approximate the portion of technical potential that can be realistically achieved in each year. For example, all unweatherized homes in Clark Public Utilities' service territory could theoretically be weatherized in a single year. However, program budgets, workforce availability, and other dynamics make this impractical. As a result, only a percentage of homes could realistically be weatherized in a single year.

For equipment measures like clothes washers, upgrading to more efficient equipment is most likely to occur when the equipment reaches the end of its life and needs to be replaced. Therefore, ramp rates for equipment measures reflect the share of equipment turning over in a given year that is replaced with a more efficient model.

The ramp rates used in this study are based on those used in the 2021 Power Plan but were updated to reflect the fact that some time has elapsed since the 2021 Power Plan. The project team assigned ramp rates that align the near-term cost-effective potential quantified in the CPA with the recent and expected achievements of Clark Public Utilities' energy efficiency programs. Under both CETA and WA EIA, utilities are required to pursue all conservation that is cost-effective, reliable, and achievable. Therefore, the ramp rates in this study are designed to ensure that the near-term potential is feasible and achievable for Clark Public Utilities' programs and the measures considered for adoption meet regulatory cost-effectiveness criteria.

Ramp Rate Alignment Process

Clark Public Utilities staff provided recent program achievement data, which the project team summarized by sector and end use. For the residential sector, the project team further classified program achievements by high-level measure categories.

Additionally, Clark Public Utilities benefits from the regional market transformation work of the Northwest Energy Efficiency Alliance (NEEA). To reflect this, the project team incorporated estimated energy efficiency savings from NEEA market transformation activity occurring in Clark Public Utilities' service territory. These savings were allocated across sectors, end uses, and measure categories based on recent reporting of NEEA's regional savings.

The project team compared the recent savings from Clark Public Utilities' programs and NEEA's market transformation initiatives with the initial estimates of the cost-effective energy efficiency potential identified in the CPA. The project team made changes to the assigned ramp rates to accelerate or decelerate the forecasted pace of savings acquisition to align future savings potential with recent programmatic achievements. Areas where there were little to no recent program achievements typically have a slow ramp rate applied to account for the fact that a program may need to build momentum over several years.

The following tables show how Clark Public Utilities' recent programmatic achievements and allocated NEEA market transformation savings compare to the potential estimated to be cost-effective after adjusting the ramp rates. Color scaling has been applied to highlight the larger values. Discussion follows each table with additional detail.

Residential

Table 22 shows how residential potential was aligned with recent achievements by measure category.

Note that ramp rate choices are discrete and may not provide exact alignment. The overall goal is to achieve a general alignment across end uses and measure.

Table 22: Residential Program History and Potential by Measure Category (MWh)

		Program History		CPA Cost-Effective Potential			
End Use	**Category**	**2023**	**2024**	**2026**	**2027**	**2028**	**2029**
Appliances	Clothes Washer	758	969	498	684	857	1,012
Appliances	Dryer	347	515	282	385	482	569
Appliances	Freezer	-	-	5	9	15	25
Appliances	Refrigerator	452	551	335	402	455	501
Cooking	Microwave	-	-	3	7	11	18
Cooking	Oven	-	-	0	1	2	3
Electronics	Advanced Power Strips	2	3	-	-	-	-
Electronics	Desktop	62	76	-	-	-	-
Electronics	Laptop	-	-	5	9	16	27
Electronics	TV	-	-	36	70	119	190
EVSE	EVSE	59	76	-	-	-	-
HVAC	ASHP	1,237	1,351	1,055	1,080	1,097	1,116
HVAC	Circulator	-	-	0	0	0	1
HVAC	Circulator Controls	-	-	0	0	0	0
HVAC	DHP	1,340	1,460	-	-	-	-
HVAC	Duct Sealing	2	2	138	224	341	488
HVAC	Room AC	3	4	-	-	-	-
HVAC	Thermostat	224	186	173	351	596	916
HVAC	Weatherization	940	1,256	629	542	503	442
Lighting	Fixtures	-	-	200	270	351	453
Water Heat	Circulator	-	-	1	2	4	6
Water Heat	Circulator Controls	-	-	1	2	3	4
Water Heat	Dishwasher	-	-	1	2	3	5
Water Heat	HPWH	964	1,020	708	1,065	1,411	1,840
Water Heat	TSRV	-	-	19	34	55	85
Whole Home	Behavior	21,911	21,739	21,735	19,665	-	-
	Total	**28,303**	**29,207**	**25,824**	**24,804**	**6,320**	**7,697**

