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2017 PSE Integrated Resource Plan

Conservation Potential Assessment

The attached report developed for PSE by Navigant Consulting analyzes demand-side resources for the electric and gas sales analyses.

Contents

2017 IRP Demand-Side Resource Conservation Potential Assessment Report

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DISCLAIMER

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EXECUTIVE SUMMARY

Introduction and Background

Puget Sound Energy (PSE) engaged Navigant Consulting, Inc. (Navigant) to prepare a conservation potential assessment (CPA) for electricity and natural gas demand-side resources (DSRs) across its territory over a 20-year planning horizon—from 2018 to 2037. This assessment was commissioned by PSE as part of its 2017 integrated resource planning (IRP) process. The CPA's primary objective is to comprehensively assess the DSR potential from all resources including energy efficiency, fuel switching, demand response (DR), and distributed generation (DG) across the residential, commercial, and industrial sectors. Distributed solar photovoltaics (PV) was treated as a non-DSR, as in the 2015 IRP, and its market potential was developed outside of the total resource cost (TRC) and portfolio optimization framework that is used to establish the cost effective DSRs. The distributed solar PV study is found in Appendix C. Additionally, a review distributed energy storage economics was included in the present scope of analysis to address how projected technology cost curves may lead to a future tipping point for this technology. This study is represented in Appendix D. The results of this CPA are intended to provide input into PSE's IRP models, strategic planning and program design, and load forecasting models.

Approach

This section provides a high level summary of the approach detailed in Section 2 of this report.

Estimation of Energy Efficiency and Fuel Conversion Potential

Navigant fully characterized over 150 measures across PSE's residential, commercial, and industrial sectors, covering electric and natural gas fuel types. The DSR team prioritized measures in existing PSE programs with good data availability, while ensuring that high impact measures were captured in the list. Additionally, over 70 comments from the Integrated Resource Planning Advisory Group (IRPAG) stakeholder group were considered in finalizing the measure list.

Navigant estimated the technical and achievable technical potential for electric energy, peak demand, and gas energy savings for energy efficiency and fuel conversion across all sectors consistent with the Northwest Power and Conservation Council (the Council's) Seventh Power Plan (Seventh Plan) and PSE's existing planning framework and program opportunities. Technical potential was calculated depending on the assumed replacement type for each measure. For instance, new construction technical potential was driven by new efficiency opportunities coming into the market due to new building stock, while lost opportunity or replace on burnout (ROB) measures were limited by the rate at which baseline measures turn over due to burnout.

Achievable technical potential was specified as a percentage of the technical potential. The percentage of technical potential that was deemed achievable was by default 85% based on the Council's planning assumptions.[1] Navigant modeled the effects of time-dependent barriers to market adoption by applying the ramp rates provided by the Council in the Seventh Plan[2] to the maximum achievable technical potential.

Estimation of Demand Response Potential

Navigant's first step to estimate DR potential was to characterize PSE's market for DR at different levels including by sector, customer class, building type, and end use. The DSR team then developed baseline projections for customer count and load over the forecast horizon before defining and characterizing DR options/programs for the relevant market segments. The list of DR options considered in this study included Direct Load Control (DLC), Commercial and Industrial (C&I) Curtailment, Economic DR, Dynamic Pricing, and Fast DR. For each of these DR options, Navigant developed participation, unit load reduction, and itemized cost assumptions by market segment and end use. In the final step, the DSR team estimated achievable technical potential for both winter and summer as well as the associated levelized costs for each DR option.

Estimation of Distributed Generation Potential

Navigant developed forecasts of technical and achievable electric energy savings potential through the installation of DG technology in PSE's service region from 2018 through 2037. This study covers two aspects to DG: solar PV and several combustion-related measures. For solar PV, Navigant used a constrained rooftop space approach combined with a solar PV module power density calculation to estimate technical potential for each sector in PSE's electric service territory. This approach included calculating an overall solar access factor for each sector, which was used to constrain the total available rooftop space for each sector to that technically suitable for the installation of solar PV. To calculate achievable technical potential for solar PV, Navigant used a payback-based market approach in conjunction with a Bass diffusion model to forecast the adoption of host-owned solar PV in PSE's electric service territory. See Appendix C for more details on the methodology and the results of the solar PV analysis.

For DG combustion, Navigant included a comprehensive list of measures including non-renewable combustion with heat recovery, renewable combustion with heat recovery, and standalone combustion without heat recovery. To calculate technical potential for these measures, Navigant accounted for resource or fuel availability, information on the number of customers near the resource or with a natural gas connection, and load profiles to estimate capacity per customer. To estimate achievable technical potential, Navigant leveraged combined heat and power (CHP) experience in other states.

Energy Storage Economic Assessment

Navigant conducted an economic feasibility (or a cost-benefit) analysis of customer-sited energy storage in PSE's service territory for all sectors. The analysis was limited to behind-the-meter (BTM) energy storage and was assessed from the customer's perspective. Front-of-the-meter energy storage is

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[1] *Achievable Savings – A Retrospective Look at the Northwest Power and Conservation Council's Conservation Planning Assumptions*: http://www.nwcouncil.org/media/29388/2007_13.pdf.

[2] See https://www.nwcouncil.org/energy/powerplan/7/technical for the supplemental data files that accompany the Council's Seventh Power Plan.

considered by PSE separately as part of its IRP. As such, the costs used reflect those paid by the end consumer, and the benefits shown only reflect those that accrue to the end user and do not reflect any external benefits to the grid, PSE, or the environment. Navigant's analysis focused on lithium ion battery technologies, which are projected to show signficant cost declines over the forecast horizon. The benefit value streams that were assessed from the customer's perspective based on PSE's existing tariff structure include demand charge management, power factor charge management, sustained outages, and momentary outages. The final cost-benefit calculation resulted from the storage cost estimate for the given system as compared to the relevant benefits.

Findings

This section presents a summary of the aggregate technical and achievable technical potential for each of the DSRs reviewed in this study. More detailed results are presented in the body of this report. All values presented in this section and throughout the report are at the generator and assume line loss of 7.3% for electric resources and 0.5% for gas resources. Additionally, the numbers discussed throughout the remainder of this report do not account for intra-year ramping, which was separately considered in the DSR bundles provided to PSE for its IRP analysis.

Table 1 summarizes the energy and capacity savings potential (cumulative in 2037) for all DSRs, excluding codes and standards and distributed solar PV. The latter are considered to be zero cost, must take resources in PSE's 2017 IRP and are thus presented separately. For electric resources, Navigant projects 1,564 average megawatts (aMW) of cumulative achievable technical potential by 2037. The two big resources that contribute to this potential are DG combustion and energy efficiency. Roughly 60% of the achievable technical potential is expected to come from DG combustion measures. Energy efficiency is forecasted to contribute 38% of the total cumulative achievable technical potential by 2037, with fuel conversion accounting for the remaining potential. In terms of winter peak demand, energy efficiency and DG combustion account for 87% of the 2037 achievable technical potential. The winter DR potential shown is for a 4-hour event duration and contributes 188 megawatts (MW) of achievable technical potential by 2037.[3] For natural gas resources, all savings come from energy efficiency, which contributes 175 million therms (MMTherms) of achievable technical potential by 2037.

Throughout this report, units for the presented results vary depending on impact type (electric energy, electric demand, or gas energy) and the general magnitude of the result values. To assist with converting between different commonly-encountered units for a given impact type, Table 27 in Appendix A provides a list of units with conversion factors that can be referenced against the results in this report.

Figure 1 shows the cumulative combined electric energy achievable technical potential for energy efficiency, fuel conversion, codes and standards, and DG combustion. The two major contributors of future electric energy savings are DG combustion and energy efficiency. Natural gas-driven standalone electric generators account for two-thirds of the DG combustion achievable technical potential by 2037.[4] For energy efficiency, whole building measures that target existing and new buildings as well as residential and commercial lighting measures contribute significantly to future achievable technical potential. The codes and standards savings shown below reflect post-2018 state building codes and federal appliance standards included in this study, with a bulk of the savings coming from the 2015

[3] This capacity is an input to PSE's Resource Adequacy Model (RAM), which determines the Effective Load Carrying Capacity (ELCC) of DR.

Washington State Energy Code (WSEC) and 2020 Energy Independence and Security Act (EISA) federal lighting standards.

Table 1. Summary of Energy and Capacity Savings Potential, Cumulative in 2037

	Energy (aMW / MMTherms)		Winter Coincident Peak Capacity (MW)	
	Technical Potential	Achievable Technical Potential	Technical Potential	Achievable Technical Potential
Electric Resources				
Energy Efficiency	836	598	1,305	975
Fuel Conversion	55	29	125	72
Demand Response	N/A	N/A	N/A	188
Distributed Generation - Combustion	4,280	933	N/A	522
Electric Resources Total	**5,172**	**1,560**	**1,430**	**1,757**
Natural Gas Resources				
Energy Efficiency	240	164	N/A	N/A

[4] Navigant is not aware of any limitation on run time at the time of this report, but such a limitation could be developed in the future.

Figure 1. Cumulative Achievable Technical Potential: Electric Energy Savings

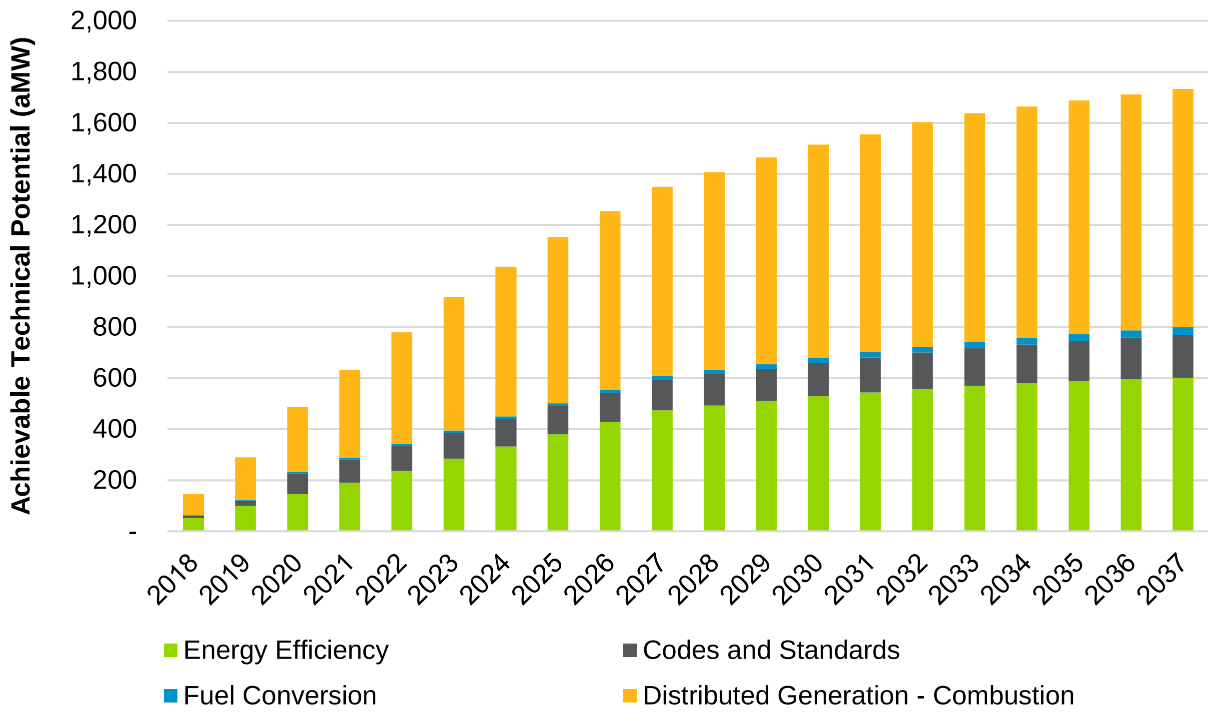


Figure 2 shows a similar output for cumulative winter peak demand savings for all electric energy resources. The largest sources of winter peak demand savings in 2037 are energy efficiency and DG combustion. Winter DR potential—driven by DLC, dynamic pricing, and C&I Curtailment—contributes about 188 MW of peak demand savings in 2037. For energy efficiency, the change in slope of the growth of achievable technical potential after 2027 is explained by the predominance of discretionary measure potential in the first 10 years, after which point lost opportunity resources account for the only remaining energy efficiency potential.