Note: For clarity, in the table above, measure categories with no program achievements and no cost-effective potential have been removed. In addition, note that some measures have savings values that are small and cannot be shown at this level of resolution. These values show as 0 in this and following tables while a true zero value is shown as a dash.

The following sections discuss the alignment within each residential end use.

Appliances

In this end use, the majority of savings are from NEEA's market transformation initiatives with 5% coming from Clark Public Utilities' program activity. NEEA's work includes an initiative for retail products and appliances that contributes savings. The savings from this work typically grow over time as markets transform. Ramp rates were adjusted to align with the NEEA savings.

Cooking

Neither Clark Public Utilities nor NEEA have savings in this end use, so the measures—microwaves and ovens—were given slow ramp rates.

Electronics

Most of the historical savings in this end use come from NEEA's work advancing efficient desktop computers. The more efficient Energy Star desktop computer is not cost-effective and therefore not incorporated in the future potential. The Regional Technical Forum (RTF) has recently deactivated advanced power strips due to a lack of data and confidence in the savings, so the measure was removed from this CPA. Going forward, the cost-effective potential is associated with TVs and laptops. The project team slowed the ramp rate for these categories since there are no current Clark Public Utilities programs or NEEA initiatives that would address these measures.

HVAC

The HVAC category is Clark Public Utilities' second largest source of program savings in the past two years, and the top program measure include air source heat pumps (ASHP), ductless heat pumps (DHP), weatherization, and smart thermostats.

Measures in the HVAC end use are often expensive. Although ASHPs typically struggle to be cost-effective, the project team included the tax credits and incentives provided for heat pumps through the federal Inflation Reduction Act (IRA). While much of IRA has recently been repealed, program funding has already been distributed to the states. Including these federal credits and incentives improves the cost-effectiveness of ASHPs, particularly for income-qualified households, who are eligible for more substantial benefits.

None of the DHP measures were identified as cost effective after updating measure assumptions with recent RTF updates.

Additional cost-effective potential is available through smart thermostats, duct sealing, efficient central air conditioning systems, and weatherization, which were assigned ramp rates to align with Clark Public Utilities' recent program history.

Lighting

The lighting end use is now subject to product standards that cover many screw-in lamps. The potential that remains is in fixtures with integrated LEDs and less common bulb types. There is not currently a program to incentivize LED fixtures, so these measures were given a slower ramp rate.

Water Heat

The past savings in the water heating category are from heat pump water heaters, both from Clark Public Utilities' programs and NEEA's market transformation efforts.

Washington has state product standards for showerheads and aerators, so there is no potential in these categories. The project team applied slower ramp rates to the remaining measure categories with cost-effective potential, which includes circulator pumps and controls, dishwashers, and thermostatic restrictor valves (TSRV).

Whole Home

This category includes a residential behavior program. The ramp rates were adjusted to align with Clark Public Utilities' planned behavior program as much as possible.

Table 23 below summarizes the residential measure category results in Table 22 by end use. In addition, this table incorporates savings for new homes that do not align with categories included in the CPA but could be grouped in the "Whole Home" end use.

Table 23: Residential Program History and Potential by End Use (MWh)

	Program History		CPA Cost-Effective Potential			
End Use	**2023**	**2024**	**2026**	**2027**	**2028**	**2029**
Appliances	1,558	2,035	1,120	1,481	1,808	2,106
Cooking	-	-	4	8	13	21
Electronics	64	79	41	79	135	217
EVSE	59	76	-	-	-	-
HVAC	3,746	4,286	1,994	2,198	2,537	2,962
Lighting	-	-	200	270	351	453
Motors	-	-	-	-	-	-
Water Heat	964	1,020	729	1,104	1,476	1,940
Whole Home	22,353	22,225	21,735	19,665	-	-
Total	**28,744**	**29,720**	**25,824**	**24,804**	**6,320**	**7,697**

Commercial

In the commercial sector, Clark Public Utilities' historic accomplishments are for HVAC, lighting, and refrigeration projects. NEEA market transformation initiatives provide additional savings in lighting, HVAC, electronics, food preparation, motors, and process loads.