Figure 2. Cumulative Achievable Technical Potential: Winter Peak Demand Reduction

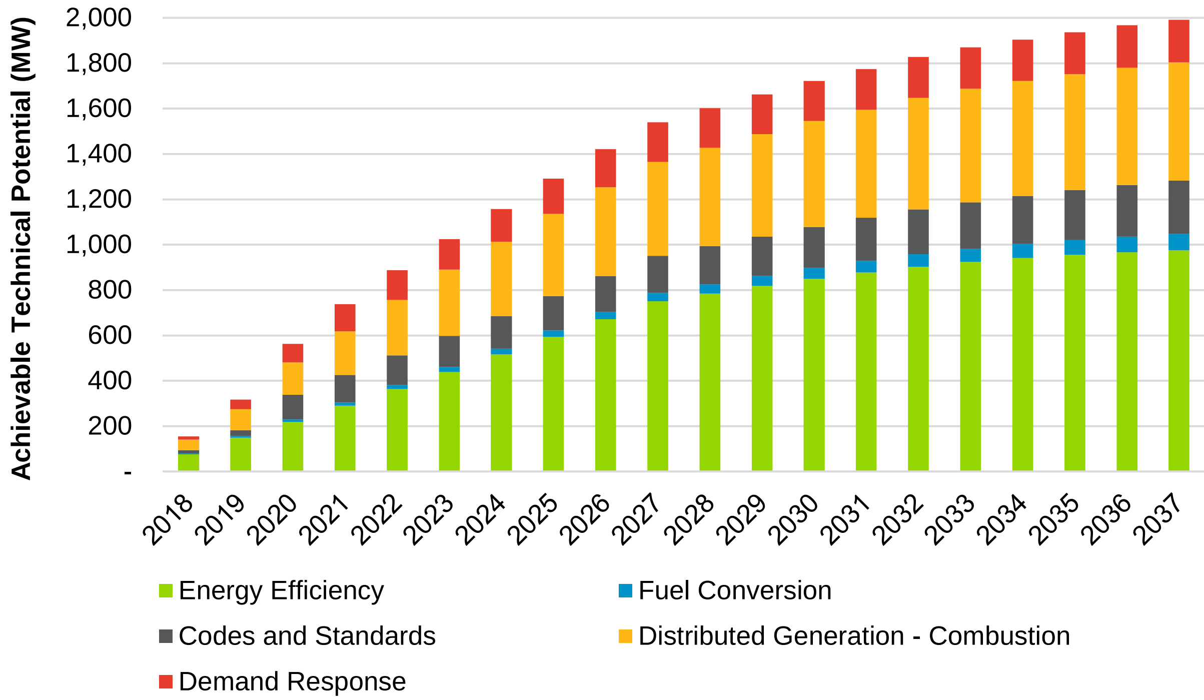
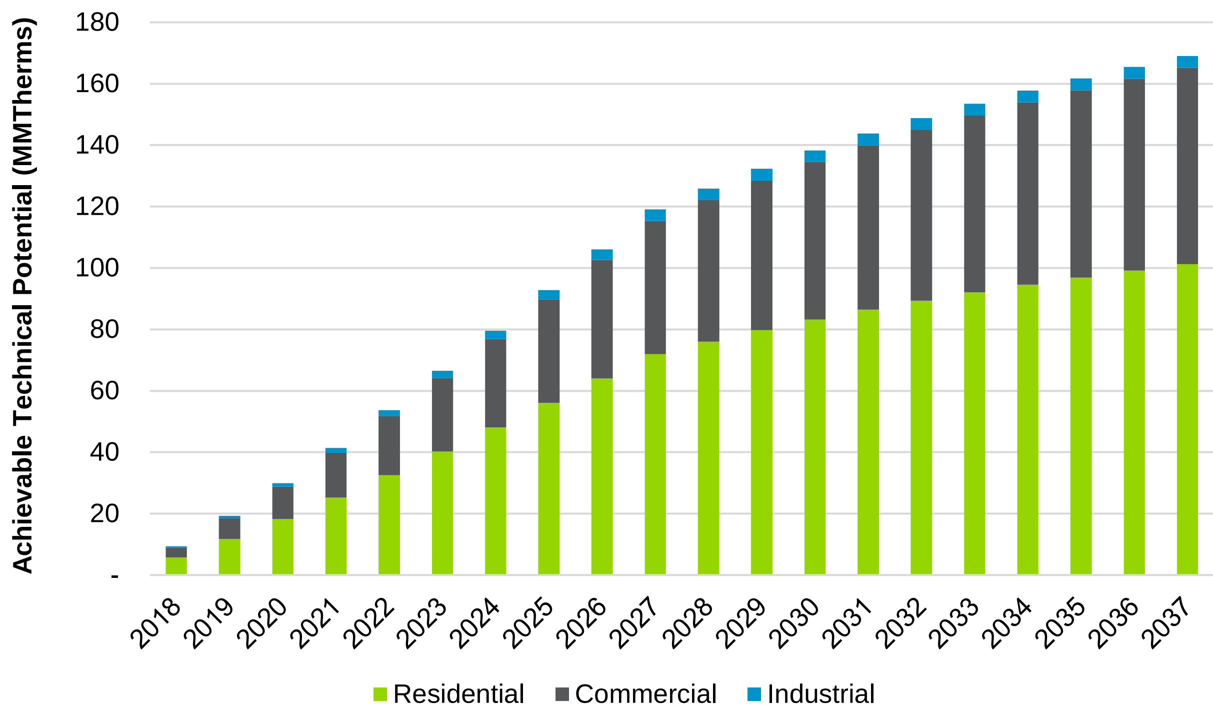


Figure 3 shows the cumulative achievable technical natural gas potential by sector. All the natural gas savings in this study come from energy efficiency. In particular, whole building and direct or indirect space heating measures account for almost 90% of all natural gas achievable technical potential energy savings in 2037. The overall achievable technical potential for natural gas is driven by the residential and commercial sectors, with the industrial sector contributing relatively limited potential. Achievable technical potential in the industrial sector declines over time due to a forecasted decline in industrial electric energy consumption of over 20% in PSE's load forecast through 2037. As with electric energy, there is noticeable growth in potential over time, and the achievable technical potential displays the effects of the ramp rates assigned to each measure as well as the change in slope after all retrofit potential is achieved in 2027.

Figure 3. Cumulative Achievable Technical Potential: Gas Resources



Key Changes from 2015 IRP

This potential assessment builds upon a previous analysis conducted to support PSE's 2015 IRP. However, a number of differences exist between this assessment and the 2015 IRP that contribute to the differences in technical and achievable technical potential. This section provides a summary of the main differences for each of the resources examined.

Energy Efficiency and Fuel Conversion

- Applied a bottom-up methodology to estimate technical savings potential
- Updated measure density/saturation data and building stock forecasts using the latest PSE-specific data from the Northwest Energy Efficiency Alliance's (NEEA's) Residential Building Stock Assessment (RBSA) and Commercial Building Stock Assessment (CBSA) reports
- Utilized ramp rates from the Council's Seventh Plan and incorporated new codes and standards
- Updated customer and sales forecasts with the latest PSE data
- Updated the methodology to better account for market share splits between competing technologies
- Updated cost values and forecasted cost declines for key measures such as light-emitting diodes (LEDs)
- Incorporated behavioral energy efficiency measures

- Assumed a default maximum achievability factor of 85% for natural gas energy efficiency measures, per the Council's guidance

Demand Response

- Segmented baseline coincident load forecast by building type and end use, taking into account coincident morning and evening peak hours and end-use load shapes by building type
- Segmented C&I customers by size into small, medium, large and extra-large categories—taking into account their maximum demand values and rate schedules—and further segmented each size category by building type
- Included a broader set of DR options than the previous IRP, including DLC for small and medium C&I customers, economic DR, and fast DR
- Differentiated potential estimates by event duration period: 4-hour vs. 2-hour duration
- Estimated technical potential for standalone DR measures
- Tied up DR programmatic assumptions with field-level information from vendors through PSE's DR acquisition efforts
- Assessed C&I curtailment potential for customers with greater than 150 kW maximum demand rather than customers with greater than 100 kW maximum demand
- Varied participation assumptions by customer segment

Distributed Generation – Combustion

- Included residential sector and standalone electric generator technology
- Revised methodology to estimate achievable technical potential
- Updated achievability factors consistent with historical adoption and market trends

Distributed Generation – Solar PV

- Updated technical and financial modeling assumptions (roof area, PV access factors, installed costs)
- Refined incentive policy scenarios for both base and best case scenarios

Table 2 compares the results of the present CPA with those from the 2015 assessment for each distributed energy resource. Generally, the 2017 analysis shows slightly less potential than the 2015 analysis across most of the electric and natural gas resources, with the exception being potential from DG combustion resources. The sections below discuss some sources for these differences as they relate to key inputs, assumptions, and modeling methodology.

Table 2. DSR Achievable Technical Potential, Comparison with 2015 IRP

	Energy (aMW / MMTherms)		Winter Coincident Peak Capacity (MW)	
	2015 IRP	2017 IRP	2015 IRP	2017 IRP
Electric Resources				
Energy Efficiency	622	598	970	975
Fuel Conversion	61	29	141	72
Demand Response	N/A	N/A	263	188
Distributed Generation - Combustion	22	933	20	522
Electric Resources Total	**705**	**1,560**	**1,394**	**1,757**
Natural Gas Resources				
Energy Efficiency	225	164	N/A	N/A

For the electric and natural gas energy efficiency potential analysis, Navigant updated several key data sources from those used in the 2015 IRP. In particular, the DSR team used an updated version of NEEA's CBSA, published in December 2014, to characterize the mix of baseline and efficient equipment currently in service. The previous assessment used the 2007 report, as it was the latest available at the time the analysis was conducted. A comparison of these reports shows a general increase in efficiency from 2007 to 2014, which corresponds to a reduction in overall potential for energy savings from efficiency upgrades to existing equipment in the commercial sector.

Additionally, the present analysis uses the WSEC as the baseline efficiency level for all new construction measures. The WSEC went into effect on July 1, 2016 and is one of the most stringent energy codes in the nation. Using the WSEC as the baseline efficiency level reduces estimated efficiency potential as compared to the previous building code for efficiency measures that was applicable to new construction.

The reduction in fuel conversion potential compared to the 2015 CPA is in part due to updated assumptions regarding eligibility requirements. Whereas the 2015 analysis considered homes that required a gas line extension to convert an electric appliance to a gas appliance, the costs of such an extension were quite high in relation to the cost of the natural gas equipment, making fuel conversion cost prohibitive for these customers. Navigant excluded these customers from those deemed eligible for fuel conversion, considering only those customers who had an existing natural gas connection or who had no existing connection but were located on a natural gas main.

Navigant also accounted explicitly for competition between fuel conversion and same fuel energy efficiency measures. That is, a customer with a baseline efficiency electric storage water heater could obtain electric energy savings by either installing a higher efficiency electric storage water heater or converting to a high efficiency tankless natural gas water heater. The methodology for allocating potential between competing fuel conversion and same fuel efficiency measures was consistent with the competition group methodology in the energy efficiency potential assessment, as described in Section 2.1.5.3. As a result of explicitly accounting for this competition, the computed potential in the present assessment is reduced relative to the 2015 CPA.

For the DR analysis, there were a number of changes in the potential assessment approach that were not considered in the 2015 CPA. For the DR potential estimation, Navigant segmented the market at four levels:

1. By sector into residential and C&I customers
2. By customer size (for C&I customers) based on maximum demand values following PSE's rate schedules
3. By customer segment[5] for C&I customers (e.g., retail grocery, office, etc.)
4. By end use within each business type

This is an enhancement over the market segmentation for DR potential considered in PSE's 2015 CPA. Specifically, the 2015 CPA did not segment customers by size for the DR potential assessment. Additionally, Navigant considered a broader spectrum of DR options/program types than what was included in PSE's 2015 CPA. For example, the 2015 potential study did not consider DLC for C&I customers, while this study included small and midsized commercial customers in the DLC potential assessment.

This study also included an economic DR option, which involves voluntary load curtailment for energy only versus firm capacity reduction commitment from customers in C&I Curtailment. Other than these additional DR options, Navigant's approach further disaggregated DR options by control type. For example, within C&I Curtailment and economic DR options, the DSR team separately estimated potential associated with manual and Auto-DR-enabled curtailment. The 2015 CPA did not include this level of granularity in the DR potential estimates. Navigant also developed highly disaggregated winter and summer peak load projections by customer class, building type, and end use utilizing the end use load shapes by building type provided by PSE and calibrated to PSE's sales forecast. This formed the foundation for developing potential estimates at a highly granular level of market segmentation (customer class, building type, and end use) for each DR option and sub-option. The 2015 CPA, on the other hand, did not present disaggregated DR potential by building type and end use. Navigant developed summer peak load reduction potential in addition to winter DR potential because PSE's 2015 CPA did not present summer peak load reduction potential. Navigant estimated DR potential for 2-hour and 4-hour event durations. Event duration affects the average impact that could be realized during the DR event period, with longer duration events realizing lower average impact than shorter duration events. Also, event duration is likely to affect participation assumptions, as customers are likely to be more willing to be controlled over shorter event durations than longer event durations.

Lastly, Navigant was simultaneously engaged with PSE's DR resource acquisition efforts at the time of this potential study. The DR potential study team members from Navigant were closely involved in reviewing DR vendor bids for PSE. This helped the potential study team to validate programmatic assumptions for the potential study with field data presented by the vendors.

In the case of DG combustion resources, the 2015 CPA considered potential only from renewable and non-renewable CHP facilities. The present analysis also considered electric standalone generators due to observed nationwide trends of increasing adoption of these units. These standalone generators account for roughly two-thirds of the total achievable technical DG combustion potential. Additionally, the 2015 CPA used achievability factors from 2008 that assumed achievable technical potential for the various

[5] This is also commonly referred to as building type.

types of DG combustion potential was quite low compared to technical potential. Since that analysis, trends in the CHP market, customer awareness, and project economics have contributed to significantly higher achievability. To reflect these trends, Navigant assumed a 50% achievability factor for all DG combustion resources, resulting in significantly higher estimates of achievable technical potential compared to the 2015 CPA.

Energy Efficiency

Table 3 and Table 4 show the technical and achievable technical savings potential in 2037 for electric energy efficiency measures as a percentage of total sector consumption. These percentages are affected by both estimated energy savings potential and forecasted sector-level energy consumption over the study horizon. The residential sector shows higher technical potential but similar achievable technical potential when compared to the 2015 CPA. This can be attributed, in part, to significant technical potential from residential whole building new construction measures, which were deemed to have a lower-than-average maximum achievability factor due to various non-economic adoption barriers.

For the C&I sectors, both technical and achievable technical potential as a percentage of sector sales are less in the present analysis than reported in the 2015 CPA. For commercial, this is largely attributed to the use of updated CBSA data that reflects a higher average level of efficiency for existing equipment, which results in relatively lower potential from efficiency upgrades. Significant decline in the industrial sector in recent years and projected continued decline over the study horizon are some of the main causes of reduced industrial potential as a percentage of sales compared to the 2015 CPA.

Table 3. 20-Year Technical Potential (Percentage of Sales), Comparison with 2015 IRP

20-Year Technical Potential (Percent of Sales)			
	Residential	Commercial	Industrial
Electric Resources			
2017 IRP	28%	25%	19%
2015 IRP	24%	26%	23%
Natural Gas Resources			
2017 IRP	19%	23%	29%
2015 IRP	26%	25%	27%

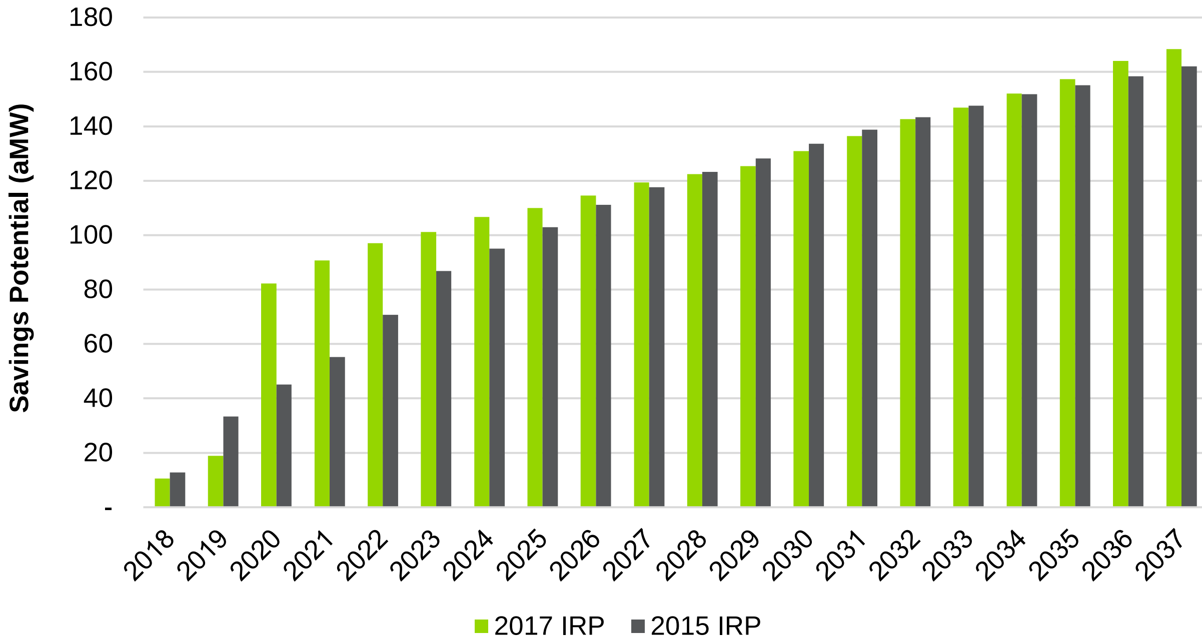
Table 4. 20-Year Achievable Technical Potential (Percentage of Sales), Comparison with 2015 IRP

20-Year Achievable Technical Potential (Percent of Sales)			
	Residential	Commercial	Industrial
Electric Resources			
2017 IRP	20%	17%	17%
2015 IRP	19%	21%	20%
Natural Gas Resources			
2017 IRP	14%	15%	17%
2015 IRP	17%	18%	17%

Overall, the estimated electric and natural gas savings potential from codes and standards in the present analysis is consistent with that of the 2015 CPA. As seen in Figure 4, Navigant forecasts a significant jump in electric savings potential from codes and standards in 2020, the year the lighting backstop provision of EISA takes effect. This provision increases the efficiency standard for various types of residential and commercial lighting to the level of a compact fluorescent lamp (CFL) bulb, resulting in significant energy savings as currently installed incandescent bulbs burn out and are replaced. Because incandescent bulbs have a relatively short lifetime, this potential is realized quickly after the EISA standard takes effect. The WSEC building code also contributes significant potential from forecasted residential and commercial new construction over the study horizon.

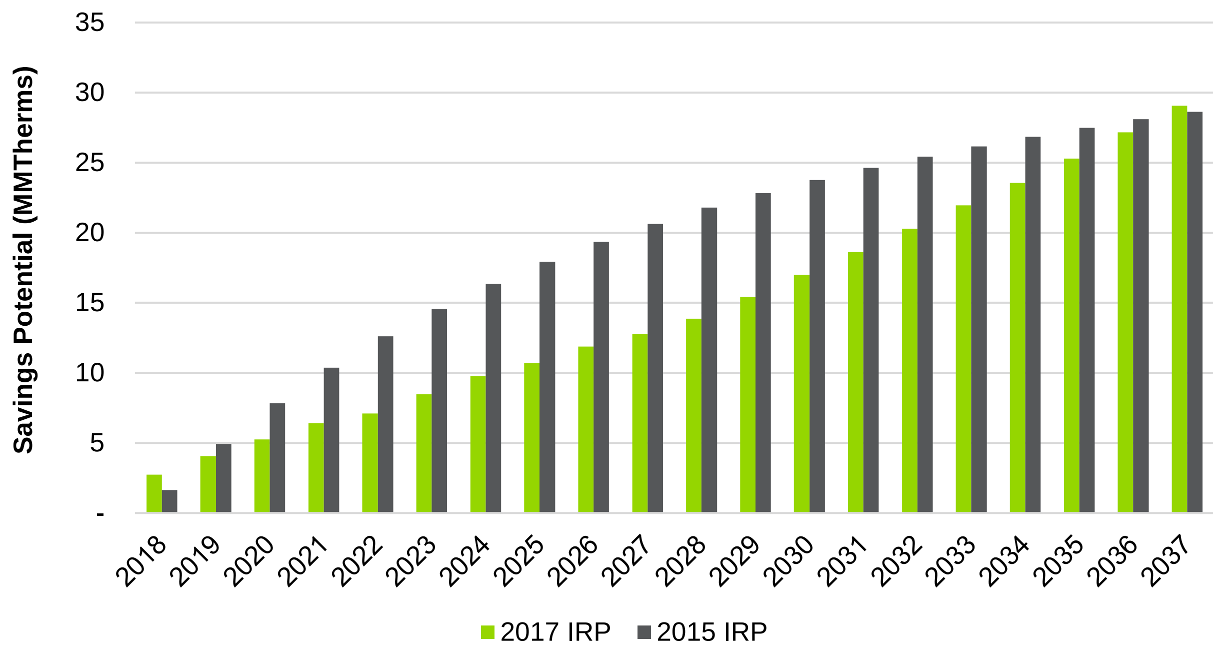
Figure 5 shows that while 20-year natural gas energy savings from codes and standards are commensurate with projected savings from the 2015 CPA, the shape of how this savings accumulates over time is significantly different. The bulk of the natural gas codes and standards savings comes from the WSEC building code and forecasted new residential and commercial building construction over the study horizon. As such, the shape of the cumulative energy savings potential over time is largely driven by the shape of PSE's sector-level natural gas energy consumption forecast. There is also a small amount of natural gas savings potential from a residential high efficiency boiler code that takes effect in 2021.

Figure 4. 20-Year Codes and Standards Electric Energy Savings (aMW),[6] Comparison with 2015 IRP



[6] In the 2017 IRP, savings from codes and standards taking effect prior to 2018 were incorporated directly into the sales forecast.

Figure 5. 20-Year Codes and Standards Gas Energy Savings (MMTherms),[7] Comparison with 2015 IRP



Demand Response

Table 5 compares the 2035 winter market potential presented in PSE's 2015 CPA with the 2037 achievable technical potential estimates from the current study. The results closely compare with the current study's potential estimates, which are slightly higher at 188 MW from the 181 MW potential presented in the 2015 CPA. The current study estimates slightly lower residential technical potential and higher C&I potential than the previous CPA.

Table 5. 20-Year Comparison of DR Achievable Technical Potential (Winter MW), Comparison with 2015 IRP

20-Year Achievable Technical Potential, MW		
	2017 IRP	2015 IRP
Winter (MW)		
Residential	109	196
Commercial & Industrial	79	67
Totals	**188**	**263**

[7] Ibid.

Distributed Generation

Table 6 provides a comparison of the 20-year achievable technical potential for DG combustion between the 2015 and 2017 IRP for all system designs including non-renewable CHP, renewable CHP, and standalone electric generation. In this study, standalone electric generators, which are natural gas-driven engines without heat recovery, were included. This contributes significantly to the difference in magnitude of the 20-year achievable technical potential between the two IRPs summed across all DG combustion technologies because standalone generation accounts for approximately 66% of the total 2017 IRP potential.

In addition, a revised methodology was implemented in this study to estimate achievable technical potential. The 2015 IRP looked at programmatic successes, while the 2017 IRP took into account current installations, which resulted in a higher estimate for achievability.

Table 6. 20-Year DG Combustion Achievable Technical Potential (aMW), Comparison with 2015 IRP

	2017 IRP	2015 IRP
Total	**933**	**22**

Table 7 provides a comparison of the 20-year market potential for solar PV between the 2015 and 2017 IRP for the base incentive scenario.[8] In this study, several key inputs were updated including roof area, PV access factors, installed system costs, and payback acceptance curves. Additionally, the DSR team worked with PSE to update both the base and best case scenarios to reflect current policy, incentive structures, and market conditions. As an example, the 2015 IRP assumes that the Federal Investment Tax Credit (ITC) for residential expired in 2016 in the base scenario, whereas the 2017 IRP assumes it is extended through 2021 based on current policy. This contributes significantly to the difference in magnitude of the 20-year achievable technical potential between the two IRPs in the base scenario.

Table 7. 20-Year Solar PV Market Potential (MW-DC), Comparison with 2015 IRP

20-Year Market Potential, MW-DC		
	2017 IRP	**2015 IRP**
Base Case (MW-DC)		
Residential	43	1
Commercial	78	2
Industrial	1	0
Totals	**122**	**3**

[8] See Appendix C for details on solar PV scenarios.

Energy Storage

Energy storage was not part of the DSR potential assessment; however, Navigant was tasked in the 2017 IRP to conduct an economic evaluation limited to a tipping point analysis of BTM storage from the customer perspective. Appendix D provides details on Navigant's methodology and detailed results.

Incorporation of DSR into PSE's IRP

After calculating achievable technical potential for all DSRs as described above, Navigant calculated levelized costs and conservation supply curves for inclusion in PSE's IRP model. Calculating the levelized cost of conserved energy is an important component of the CPA and allows the cost of conservation to be compared with other distributed energy and supply-side resources in budgeting and resource planning activities. The levelized cost of conserved energy is the discounted present value net cost of each measure over the 20-year analysis horizon divided by the discounted present value of energy savings over the same period. Navigant worked closely with both PSE and Council staff to ensure that the methodology employed in the present analysis for computing each measure's levelized cost was consistent with that outlined in Appendix G of the Seventh Plan.[9]

The levelized costs were subsequently used to aggregate or bundle different resources into distinct cost groups from lowest cost to highest along the conservation supply curve for inclusion into PSE's IRP model. This allowed the IRP model to identify optimal amounts of annual DSR given projected energy prices, load growth, and supply-side resources. Navigant spread the annual savings estimates using the 8,760 hourly load profiles by end use and customer segment provided by PSE to produce hourly DSR bundles for electric DSRs and monthly load shapes for gas. Additionally, Navigant's IRP bundling approach ensured that savings are not acquired instantly on the first day of January but are instead split so that half the savings are allocated in one year and half to the next year. A more detailed description of the methodology used to calculate the levelized costs and supply curves is provided in Sections 2.1.8 and 2.1.9 of the report.

Figure 6 and Figure 7 provide a summary of the DSR electric and natural gas bundled potential from the 2017 IRP. The electric bundles include energy efficiency, fuel conversion, and DG combustion potential. The large jump in the Over $190/MWh bundle is due in large part to the DG combustion potential, which is quite expensive. As described above, the 2017 IRP considered natural gas standalone generators and while they account for a large portion of achievable technical potential, the potential is expensive. The jump in the natural gas bundled potential that can be observed in the $0.55 to $0.70 per therm bundle comes from high efficiency furnaces for single-family homes.

[9] https://www.nwcouncil.org/media/7149911/7thplanfinal_appdixg_consresources.pdf