The greatest potential lies within lighting, HVAC, and refrigeration end uses, which are also the areas where Clark Public Utilities' programs achievements are the greatest. The ramp rates associated with these end uses were aligned as best as possible. All other end uses were generally given slower ramp rates to reflect the lower program activity in these areas.

Note that lighting in the commercial sector is impacted by Washington House Bill 1185's[16] ban on the sale of lighting products containing mercury, which includes fluorescent lighting. The ban takes effect in the second half of 2029. After this, much of the remaining lighting potential is associated with lighting controls and lighting technologies where fluorescent lighting is not the baseline technology.

[16]Accessed July 11, 2025. https://lawfilesext.leg.wa.gov/biennium/2023-24/Pdf/Bills/Session%20Laws/House/1185-S2.SL.pdf?q=20250714075226

Table 24 below shows the alignment of program history and potential in the commercial sector.

Table 24: Alignment of Commercial Program History and Potential by End Use (MWh)

	Program History		CPA Cost-Effective Potential			
End Use	**2023**	**2024**	**2026**	**2027**	**2028**	**2029**
Compressed Air	-	-	3	6	11	17
Electronics	161	196	80	158	278	447
Food Preparation	60	73	22	32	44	59
HVAC	1,793	4,538	1,710	2,212	2,818	3,605
Lighting	5,204	5,456	4,649	4,958	5,057	4,191
Motors/Drives	140	171	69	129	215	324
Process Loads	4	5	-	-	-	-
Refrigeration	2,592	1,256	799	1,236	1,782	2,402
Water Heat	-	-	14	25	39	59
Total	**9,955**	**11,695**	**7,347**	**8,756**	**10,244**	**11,104**

Industrial

Savings in the industrial sector are often irregular and uneven, subject to the projects that are completed in a given year. Therefore, the project team started with the adoption rates determined in the 2021 Power Plan and applied faster ramp rates only when program history indicated consistent savings (rather than singular large projects) above this level. For example, in 2023, Clark Public Utilities completed a large HVAC project that may not be repeatable in the upcoming biennium, so the 2021 Power Plan ramp rates were not increased. For some end uses, ramp rates were slowed relative to the 2021 Power Plan rates if there had been no historical savings. Table 25 shows the alignment of industrial potential and recent program history by end use.

Table 25: Alignment of Industrial Program History and Potential by End Use (MWh)

	Program History		CPA Cost-Effective Potential			
End Use	**2023**	**2024**	**2026**	**2027**	**2028**	**2029**
Energy Management	-	1,695	1,444	2,014	2,714	3,533
Compressed Air	935	680	642	687	732	724
Fans and Blowers	367	723	318	398	498	636
HVAC	2,979	-	443	443	443	399
Lighting	7,472	11,227	3,583	2,790	2,445	2,115
Motors	-	-	6	8	11	15
Refrigeration	831	-	33	54	82	119
Process	3,073	2,841	644	664	681	643
Pumps	259	205	161	297	500	780
Other	-	-	0	1	1	1
Total	**15,915**	**17,371**	**7,274**	**7,355**	**8,107**	**8,964**

Utility Distribution System

The amount of potential in the utility distribution system is limited compared to other sectors. The 2021 Power Plan assumes that the potential in this sector will be acquired slowly. No changes were made to the default ramp rate assigned in the 2021 Power Plan.

Table 26: Alignment of Distribution System Program History and Potential by End Use (MWh)

	Program History		CPA Cost-Effective Potential			
End Use	**2023**	**2024**	**2026**	**2027**	**2028**	**2029**
Distribution System	-	-	253	506	899	1,462