Figure 6. DSR Potential Electric Bundles

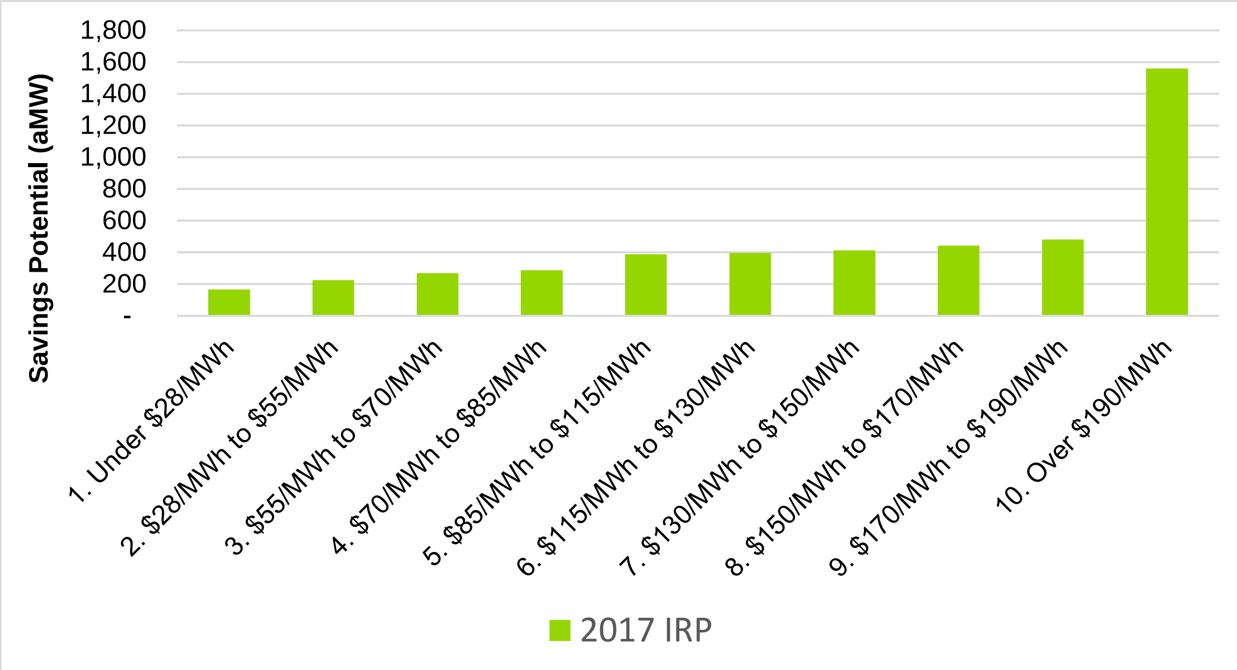
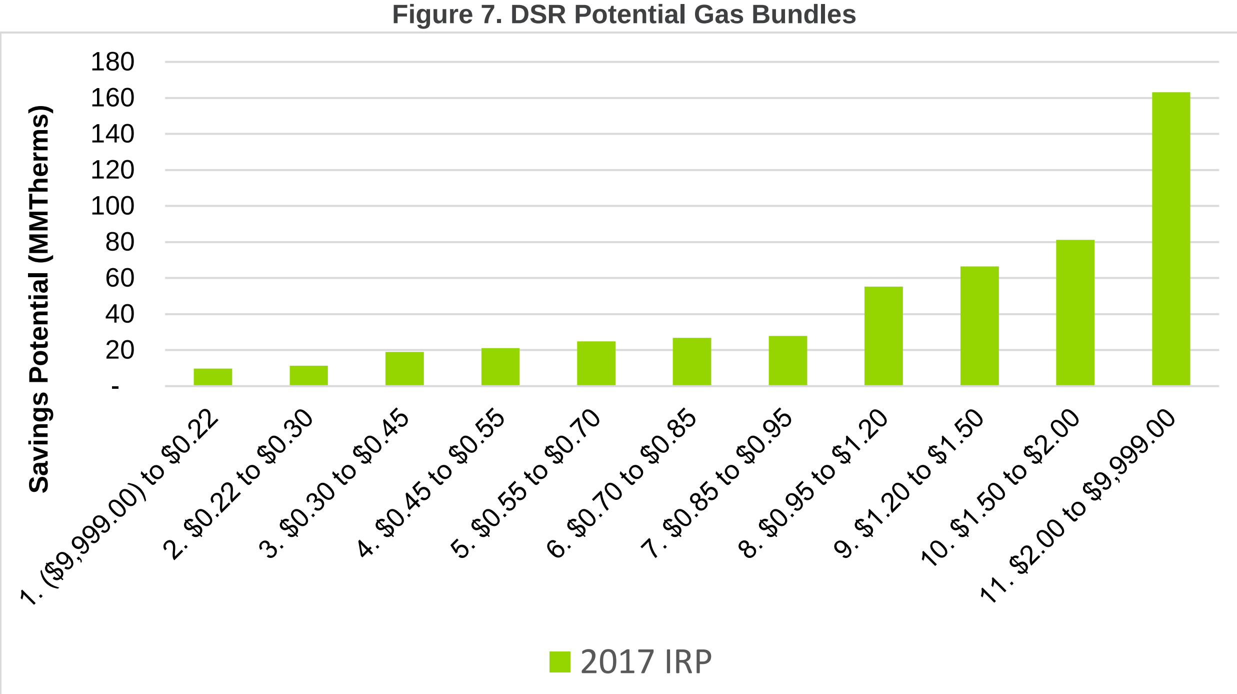


Figure 7. DSR Potential Gas Bundles



1. INTRODUCTION

1.1 Conservation Potential Assessment Background and Study Goals

Puget Sound Energy (PSE) engaged Navigant Consulting, Inc. (Navigant) to prepare a conservation potential assessment (CPA) for electricity and natural gas demand-side resources (DSRs) across its territory over the 20-year planning horizon—from 2018 to 2037. This assessment was commissioned by PSE as part of its 2017 integrated resource planning (IRP) process. The CPA's primary objective is to comprehensively assess the DSR potential from all resources including energy efficiency, fuel switching, demand response (DR), and distributed generation (DG) across the residential, commercial, and industrial sectors. Distributed solar photovoltaics (PV) was treated as a non-DSR, as in the 2015 IRP, and its market potential was developed outside of the total resource cost (TRC) and portfolio optimization framework that is used to establish the cost effective DSRs. The distributed solar PV study is found in 0. Additionally, a review distributed energy storage economics was included in the present scope of analysis to address how projected technology cost curves may lead to a future tipping point for this technology. This study is represented in Appendix D. The results of this CPA are intended to provide input into PSE's IRP models, strategic planning and program design, and load forecasting models.

1.2 Organization of Report

This report is organized as follows:

- **Section 2** describes the methodologies and approaches Navigant used to estimate potential for all distributed resources, including discussion on measure identification and characterization, data sources leveraged, and assumptions used in calculating technical and achievable technical long-term potentials.
- **Section 3** offers the results of the potential study analysis for all resources. This includes a summary of the aggregate DSR potential as well as disaggregated savings results by sector, customer segment, and end use. This section also includes details on the supply curves estimated for PSE's 2017 IRP.
- The document's **appendices** present additional technical information and descriptions of data used and their sources. It also includes the methodology and results for DG solar and energy storage.

1.3 Caveats and Limitations

There are several caveats and limitations associated with the results of this study, which are outlined in the following sections.

1.3.1 Data Uncertainties

CPA studies may employ a variety of primary data collection techniques (e.g., customer surveys, onsite equipment saturation studies, and telephone interviews), which can enhance the accuracy of the results—though not without associated cost and time requirements. The scope of this study did not include primary data collection; rather, it relied on existing data sources acquired from PSE and other regional data sources such as the Residential Building Stock Assessment (RBSA), Northwest Regional Technical Forum (RTF), and the Northwest Power and Conservation Council (the Council). Uncertainty in the estimates from these sources inevitably exist which can affect estimates of potential.

1.3.2 Market Uncertainties

Several uncertainties exist regarding the market acceptance of DSR technologies. The estimates of energy efficiency achievable technical potential assume at maximum an 85% achievability factor. This sets an upper limit of market penetration in the region over a 20-year period. While this is consistent with regional assumptions and is supported by retrospective research conducted by the Council, there remains uncertainty as to how much of the technical potential is achievable over the modeling period. Another example is the application of payback acceptance curves to estimate long-run market share for solar PV. While this approach is commonly used in potential studies as a reasonable and tractable approach to estimate market share for dozens or even hundreds of technologies, it is limited in its ability to account for non-monetary product purchase considerations.

2. GENERAL APPROACH AND METHODOLOGY

2.1 Energy Efficiency

For the present analysis, Navigant developed forecasts of technical and achievable technical electric and gas energy efficiency savings potential in PSE's service territory from 2018 through 2037. In turn, these efficiency forecasts relied on disaggregated forecasts of building stock and electricity and gas energy sales before conservation, as well as a set of detailed measure characteristics for a comprehensive list of energy efficiency measures relevant to PSE's service region. This section details the DSR team's approach to developing these key inputs and calculating the bottom-up estimates of technical and achievable technical energy efficiency potential over the study horizon.

2.1.1 Model Segmentation

Navigant disaggregated key model inputs at several levels of granularity to ensure that the results reflected key differences in efficiency potential across distinct population segments and replacement types. The segments considered at each level of disaggregation were selected in close collaboration with PSE program staff to provide as complete a cross-section of the region as possible while aligning with available data sources. From coarsest to finest granularity, the modeling segmentation was as follows:

- **Service territories:** Three service territories were considered based on the type of service PSE provides in each geographical region: electric-only service, gas-only service, or combined electric and gas service.
- **Sectors:** Three main sectors of PSE customers were considered: residential, commercial, and industrial.
- **Customer segments:** Various customer segments were considered as sub-classes of PSE customers within each sector. For example, the residential sector was further segmented to single-family, multifamily, and manufactured home customer segments. Table 8 lists the customer segments for each sector.
- **End uses:** Distinct end uses of electricity and natural gas were considered—e.g., lighting, space heating, etc. Table 9 gives a complete list of the end uses included in the study and maps them to the sectors in which they were applicable.
- **Replacement types:** This means the ways in which energy efficiency measures were implemented. All energy efficiency measures were assigned one or more of the following replacement types:
    - **New construction (NEW):** Measures applicable to new construction not existing prior to the first year of the study. New replacement type measures were considered *lost opportunity* measures. That is, the opportunity to implement a new replacement type measure was considered lost if the measure was not implemented at the time of new building construction. For example, an integrated space and water heating system can be installed at the time of building construction but becomes more difficult and costly afterwards. Integrated space and water heating was assigned the new replacement type.

- **Replace on burnout (ROB):** Measures that replace inefficient equipment units as they are retired from service due to burnout/end of life. ROB replacement type measures were considered *lost opportunity* measures. That is, the opportunity to implement a ROB replacement type measure was considered lost if the measure was not implemented upon retirement of an applicable inefficient equipment unit. For example, if a baseline efficiency furnace burns out and is replaced by another baseline efficiency furnace, the opportunity to install an efficient furnace has been lost. Efficient furnaces and other types of equipment with high upfront costs and long useful lifetimes were typically assigned the ROB replacement type.
- **Retrofit (RET):** Measures that replace inefficient equipment units before their retirement or measures that are add-ons to existing equipment or processes. RET replacement type measures were considered *discretionary* measures. That is, the timing for implementation of RET replacement type measures was not governed by equipment burnout or new construction; rather, it was at the discretion of the equipment owner. For example, reducing the temperature setpoint for a water heater may be just as easily done at any time prior to burnout of the water heater. The water heater temperature setback measure was assigned the RET replacement type.

Table 8. Customer Segments by Sector

Residential	Commercial	Industrial
Manufactured	Food Service	Chemicals
Multifamily	Grocery	Food Products
Single-Family	Hospital	Hi Tech
	Lodging	Metal Fabrication and Foundries
	Office	Non-Metallic Manufacturing
	Other	Other
	Retail	Public Street and Highway
	Schools	Publishing, Broadcasting, and Telecommunications
	University	Pulp and Paper
	Warehouse	Transportation and Equipment
		Wood Products

Table 9. End Use by Sector

End Use	Residential	Commercial	Industrial
Appliances	✓	✓	
Compressed Air			✓
Electronics and Office	✓	✓	
Fans, Blowers, Motors, Drives,			✓
Hot Water	✓	✓	
Lighting	✓	✓	✓
Non-Res Cooking		✓	
Non-Res Refrigeration		✓	✓
Process Heat			✓
Space Cooling	✓	✓	✓
Space Heating	✓	✓	
Space Heating and Cooling	✓	✓	✓
Whole Building/House	✓	✓	✓

2.1.2 Building Stock and Energy Sales Forecast Methodology

As a primary input to the bottom-up calculation of energy efficiency potential, Navigant developed a customer segment-level forecast of residential and commercial building stock within PSE's service territory from 2018 through 2037. To do this, Navigant first estimated the existing building stock in 2018 for each residential and commercial customer segment and then grew these estimates over the study horizon. For the residential sector, building stock was in units of dwellings. For the commercial sector, building stock was in units of thousands of square feet of floor space, which better accounted for the high degree of heterogeneity in commercial building sizes and energy consumption. For the industrial sector, energy consumption itself was used as the basis for estimating energy efficiency potential, and no building stock forecast was required.

To estimate the building stock for each customer segment in PSE's service region in 2018, Navigant analyzed data from the Northwest Energy Efficiency Alliance's (NEEA's) 2011 RBSA and 2014 Commercial Building Stock Assessment (CBSA) reports.[10] These report vintages were the most current available at the time of the present analysis. Though the reports themselves covered the broader Pacific Northwest region, many of the datasets also included estimates specific to PSE's service region. Navigant leveraged this PSE-specific data wherever possible to ensure building stock estimates used for potential estimation were reflective of PSE's customer demographics. The building stock estimates obtained from the raw RBSA and CBSA data were grown to forecasted 2018 levels using Washington State-specific stock growth rates for each customer segment, as detailed in the supporting data files from the Council's Seventh Power Plan (Seventh Plan).[11] This yielded estimates of total building stock in PSE's service region by customer segment in the first year of analysis for the present CPA.

Because building stock is closely related to electricity and natural gas sales, growing the 2018 building stock estimates through 2037 required careful alignment with PSE's sales forecast. PSE provided Navigant with forecasted sector-level electricity and gas sales from 2016 through 2037. Navigant disaggregated the 2016 forecasted sales to the customer segment level using the most current year of PSE's customer billing data and computed energy use intensities (EUIs) in 2016 for each customer segment by dividing the disaggregated segment electricity sales by segment building stock in the same year. The EUIs reflect average consumption per stock unit for each customer segment in PSE's service territory. Finally, dividing the forecasted segment-level electricity sales by the 2016 segment-level EUIs yielded a forecast of building stock aligned with the segment-level sales forecast, with forecasted EUIs frozen at 2016 levels. This methodology allowed Navigant to leverage the highest fidelity data available for sector-level stock and sales forecasts, while also ensuring that customer segment consumption per stock unit remained reasonable over the forecast horizon.

It should be noted that while customer segment EUIs may vary slightly over time, it is difficult to determine whether they will increase or decrease. Equipment units will generally become more efficient over time due to the general advancement of technology and retirement of older units, but these efficiency gains may be offset by changes in equipment density, fuel selection, or other stock basis attributes. For example, if a family decides to replace an inefficient television with a more efficient model but decides to also add a second efficient television in another room of the house, the overall energy use of that home could actually increase despite the increased efficiency of the individual equipment units. Because of the uncertainties around forecasting changes to EUIs and the lack of definitive data to support such a forecast in PSE's service region, Navigant deemed it appropriate to freeze forecasted EUIs at 2016 levels. The frozen EUI approach resulted in a natural alignment of sales and stock forecasts consistent with the most currently available data.

[10] RBSA and CBSA data can be accessed online at: http://neea.org/resource-center/regional-data-resources.

[11] Raw data from the Council's building stock forecast can be found online at: https://nwcouncil.app.box.com/v/7thplanconservationdatafiles/1/6723348297/54717637589/1.

2.1.3 Measure Identification and Characterization

Navigant fully characterized over 150 measures across PSE's residential, commercial, and industrial sectors covering electric and natural gas fuel types. The DSR team prioritized measures based on regional characteristics and information received from PSE staff, measures with data availability, and measures with a high impact as thresholds for inclusion into the study.

2.1.3.1 Measure List

Navigant developed a comprehensive measure list of energy efficiency measures. The DSR team reviewed current PSE program offerings, the RTF, the Seventh Plan, the previous IRP and other regional programs, and potential model measure lists from other jurisdictions to identify energy efficiency measures with the highest expected impact. The team then supplemented the measure list using the 2014 Energy Trust of Oregon potential study and technical reference manuals (TRMs) from other states, and leveraged the Industrial Assessment Center (IAC) database to inform the list of industrial measures. Navigant prioritized measures in existing PSE programs with good data availability and that are cost-effective; the team also ensured that high impact measures were captured in the list. Navigant worked with PSE to finalize the measure list and confirm it contained technologies viable for future PSE program planning activities. Additionally, over 70 comments from the Integrated Resource Planning Advisory Group (IRPAG) were considered to add measures, update technology efficiencies and replacement types, and ensure the latest codes and standards were taken into account. Table 24 provides the final measure list and assumptions.

Working sessions with PSE staff revealed topics of note for the following:

- **Light-emitting diode (LED) measures:** Navigant characterized LED bulbs and fixtures for all sectors replacing incandescent bulbs and incandescent, halogen, or T8/T12 fixtures. Competition in lighting measures between LED and compact fluorescent lamp (CFL) bulbs has also been considered. Navigant used LED costs and cost projections using the US Department of Energy's (DOE's) Solid-State Lighting Report[12] that projects a significant cost decrease through 2037. Appendix F.1 shows the cost curves for LED lamps and LED luminaires that were considered as part of this study.
- **Behavior measures:** The DSR team considered behavioral measures in this study after consulting with PSE. Technologies that affect whole building energy usage through a change in customer behavior, a commercial or industrial facility process change, or by optimizing equipment usage are considered to be behavior-based measures. Measures such as home energy reports, strategic energy management, building automation systems, and industrial process optimization have been included as part of this study.
- **Washington State Energy Code (WSEC):** The WSEC 2015[13] that provides building energy code requirements was reviewed to determine the baseline and efficient technologies.

[12] Navigant. *Energy Savings Forecast of Solid-State Lighting in General Illumination Applications.* Prepared for the US Department of Energy Solid State Lighting Program, September 2016.

[13] The WSEC 2015 code went into effect July 1, 2016.

2.1.3.2 Measure Characterization Key Parameters

The measure characterization effort consisted of defining nearly 50 individual parameters for each of the 150 measures included in this study. This section defines the top 10 key parameters and how each affects the technical and economic potential savings estimates.

1. **Measure definition:** The DSR team used the following variables to qualitatively define each characterized measure:
    - ***Replacement type:*** Replacing the baseline technology with the efficient technology can occur in three variations:
        1. Retrofit (RET): Where the model considers the baseline to be the existing equipment and uses the energy and demand savings between the existing equipment and the efficient technology during technical potential calculations. RET also applies the full installed cost of the efficient equipment during the economic screening.
        2. Replace On Burnout (ROB): Where the model considers the baseline to be the code-compliant technology option and uses the energy and demand savings between the current code option and the efficient technology during technical potential calculations. ROB also applies the incremental cost between the efficient and code-compliant equipment during the economic screening.
        3. New Construction (NEW): Where the model considers the baseline to be the least cost code-compliant option and uses the energy and demand savings between this specific current code option and the efficient technology during technical potential calculations. NEW also applies the incremental cost between the efficient and code-compliant equipment during the economic screening.
    - ***Baseline definition:*** Describes the baseline technology.
    - ***Energy efficiency definition:*** Describes the efficient technology set to replace the baseline technology.
    - ***Unit basis:*** The normalizing unit for energy, demand, cost, and density estimates.
2. **Sector and end-use mapping:** The DSR team mapped each measure to the appropriate end uses, customer segments, and sectors across PSE's service territory as described in Section 2.1.1.
3. **Annual energy consumption:** The annual energy consumption in kilowatt-hours (kWh) or therms for each of the base and energy efficient technologies.
4. **Fuel type applicability multipliers:** Applies an adjustment to the total equipment stock to account for the proportion applicable to a given measure's fuel type. For example, a measure that replaces a baseline efficiency resistance water heater with a more efficient unit is only applicable to existing electric resistance water heaters. This multiplier is used to restrict the existing water heater equipment stock to only those that use electricity.
5. **Measure lifetime:** The lifetime in years for the base and energy efficient technologies. The base and energy efficient lifetimes only differ in instances where the two cases represent inherently different technologies, such as LEDs or CFL bulbs compared to a baseline incandescent bulb.

6. **Incremental costs:** The incremental cost between the assumed baseline and efficient technology, using the following variables:
   - ***Base costs:*** The cost of the base equipment, including both material and labor costs.
   - ***Energy efficient costs:*** The cost of the energy efficient equipment.
7. **Technology densities**: This study defines density as the penetration or saturation of the baseline and efficient technologies across PSE's territory. For residential, these saturations are on a per home basis; for commercial, they are per 1,000 square feet of building space; and for industrial, they are based on energy consumption.[14]
   - ***Base initial saturation:*** The initial saturation of the baseline measure as defined by the fraction of the end-use stock that has the baseline measure installed.
   - ***Energy efficient initial saturation:*** The initial saturation of the efficient measure as defined by the fraction of the end-use stock that has the efficient measure installed.
   - ***Total maximum density:*** The measure density (e.g., quantity of measures per home) as the sum of the base and efficient technology densities.
8. **Technology applicability:** The percentage of the base technology that can be reasonably and practically replaced with the specified efficient technology. For instance, occupancy sensors are only practical for certain interior lighting fixtures (an applicability less than 1.0), while all existing incandescent exit signs can be replaced with efficient LED signs (an applicability of 1.0).
9. **Competition group:** The team combined efficient measures competing for the same baseline technology density into a single competition group to avoid the double counting of savings. Section 2.1.5.3 provides further explanation on competition groups.

2.1.3.3 Measure Characterization Approaches and Sources

This section provides approaches and sources for the main measure characterization variables.

Energy Savings
Navigant took three general bottom-up approaches to analyzing residential and commercial measure energy and demand savings, including:

1. **RTF Measure Workbooks:** Navigant used RTF Measure Workbooks as much as possible for unit energy savings and calculations for the majority of measures. To supplement this, Navigant also leveraged the Seventh Plan, 2015 IRP, DOE Appliance Standards and Rulemakings Technical Support Document (TSD), IAC database, and TRMs.
2. **Program evaluation data:** Where available, Navigant used measure-specific program evaluation data from PSE to inform energy savings.
3. **Engineering analysis:** Navigant used appropriate engineering algorithms to calculate energy savings for any measures not included in PSE programs or available TRMs. The DSR team leveraged its internal expertise and past experience with potential studies to calculate the energy and demand savings.

Incremental Costs

[14] Navigant sourced density estimates from the RBSA, CBSA, IAC database, PSE program data, and other related secondary resources.

Navigant relied primarily on data from RTF Measure Workbooks, PSE-provided program data, and TRM data for incremental cost data. The team conducted secondary research and used other publicly available cost data sources such as the Seventh Plan, the Database for Energy Efficient Resources (DEER), ENERGY STAR, and other state databases for all other cost data.

Densities

The RBSA and CBSA were used to develop measure densities by customer segment. For measures not included in the RBSA or CBSA, Navigant leveraged other secondary data sources such as the Energy Trust of Oregon potential study, ENERGY STAR, and other state databases.

Industrial Measures

The industrial sector measure characterization deploys a high level approach that differs from the residential and commercial sectors. Navigant characterized industrial measures as a percentage reduction of the customer segment consumption. Energy savings and incremental cost for all industrial measures were evaluated using the IAC database.

2.1.3.4 Codes and Standards Adjustments

Energy efficiency regulations and standards, along with Washington State building energy codes, have been incorporated in this study.

The following sources were considered for this study:

- **US DOE:** The DOE publishes all federal energy efficiency standards and regulations. The TSD[15] contains information on the energy and cost effect of each appliance standard. Engineering analysis is available in Chapter 5 of the TSD; energy use analysis is available in Chapter 7; and cost impact is available in Chapter 8.
- **WSEC:** The WSEC 2015[16] that provides building energy code requirements was considered for baseline and efficient technology considerations. The WSEC 2015 has also been considered as the baseline assumption for whole building new construction measures.

As these codes and standards take effect, the energy savings from existing measures affected by these codes and standards declines and the reduction is transferred to the codes and standards savings potential. Navigant accounts for the effect of codes and standards through baseline energy and cost multipliers—sourced from the DOE's analysis—which reduce the baseline equipment consumption starting from the year a particular code or standard takes effect. The baseline cost of an efficient measure affected by codes and standards will often increase upon implementation of the code. Table 10 provides a summary of the relevant 2018 and beyond federal appliance standards that Navigant factored into this study. For example, the EISA 2020 lighting provision has been incorporated in the study and results in the baseline for general service lighting changing from an incandescent to a CFL-level wattage in 2020 (other lighting measures are also affected by the EISA provision). Accordingly, the model accounts for a reduction in energy consumption and an increase in cost in 2020 for the baseline technology through the above-stated codes and standard multipliers. As such, computed measure-level technical and achievable technical potential is net of these adjustments from codes and standards implemented after the first year

[15] Appliance standards rulemaking notices and Technical Support Documents can be found at: http://energy.gov/eere/buildings/current-rulemakings-and-notices.

[16] The WSEC 2015 code went into effect July 1, 2016.

of the study. The savings potential from codes and standards themselves is also reported at the aggregate level.

Table 10. List of Relevant Federal Appliance Standards

Sector	Product Type	Standard	Compliance Year
Residential	HVAC	Furnace Fans (ECM Motors)	2019*
	HVAC	Boilers	2021
	Appliances	Residential Clothes Washers	2018*
Commercial	HVAC	Commercial Package AC and Heating Equipment	2023
	Appliances	Commercial Clothes Washers	2018
	Water Heating	Pre-Rinse Spray Valves	2019
	Refrigeration	Automatic Commercial Ice Makers	2018
Industrial	Lighting	EISA Standards for General Service Lamps	2020

*These standards require compliance starting in the middle of the year, so Navigant estimated their effects starting in the following year.

2.1.4 Consistency with the Seventh Plan

As discussed in more detail in the following methodology sections and in Appendix B, Navigant used great care to maintain methodological consistency with the Council's Seventh Plan wherever possible. Key analytical components of this CPR where Navigant's methodology is explicitly consistent with the Council's methodology include the calculation of technical and achievable technical potential, the specification of measure-level maximum achievability factors, the assignment of measure-level ramp rates, the calculation of the TRC net levelized cost of energy, and some assumptions around the forecasted customer segment level growth rate of building stock in Washington State. On several occasions, Navigant interfaced directly with Council staff to solicit feedback on the methodology employed in the CPA analysis. These conversations helped to verify and validate methodological alignment where possible.

2.1.5 Approach to Estimating Technical Energy Savings Potential

This study defined technical potential as the total energy savings available assuming that all efficient measures/technologies are implemented wherever and whenever technically feasible. For discretionary (i.e., RET replacement type) measures, this means that all retrofits applicable to existing equipment or building stock are performed immediately. For lost opportunity (i.e., ROB and NEW replacement type) measures, existing baseline equipment is assumed to always be replaced with its efficient counterpart at the time of retirement and new construction building stock is assumed to always incorporate all technically feasible energy efficiency measures. The technical potential estimate explicitly ignores the effects of cost, market availability, and any other non-technical factors that could affect the adoption of an energy efficiency measure in practice. Thus, the technical potential represents a theoretical upper bound on the energy savings potential that can be achieved.

Navigant applied a bottom-up, technology diffusion and stock tracking model using a system dynamics framework to estimate the technical potential for energy efficiency and fuel conversion resources within PSE's service territory. The DSR team's modeling approach considers an energy efficient measure to be any change made to a building, piece of equipment, process, or behavior that saves energy. The savings can be defined in numerous ways depending on which method is most appropriate for a given measure. Measures like condensing water heaters are best characterized as providing some fixed amount of savings per equipment unit (e.g., water heater), while measures like commercial building automation systems are typically characterized as providing savings amounting to a fixed percentage of total customer segment energy consumption. Navigant's modeling approach can appropriately handle measure-level energy savings characterizations for both methods.

The calculation of technical potential in this study differs depending on the assumed measure replacement type. All technical potential is calculated on a per-measure basis and incorporates estimates of savings per unit, measure density (e.g., quantity of measures per residential home or per thousand square feet of commercial floor space), and total building stock for each customer segment in each service territory. The study accounts for three replacement types, as described in Section 2.1.1, where potential from NEW measures is calculated differently from potential for RET and ROB measures. The sections below provide explanations of the formulas used to calculate technical potential for each replacement type.

2.1.5.1 NEW Measures

The cost of implementing NEW measures is incremental to the cost of a baseline (and less efficient) measure. However, new construction technical potential is driven by equipment installations in new building stock rather than by installations in existing building stock.[17] New building stock is added to keep up with forecasted growth in total building stock and to replace existing stock that is demolished each year. Demolished (sometimes called replacement) stock is calculated as a percentage of existing stock in each year; this study used a demolition rate of 0.5% per year for residential and commercial stock and 0% for industrial stock. New building stock (the sum of growth in building stock and replacement of demolished stock) determines the incremental annual addition to technical potential, which is then added to totals from previous years to calculate the total potential in any given year. Equation 1 gives the formula used to calculate annual incremental technical potential for NEW measures, and Equation 2 gives the formula for computing the corresponding cumulative technical potential.

Equation 1. NEW Annual Incremental Technical Potential (AITP)

$$AITP_{Year} = New\ Buildings_{Year}\ (e.g., buildings) \times Measure\ Density\ \left(e.g., \frac{widgets}{building}\right) \times Measure\ Savings_{Year}\ \left(e.g., \frac{kWh}{widget}\right) \times Technical\ Suitability\ (dimensionless)$$

[17] In some cases, customer segment-level consumption/sales is used as a proxy for building stock. Consumption/sales is treated like building stock in that it is subject to demolition rates and stock-tracking dynamics.

Equation 2. NEW Cumulative Technical Potential (CTP)

$$CTP = \sum_{Year=2018}^{2037} AITP_{Year}$$

2.1.5.2 RET and ROB Measures

RET measures—commonly referred to as discretionary, advancement, or early retirement measures—are replacements of existing equipment before the equipment fails. They can also be efficient processes that are not currently in place and that are not required for operational purposes. Retrofit measures incur the full cost of implementation rather than costs that are incremental to some other baseline technology or process because the customer could choose not to replace the measure and would therefore incur no costs at all.

In contrast, ROB measures—sometimes referred to as lost opportunity measures—are replacements of existing equipment that has failed and must be replaced or updates to existing processes that must be renewed. Because the failure of the existing measure or renewal of the existing process prompts a capital investment by the customer, the cost of implementing ROB measures is always incremental to the cost of an associated baseline (i.e., less efficient) measure.

Retrofit and ROB measures have different implications for the computation of technical potential compared with new construction measures. For retrofit measures, the DSR team uses the entire building stock to calculate technical potential in any given year.[18] This method effectively assumes that all retrofits can be made instantaneously and does not limit the calculated technical potential to any pre-assumed rate of adoption of retrofit measures. Existing building stock is reduced each year by the quantity of demolished building stock in that year and does not include new building stock that is forecasted to come online throughout the study horizon.

For retrofit measures, annual potential is equal to cumulative potential, thus offering an *instantaneous* view of technical potential. Equation 3 gives the formula used to calculate technical potential for retrofit measures.

Equation 3. RET Annual/Cumulative Technical Potential

$$CTP = Existing\ Building\ Stock_{Year}\ (e.g., buildings) \times Measure\ Density\ \left(e.g., \frac{widgets}{building}\right) \times Measure\ Savings_{Year}\ \left(e.g., \frac{kWh}{widget}\right) \times Technical\ Suitability\ (dimensionless)$$

For ROB measures, the turnover of existing equipment units constrains computed technical potential. The present analysis assumes that equipment turnover/burnout occurs at a rate inversely proportional to the effective useful lifetime (EUL) of the inefficient equipment, and only equipment that turns over in a given year is eligible for replacement by more efficient equipment. For example, for an equipment unit with a useful lifetime of 8 years, the technical potential calculation assumes one-eighth of existing equipment units turn over in the first year of analysis, and all of these are replaced by the corresponding efficient technology. In the second year, one-eighth of the remaining equipment units turn over (i.e., 1/8*(1-

[18] Ibid.

1/8) = 7/64 < 1/8 of the original existing equipment units) and are replaced by the efficient technology. This process repeats for the remaining analysis years resulting in an exponential decay of existing baseline equipment stock.

For ROB measures, annual potential is incremental in each year and cumulative potential is the accumulation of annual potential over the study horizon. Equation 4 provides a simplified formula used to calculate annual incremental technical potential for ROB measures under the assumption of zero building stock demolition. Because the present study assumed nonzero demolition rates of 0.5% per year for the residential and commercial sectors, a system dynamics framework was required to properly track ROB stock eligible for efficient equipment replacement in each year of the study.[19] Equation 5 provides the formula for aggregating annual potential to cumulative technical potential.

Equation 4. ROB AITP Without Demolitions

$$AITP_{Year} = \left[Existing\ Building\ Stock_{2016}\ (e.g., buildings) \times Measure\ Density\ \left(e.g., \frac{widgets}{building}\right)\right] \times \left(\frac{1}{Widget\ EUL\ in\ years}\right)^{(Year-2016)} \times Measure\ Savings_{Year}\ \left(e.g., \frac{kWh}{widget}\right) \times Technical\ Suitability\ (dimensionless)$$

Equation 5. ROB CTP

$$CTP = \sum_{Year=2018}^{2037} AITP_{Year}$$

2.1.5.3 Competition Groups

Navigant's modeling approach recognizes that some efficient technologies should directly compete against each other in the calculation of potential. The study defines competition as one efficient measure competing for the same installation as another efficient measure. For instance, a consumer has the choice to install a condensing or a near-condensing water heater but typically will not install both—these efficient technologies compete for the same installation. Any measures that directly compete with one another for the same installation are said to be in the same competition group.

Characteristics of competing technologies used to define competition groups include the following:

- Competing efficient technologies share the same baseline technology characteristics, including initial market saturation, cost, and consumption
- Baseline and efficient measure densities (i.e., number of equipment units per building) for competing efficient technologies are the same
- Installation of competing technologies is mutually exclusive (i.e., installing one precludes installation of the others for a particular application)

[19] See Sterman, John D. *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Irwin McGraw-Hill. 2000 for detail on system dynamics modeling. Also see http://en.wikipedia.org/wiki/System_dynamics for a high level overview.

- Competing technologies share the same replacement type (RET, ROB, or NEW)
- The initial baseline market saturation for a competition group together with the initial efficient market saturations of all competing measures in the group sum to one

To address the overlapping applicability of measures within a competition group, Navigant's analysis selects only one measure per competition group to include in the summation of technical potential across measures (e.g., in reporting of aggregated technical potential at the end use, customer segment, sector, service territory, or total level). The measure with the largest energy savings potential in a given competition group is used for calculating the total technical potential of that competition group, ensuring that the aggregated technical potential does not double count savings. The model does still calculate the technical potential for each individual competition group measure outside the aggregate result summations.

2.1.6 Approach to Estimating Achievable Technical Energy Savings Potential

Achievable technical potential is defined as the subset of technical potential considered achievable given assumptions about the realistic market adoption of a given measure. It is the product of the technical potential with two measure-specific factors: the assumed maximum long-run achievability of each measure and a time-dependent factor that reflects barriers to market adoption. These adoption barriers include consideration of likely implementation strategies, available market delivery channels, potential for adoption by building code or appliance standards, and past experience of PSE program staff with similar measures, among other factors. Navigant's approach to estimating achievable technical potential is consistent with the guidelines and methodology set forth in the Council's Seventh Plan.[20]

The maximum long-run achievability factor for each measure is a number between zero and one reflecting the percentage of that measure's technical potential that can be achieved over a long-term time horizon without considering time-dependent barriers to market adoption. The product of this factor with the total technical potential over the study horizon yields the maximum achievable technical potential for each measure. The Seventh Plan limits achievability factors to 85%, drawing on a retrospective analysis that suggests roughly 15% of the population will typically abstain from adopting an energy efficiency measure even under favorable economics and availability.[21] Navigant assigned this 85% maximum achievability factor to most efficient measures in the present analysis. Exceptions included building automation systems, high efficiency new construction, HVAC heat recovery, fuel conversion measures, and various industrial measures, which were assigned lower achievability factors based on past PSE program experience with these and similar measures. Table 28 in Appendix A provides a list of the individual measures whose maximum achievability factors were adjusted below the 85% default value.

Navigant modeled the effects of time-dependent barriers to market adoption by applying ramp rates to the maximum achievable technical potential. These ramp rates spread the maximum achievable technical potential for each measure over the study horizon, accounting for assumptions about the timing of when this potential will be realized. Navigant leveraged the suite of ramp rates provided by the Council in the

[20] See the Chapter 12 and Appendix G of the Seventh Power Plan for more details on the calculation of achievable technical potential.

[21] See https://www.nwcouncil.org/reports/2007/2007-13/ for more information on how the Council arrived at the 85% limit for maximum long-run achievability.

Seventh Plan's supplemental data files[22] and assigned a single ramp rate to each measure based on the technical characteristics and the availability of likely delivery channels for that measure. Where possible, Navigant's ramp rate assignments were consistent with the Council's assignments. For example, lighting measures were typically assigned a fast ramp rate that achieved 90% of the maximum achievable technical potential within the first 10 years, while high efficiency air conditioners, furnaces, and heat pumps were assigned a ramp rate that achieved adoption slowly over the initial study years and then accelerated toward the maximum achievable technical potential in the later years. Consistent with the 2015 IRP, all retrofit measures were assigned an accelerated 10-year ramp that assumed one-tenth of the maximum achievable technical potential was realized in each of the first 10 years of the study.

Using the definitions of cumulative total technical potential provided in Equation 2 and Equation 3, the formula for calculating achievable technical potential is given in Equation 6. Achievable technical potential is calculated by multiplying each measure's total technical potential by its maximum achievability factor (generally 85% per the Council's recommendation) and then applying a ramp rate to the resulting maximum achievable technical potential.

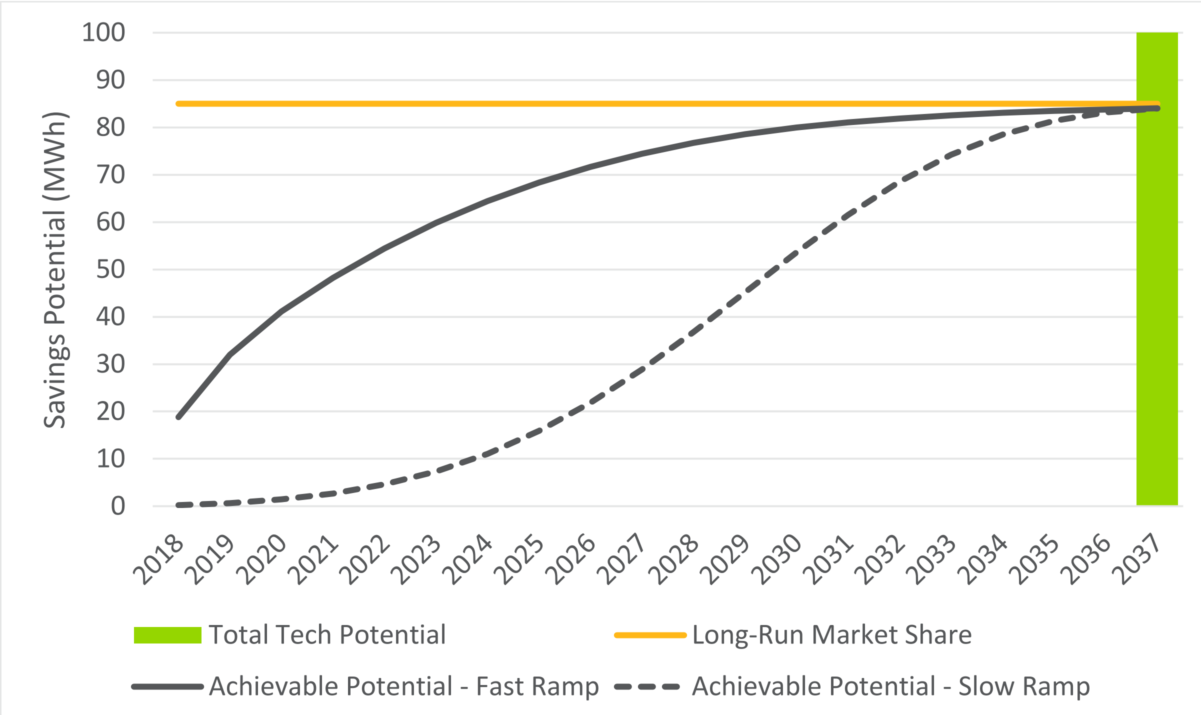
Equation 6. Achievable Technical Potential

$$Achievable\ Tech\ Potential_{Year} = Total\ Technical\ Potential \times Max\ Achievability\ Factor \times Ramp\ Rate_{Year}$$

Figure 8 illustrates the relationship between total technical potential, maximum achievable technical potential, and final computed achievable technical potential in each year of the study as a function of ramp rate choice. The timing of achievable technical potential across the study horizon is driven by the choice of ramp rate. All average megawatt (aMW) values in the figure are for illustration purposes only.

[22] See https://www.nwcouncil.org/energy/powerplan/7/technical for the supplemental data files that accompany Council's the Seventh Plan.

Figure 8. Illustration of Achievable Technical Potential Calculation



For measures involved in competition groups, an additional computational step is required to compute achievable technical potential. While the technical potential for a competition group as a whole reflects only the measure in that group with the greatest savings potential, all measures in a competition group may be allocated achievable technical potential based on their attractiveness relative to one another. The product of the technical potential for the competition group with the maximum achievability factor for the group (all measures in a competition group had identical maximum achievability factors) gave the group's maximum achievable technical potential. This was then allocated across the various competing measures based on their relative customer economics.

For each competition group measure, Navigant computed the relative customer economics ratio to reflect all costs and savings a customer would experience as a result of implementing the measure. This ratio was then input to a logit discrete choice model[23] to allocate market share across the competing measures based on their relative customer economics. The resulting market share splits were multiplied by the maximum achievable technical potential for the group to give the achievable technical potential for each individual measure. This methodology ensured that final estimates of achievable technical potential reflected the relative economic attractiveness of measures in a competition group and that the sum of achievable technical potential from all measures in a competition group respected the maximum achievable technical potential of the group as a whole.

[23] A logit formulation is based on documented consumer decision theory that accounts for consumer preferences in competing choices based on the relative and absolute differences between the choices.
See McFadden, D. and Train, K. "Mixed MNL Models for Discrete Response," *Journal of Applied Econometrics,* Vol. 15, No. 5, 447-470. 2000. and Train, K. "Discrete Choice Methods with Simulation," (Massachusetts: Cambridge University Press, 2003).

2.1.7 Approach to Estimating Electric Peak Demand Savings Potential

Navigant computed technical and achievable technical electric peak demand savings for each measure based on the corresponding electric energy savings potential. A portion of the annual electric energy savings for each measure was allocated to each of the 8,760 hours in the year (8,784 hours in leap years) by applying an hourly load shape. PSE provided Navigant with load shapes by end use and customer segment, and the DSR team supplemented these with whole building/facility load shapes from the DOE's Open EI database[24] for measures applicable to the whole building end use. Load shapes were assigned based on the associated customer segment and end use applicable to each measure. For example, the hourly load shape for single-family home lighting was different from the load shapes for multifamily lighting and single-family space heating.

After generating hourly savings profiles for each measure's technical or achievable technical electric energy savings potential by applying the hourly load shapes, the savings in each hour was compared with PSE's peak load hours to determine the average energy savings across those hours.[25] This average hourly savings was the measure's technical or achievable technical peak demand savings potential.

2.1.8 Approach to Calculating Levelized Cost of Conserved Energy

The levelized cost of conserved energy is the discounted present value net cost of each measure over the 20-year analysis horizon divided by the discounted present value of energy savings over the same period. Calculating the levelized cost of conserved energy is an important component of the CPA and allows the cost of conservation to be compared with other distributed energy and supply-side resources in budgeting and resource planning activities. The levelized cost of conserved energy is also a primary input for generating the conservation supply curves outlined in Section 2.1.9.

For each measure considered for analysis, Navigant computed a total resource net levelized cost, or TRC net LCOE. For brevity, the TRC net LCOE will be referred to simply as the LCOE for the remainder of the report. Similar to the TRC test as outlined by the California Standard Practice Manual,[26] the TRC net LCOE calculation is meant to value all cost and benefit streams associated with a measure, regardless of who incurs these costs or benefits. The DSR team worked closely with both PSE and Council staff to ensure that the methodology employed in the present analysis for computing each measure's LCOE was consistent with that outlined in Appendix G of the Seventh Plan.[27] The costs and benefits considered for each measure fell into the categories shown in

Table 11.

[24] Whole building loadshapes can be found at the following link: http://en.openei.org/doe-opendata/dataset/commercial-and-residential-hourly-load-profiles-for-all-tmy3-locations-in-the-united-states

[25] Peak load hours were defined to be hour-ending 7 a.m.-11 a.m. and 6 p.m.-10 p.m. on weekdays in December.

[26] The California Standard Practice Manual can be accessed at the following link: http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy_-_Electricity_and_Natural_Gas/CPUC_STANDARD_PRACTICE_MANUAL.pdf

[27] More detail on the Council's LCOE methodology can be found at the following link: https://www.nwcouncil.org/media/7149911/7thplanfinal_appdixg_consresources.pdf

Table 11. Costs and Benefits Included in LCOE Calculation

Costs	Benefits
Capital and labor	Deferred transmission and distribution (T&D) expansion
Annual operations and maintenance (O&M)—negative if measure provides O&M savings relative to baseline	Regional act credit—10% adder to measure energy savings
Program administration—20% of measure incremental costs	Other fuel benefits—negative if measure results in additional other fuel costs relative to baseline
	Quantifiable non-energy benefits—negative if measure results in additional non-energy costs relative to baseline

Note: These costs and benefits were included in the computation of each measure's LCOE. Note that negative costs are considered benefits and negative benefits are considered costs.

In most cases, measure incremental costs were the largest cost component. However, for measures that saved both electric and gas energy, other fuel benefits and costs could also be substantial. For example, for homes with electric cooling and natural gas space heating, a smart or programmable thermostat measure would save cooling electricity in the summer and space heating natural gas in the winter. Both of these savings were tracked and valued in the measure's reported LCOE.

Deferred T&D expansion benefits could also be significant for measures whose hourly savings profile aligned well with PSE's system peak. For example, since lighting is highly coincident with PSE's evening peak hours (weekdays from 6 p.m.-10 p.m. during December), lighting measures tended to have a significant deferred T&D expansion benefit. These benefits were valued by multiplying a measure's per-unit peak demand savings by PSE's T&D avoided costs.

The Council's LCOE methodology employs assumptions about program administration costs and also allows for an additional 10% regional act credit on top of the reported savings of conservation measures to incentivize them over other supply alternatives. Navigant incorporated both of these assumptions in its computation of LCOE. Consistent with the Council's methodology, program administration costs were included at a rate of 20% of a measure's net incremental cost and the 10% regional act credit was applied as an adder to the measure's energy savings.

Finally, quantifiable non-energy benefits were accounted for as an ongoing annual O&M savings stream. For example, efficient low-flow showerheads result in decreased water consumption. This water savings was valued as a benefit to installing the measure and incorporated into the measure's LCOE.

Navigant computed the present value of the cost and benefit streams for all categories listed in

Table 11 over the 20-year analysis horizon from 2016 to 2037.[28] For measures with a lifetime less than 20 years, a combination of a true cash flow approach and an annuitization approach was used to calculate the present values. For example, a measure with a 5-year lifetime can be installed exactly four times over a 20-year horizon, and the resulting cash and energy flows repeat exactly four times during that horizon. A measure with an 8-year lifetime can be installed twice during the horizon and receive credit for its full lifetime savings potential each time. To account for the remaining 4 years in the horizon, the costs and benefits over the full measure life are annuitized and assigned to each of the last 4 years. This ensures that the 8-year measure is not penalized with the full incremental costs when installed in year 17 while only being credited with the final 4 years of benefits.

With this accounting of the present value of costs and benefits over the 20-year analysis horizon, Equation 7 provides the formula used to compute the LCOE.

Equation 7. Formula for Computing LCOE

$$LCOE = \frac{PV\ of\ Net\ Costs}{PV\ of\ Energy\ Savings} = \frac{PV\ of\ Costs - PV\ of\ Benefits}{PV\ of\ Energy\ Savings}$$

2.1.9 Conservation Supply Curves

Supply curves of conservation potential provide an excellent view into the savings potential and associated costs across the entire stack of measures considered for analysis. Some measures may have a large amount of savings potential but also have a high cost for each unit of energy saved, while other measures may have a low cost of conserved energy but also little potential for energy savings. Additionally, the savings and LCOE for a given measure may vary considerably across customer segments and/or replacement types; that is smart thermostats may yield a higher cost of conserved energy as a retrofit measure to existing construction than as an upgrade to new construction. Conservation supply curves help to organize these differences in measure potential and cost in a format that is intuitive for resource planning and program staff, and provide a means to focus attention on the most cost-effective measures when trying to acquire a target amount of conserved energy with a proposed amount of budget.

Navigant calculated energy conservation supply curves by ranking each unique combination of measure, customer segment, and replacement type by its associated LCOE and then plotting this LCOE as a function of the energy conservation potential accumulated up to that point in the rank ordering. Supply curves were computed for both electric and gas achievable technical energy savings potential.

The ranked LCOE values used to compute the supply curves were slightly different than those discussed in Section 2.1.8 and presented elsewhere in the report. Because of inflation, projected future cost declines for certain measures, and forecasted changes in avoided costs over the study horizon, the TRC net LCOE for a given measure could vary across the various years in which it was installed. However, to generate the supply curves, a single LCOE value was needed that represented the value of all savings and cost streams associated with a given measure over all install years within the study horizon. This

[28] Navigant used PSE's weighted average cost of capital as the discount rate in this study.

single LCOE value was computed in real 2018 dollars as the net present value (NPV) of the stream of nominal TRC net LCOE values from 2018 through 2037, discounting future values at PSE's weighted average cost of capital discount rate. This yielded a single LCOE value for each measure that accurately reflected the present value of this measure's projected costs and savings from all installations over the study horizon. It was this value that was used to generate the supply curves and to bundle measures by cost of savings for input into PSE's IRP model, as discussed in Section 2.5.

2.1.10 Approach to Disaggregating Potential to the ZIP Code Level

In addition to conservation supply curves and aggregate potential results at the customer segment level, Navigant provided PSE with disaggregated forecasts of achievable technical energy and peak demand potential at the ZIP code level. Because building stock and sales data for each customer segment was only available at the level of PSE's service territory as a whole, this geographical disaggregation was performed as a post-processing step after the computation of the achievable technical potential at the service territory level. This highly granular output will enable PSE to target particular locales for conservation and, in particular, to identify areas of its service territory where energy conservation may be able to alleviate congestion in the transmission and distribution system. Having such a granular forecast of potential will also enable PSE to re-aggregate results to satisfy any other geographical analyses of conservation potential that may be desired and that were outside the scope of this particular CPR.

To perform the disaggregation of potential, Navigant leveraged the most recent year of PSE's customer billing data to determine customer counts and electric and gas energy consumption for each customer segment associated with each ZIP code in PSE's service territory. This required first developing a mapping between the North American Industry Classification System (NAICS) building codes[29] assigned to each of PSE's billing accounts and the customer segments used for the CPA analysis. Once each customer account was mapped to one of the twenty-four CPA customer segments, the percentage of each customer segment's total electric and natural gas energy consumption coming from each ZIP code in PSE's service territory was determined by aggregating accounts by the ZIP codes associated with the primary account address. These ZIP code percentages varied by customer segment and impact type, i.e., electric energy or natural gas. Finally, the ZIP code percentages were applied to the achievable technical potential computed at the service territory level for each customer segment to disaggregate the potential to the ZIP code level.

Navigant's disaggregation methodology ensured that the achievable technical savings potential was not simply spread evenly across all customer segments for each ZIP code. Rather, each ZIP code's unique demographic composition and corresponding pattern of energy consumption were directly used to accurately allocate potential. This ensured that the reported energy savings potential for any ZIP code accurately reflected the types and relative densities of businesses and homes in that ZIP code, Ultimately, such an analysis will enable PSE to target individual ZIP codes where program efforts may have the greatest impact, as well as to combine its detailed understanding of distributed energy resource potential with supply and distribution planning at the same level of geographical granularity.

[29] See https://www.census.gov/eos/www/naics/ for more information about NAICS code designations.

2.2 Fuel Conversion

This study estimates the potential for electricity savings in PSE's service territory that results from the replacement of equipment that consumes electricity with corresponding equipment that consumes natural gas. Navigant considered a range of space and water heating equipment and large appliances eligible for fuel conversion and estimated the total electricity saving potential and costs of converting to natural gas equipment. The final estimates of electric savings potential from fuel conversion were a function of gas availability, upfront equipment costs, gas consumption costs, technical equipment applicability, and competition between fuel conversion and associated energy efficiency measures applicable to the same installation.

2.2.1 General Approach and Methodology

Navigant estimated the fuel conversion potential for the residential and commercial sectors in the portion of PSE's service territory where PSE provides both electricity and natural gas service. The analysis considered potential from existing single-family homes, existing and new multifamily buildings, and existing and new commercial buildings for the space heating, water heating, and large appliance end uses. Because of high upfront costs for the equipment units associated with the fuel conversion potential, all fuel conversion measures were considered lost opportunity measures. That is, a fuel conversion could only take place upon new building construction (NEW replacement type) or burnout of existing equipment (ROB replacement type).

Navigant carefully considered customer eligibility in the computation of fuel conversion electricity savings potential. Customers were considered eligible for fuel conversion if they resided in PSE's combined electric and gas service territory, had electric equipment that could be converted to natural gas equipment, and either had existing natural gas service or did not have existing gas service but were located on a natural gas main. PSE does not charge a customer for installing a gas meter, provided that the customer does not require a gas line extension from the gas main to the property. Customers that required gas line extensions to establish natural gas service were deemed ineligible for fuel conversion because the costs for these line extensions would have been prohibitive in the context of the present analysis. Navigant used the 2015 CPA and PSE's 2010 Residential Characteristics Research report to determine the population eligible for fuel conversion within PSE's combined electric and gas service territory. Table 12 provides percentages of the population eligible for fuel conversion based on gas availability alone.

Table 12. Gas Availability by Customer Segment and Replacement Type

End Use	**Residential Single-Family Homes** (ROB)	**Residential Multifamily Homes** (NEW)	**Commercial Buildings** (ROB and NEW)
Space Heating	14%	25%	25%
Water Heating	19%	25%	25%
Appliances	80%	25%	25%

Note: For each customer segment considered in the fuel conversion potential analysis, these percentages reflect the proportions of customers within PSE's combined electric and gas service territory that had existing natural gas service or had no gas service but were located on a gas main.

Navigant computed technical fuel conversion potential in a similar manner to technical energy efficiency potential (described in Section 2.1.5). Each fuel conversion measure competed with at least one other electric energy efficiency measure. The technical potential for the associated competition group was calculated by assuming the measure with the highest overall electric energy savings potential in the group was implemented wherever technically feasible. This was not always the fuel conversion measure, even though fuel conversion measures typically saved nearly 100% of baseline electric energy consumption.[30] In some cases, reduced applicability of the fuel conversion measure due to gas availability constraints resulted in a total technical savings potential lower than that of an associated electric energy efficiency measure. In this case, the energy efficient measure with the higher technical potential was used to compute the total technical potential for the competition group. That is, the competition group measure with the highest overall technical potential was not always the same as the measure with the highest per-unit savings.

The achievable technical potential for each measure in the competition group was computed according to the same methodology outlined in Section 2.1.6. That is, the maximum achievable technical potential for each competition group was allocated across all competing measures using a logit model based on relative customer economics. In the case of fuel conversion measures, the customer economics included a full treatment of net measure cost, including the upfront cost of equipment, the cost of any increased natural gas consumption, the value of the saved/avoided electricity, and any changes to yearly O&M costs resulting from implementing the measure. By directly competing fuel conversion measures with their electric energy efficiency counterparts, the achievable technical fuel conversion potential allowed for the possibility of customer preference for non-fuel-conversion alternatives. The direct measure competition also explicitly prevented any double counting of potential between fuel conversion and same fuel energy efficiency measures.

2.3 Demand Response

Navigant followed a bottom-up approach for developing DR potential and cost estimates. The potential estimation framework combined primary data available from PSE with relevant secondary sources of information. All input variables fed into Navigant's DR-Sim model, which was customized to meet the specific requirements for this study. This section presents the overall potential estimation approach and provides a detailed description of the potential estimation steps.

2.3.1 Key Highlights of Navigant's Methodology for DR Potential Estimation

This section briefly summarizes the key highlights of the DSR team's methodology and how it differed from the approach followed in PSE's 2015 CPA.

[30] In some cases, the electric energy savings from fuel conversion measures was less than 100% of the baseline consumption. In these cases, fans, pumps, or other auxiliary processes related to the fuel conversion measure still consumed some small amount of electricity.

2.3.1.1 Segmentation of Commercial and Industrial (C&I) Customers by Size

For DR potential estimation, Navigant segmented C&I customers by size, based on maximum demand values following PSE's rate schedules. Segmentation by size is an important criterion for the DR potential assessment because DR programs/pricing offers vary by size within the same building type (e.g., small and medium offices are typically offered a DLC program while a large office customer is typically offered a C&I Curtailment type program). In addition, DR programmatic assumptions vary by customer size.

2.3.1.2 Broad Spectrum of DR Options and Sub-Options

Navigant considered a broader spectrum of DR options/program types than the 2015 CPA. For example, the 2015 potential study did not consider DLC for C&I customers, while this study included small and midsized commercial customers for the DLC potential assessment. This study also includes an Economic DR option, which involves voluntary load curtailment for energy only versus firm capacity reduction commitment from customers in C&I Curtailment. In addition, the present study estimates DR potential for providing ancillary services (spinning, non-spinning, frequency regulation) to help fulfill operating reserve requirements.[31]

Navigant's approach also further disaggregated DR options by type of control. For example, within C&I Curtailment and Economic DR options, the study provides separate potential estimates for manual and Auto-DR-enabled curtailment.

2.3.1.3 Potential Estimates by Customer Class, Building Type, and End Use

Navigant developed disaggregated winter and summer peak load projections by customer class, building type, and end use, utilizing the end use load shapes by building type provided by PSE and calibrated to PSE's sales forecast. This formed the foundation for developing potential estimates at a highly granular level by segment and end use for each DR option and sub-option. The programmatic assumptions for potential estimation, such as participation and unit impacts, were also developed at these levels.

2.3.1.4 Summer Potential Estimates

At PSE's request, Navigant developed summer peak load reduction potential in addition to winter DR potential. Summer potential estimates included the same level of granularity in terms of disaggregation of summer coincident peak demand by customer class, building type, and end use. Appendix E of this report presents summer potential results.

2.3.1.5 DR Potential Estimates by Event Duration

Navigant estimated DR potential for 2-hour and 4-hour event durations. Event duration affects the average impact that could be realized during the DR event period, with longer duration events realizing lower average impact than shorter duration events. Event duration is also likely to affect participation

[31] Fast DR events may be called at any time to help meet ancillary services requirements such as spinning and non-spinning reserves. These are not necessarily restricted to system peak hours. Therefore, Fast DR potential assessment requires hourly load analysis, which is outside the scope of this analysis. The Fast DR potential estimates in this report do, however, provide an indication of fast-responding DR resource availability during system peak hours.

assumptions because customers are likely to be more willing to be controlled over shorter event durations than longer event durations.

2.3.1.6 Validation of Assumptions with Field Information from DR Vendors

Navigant was simultaneously engaged with PSE's DR resource acquisition efforts at the time of this potential study. Navigant's DR potential study team members were also closely involved in the review of DR vendor bids for PSE. This helped the potential study team validate programmatic assumptions for the potential study with field data presented by the vendors.

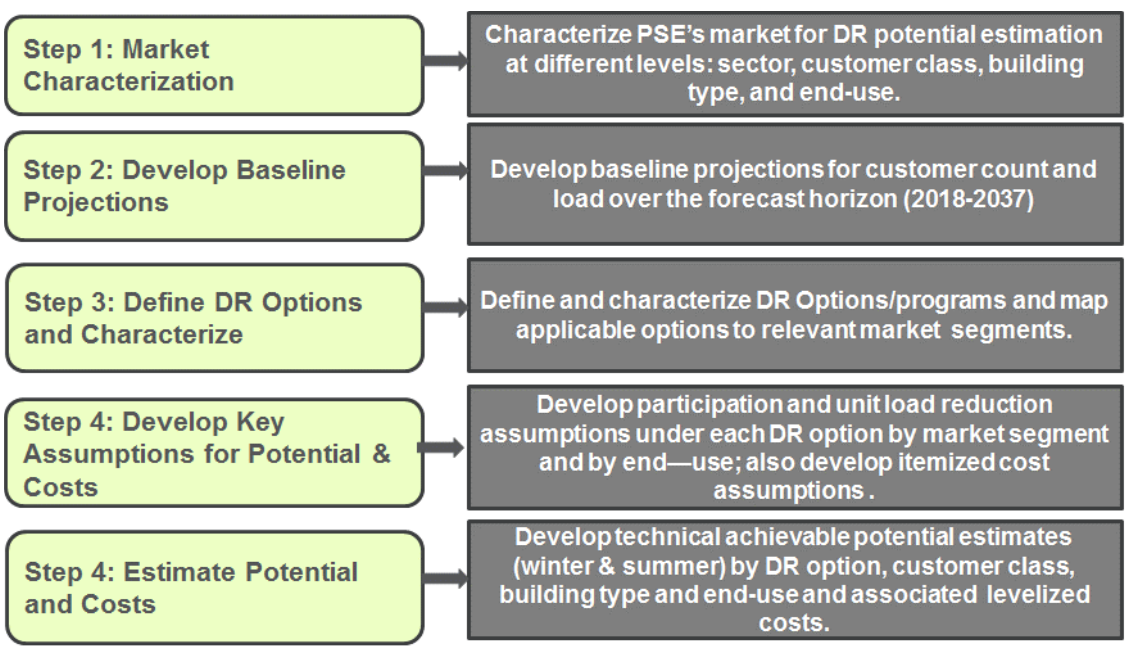
2.3.1.7 Standalone DR Technical Potential Estimates

At PSE's request, Navigant estimated the theoretical potential associated with each DR sub-option, referred to as technical potential. Technical potential assumes 100% participation of the eligible load is controllable and curtailable by the associated control technology type in a particular DR potential. For example, for C&I Curtailment, technical potential estimates are based on 100% of the load being available for curtailment through either manual methods or Auto-DR-enabled control, and represents the theoretical maximum load reduction potential associated with that particular type of control mechanism. Appendix E presents the DR technical potential results.

2.3.2 General Approach and Methodology

Figure 9 presents the steps Navigant followed for this study's DR potential estimation. This section describes these potential estimation steps.

Figure 9. DR Potential Assessment Steps



2.3.2.1 Market Characterization for DR Potential Assessment

Market characterization is the first step in the DR potential assessment process. Table 13 presents the different levels of market segmentation for PSE's DR potential assessment. It is based on an examination of PSE's rate schedules, retail sales and demand data, and available end use load shapes provided by PSE. Navigant finalized the market segmentation for DR potential assessment in consultation with PSE. The different levels at which Navigant segmented the market for this assessment is briefly described below.

Table 13. Market Segmentation for DR Potential Assessment

Level	Description
Level 1: By Sector	• Residential • Commercial and Industrial (C&I

Level 2: By Size Customer Class	• Residential
	• C&I customers by size based on maximum demand values:
	  o Small C&I: ≤50 kW maximum demand
	  o Medium C&I: >50 kW, but ≤150 kW maximum demand
	  o Large C&I: >150 kW maximum demand (excluding customers under primary and high voltage service)
	  o Extra-large C&I: Very large sized customers under primary and high voltage service

Level 3: By Building Type (Under Each C&I Class)	Segmentation based on mapping of NAICS codes to building types. C&I segments are Grocery, Hospital, Hotel, Office, Restaurant, Retail, School, University, Warehouse, and Industrial.
Level 4: By End Use	Disaggregation by end use based on available end use load shapes from PSE. • Residential: Central Air Conditioning, electric central furnace, heat pump, electric water heating, other. • C&I: Space cooling, central heating, heat pump, water heating, lighting, refrigeration, process, other.

Level 1: By Sector. At the first level, the DSR team segmented customers broadly into residential and commercial and industrial (C&I customers.

Level 2: By Size (based on maximum demand value). At the next level, Navigant further segmented C&I customers by size based on their maximum demand values, as the type of DR program offer varies by customer size. As shown in Table 13, C&I customers were segmented by size into four categories: small, medium, large and extra-large. Table 14 shows how these size categories map to PSE's rate schedules and their maximum demand values. For the DR potential analysis, residential customers were considered to be a single segment and were not specified by dwelling type because DR programs and pricing offers typically target all residential customers.

Table 14. Mapping of PSE's Rate Schedules to Customer Classes

Customer Class	Description	PSE Rate Schedules
Small C&I	≤50 kW max demand	Sch. 24: General Service (≤50 kW max demand customers)
Medium C&I	>50 kW and ≤150 kW max demand	Sch. 25: Small Demand General Service (>50 kW and ≤350 kW max demand customers)
Large C&I	>150 kW max demand	• Sch. 25: Small Demand General Service (>50 kW and ≤350 kW max demand customers) • Sch. 26: Large Demand General Service (>350 kW max demand customers)
Extra Large C&I	Very large sized customers under primary and high voltage services	• Sch. 31: Primary General Service (>350 kW with delivery at primary voltage—600 volts or higher) • Sch. 40: Large Demand General Service (>3aMW load on a distribution feeder) • Sch. 49: High Voltage General Service (Billing demands not less than 4,400 kVA and delivered at high voltage—50,000 volts or higher)

Level 3: By Building Type. Within each C&I size segment, customers were further segmented by building type. The segmentation by building type followed the approach undertaken for energy efficiency potential assessment where NAICS codes were mapped to the building segments considered in the analysis. For the DR potential assessment, only one industrial segment was considered because end use load shapes data was only available in aggregate for industrial customers.

Level 4: By End Use. The last stage in market characterization was to disaggregate coincident peak demand by end use for each building type within the four C&I customer classes and for residential. Residential electric load was broken down by central heating, central cooling, heat pump, water heating and everything else as other. C&I load was disaggregated by central heating, central cooling, heat pump, water heating, lighting, refrigeration, process, and other.

2.3.2.2 Baseline Projections for DR Potential Assessment

Once market segments are defined, the next step is to select the base year, which is the latest year for which full customer count and load data is available, and define the potential assessment period. 2015 was the base year for this study because it was the latest year for which full market data was available at the time of the analysis. The study developed DR potential assessment over a 20-year time horizon—from 2018 to 2037.

For DR analysis, the two key parameters for which baseline projections need to be developed are customer count and load. These projections are based on system demand and customer data (both sales and count), which were provided to Navigant by PSE. As mentioned earlier, customer data from PSE by NAICS code was mapped to the segments considered in the study. For the DR potential assessment, a combination of the customer data by NAICS code and rate schedule was used to develop count and sales projections by customer class and building type. To further break down sales by end use within each building type, Navigant heavily leaned on Pacific Northwest-specific data from Navigant's previous

DR potential assessment for the Council[32] under the Council's Seventh Power Plan and also on data from the Commercial Building Energy Consumption Survey (CBECS)[33] for the Pacific region. Using these sources, Navigant developed end use-level baseline energy use projections by customer class and building type. Navigant then utilized the 8,760 end use load shapes by building type—available from PSE—to characterize the peak demand by building type. The determination of peak demand months and hours for winter and summer were based on an assessment of PSE's 8,760 system load data. The winter peak demand period refers to 7 a.m. to 10 a.m. in the morning, and 5 p.m. to 9 p.m. in the evening, from November 1 through February 28/29 on weekdays. The summer peak demand period refers to 2 p.m. to 6 p.m. on weekdays from May through September. For customer count projections, Navigant used sector-level projections available from PSE in combination with customer count data by rate schedule and NAICS code to develop disaggregate customer count projections by customer class and building type.

Table 15 summarizes the DR options included in this study. These are briefly described below.

Table 15. DR Options Considered in the Study

DR Options	Characteristics of DR Options	Eligible Customer Classes	Targeted/Controllable End Uses
DLC • Thermostat • Load Control Switch	Control of electric loads by a thermostat and/or load control switch	• Residential • Small C&I • Medium C&I	Electric space heating (including heat pumps), electric water heating, cooling
C&I Curtailment • Manual • Auto-DR enabled	• Firm capacity reduction commitment • $/kW payment based on contracted capacity plus $/kWh payment based on energy reduction during an event	• Large C&I • Extra Large C&I	Various load types including HVAC, lighting, refrigeration, and industrial process loads
Economic DR • Manual • Auto-DR enabled	• No firm capacity commitment • Voluntarily reduce load during events • Only $/kWh payment for energy reduction	• Large C&I • Extra Large C&I	Various load types including HVAC, lighting, refrigeration, and industrial process loads

[32] Navigant. "Assessing Demand Response Program Potential for the Seventh Power Plan," prepared for Northwest Power and Conservation Council. February 2015.
[33] See https://www.eia.gov/consumption/commercial/.

DR Options	Characteristics of DR Options	Eligible Customer Classes	Targeted/Controllable End Uses
Dynamic Pricing • Without enabling tech. • With enabling tech.	Voluntary opt-in dynamic pricing offer (critical peak pricing, or CPP) for all customer classes	All classes	All
Fast DR • Only tech. enabled	Fast responding DR for providing ancillary services (with 10 minutes or less response time)	Customers enrolled in other programs with appropriate enabling technology	Loads with fast responding capability

Direct Load Control (DLC includes electric space heating control (both central furnaces and heat pumps) and electric water heating control in winter and space cooling (both CAC and heat pumps) and water heating control in summer. Space heating and cooling control can be either through a load control switch or a thermostat. Water heating load is controlled through a load control switch. This DR option applies to eligible residential customers with electric space heating, cooling, and electric water heating. The two sub-options included in the study under DLC are DLC-Thermostat for space heating/cooling control and DLC-Switch for electric water heating control.

C&I Curtailment involves a contract for a firm capacity reduction commitment from large C&I and extra-large C&I customers. Under this option, PSE would typically enter into a turnkey implementation contract with a third-party DR service provider (commonly referred to as an aggregator) to deliver a certain fixed amount of megawatt load reduction. Enrolled participants agree to curtail their demand to a pre-specified level. In return, they receive a fixed incentive payment in the form of capacity credits or reservation payments (expressed as $/kW-year). Customers are paid to be on call even though actual load curtailments may not occur. The capacity payment level could vary with the load commitment level. In addition to the fixed capacity payment, participants typically receive a payment for energy reduction ($/kWh amount). Because it is a contractual arrangement for a specific level of load reduction, enrolled loads represent a firm resource. Once enrolled, participation during events is mandatory with penalty clauses. A particular site could curtail a variety of end use loads depending on the types of business processes—either manually or automatically (Auto-DR-enabled). Auto-DR enablement can help provide greater reliability and higher predictability in load reductions. Accordingly, the study includes two sub-options under C&I Curtailment, which are C&I Curtailment-manual and C&I Curtailment-Auto-DR.

Economic DR, as defined in the FERC) DR Survey report,[34] involves $/kWh payment only for energy reduction under high energy market prices. Typically, participation is voluntary and there are no penalties for non-performance. Unlike the C&I Curtailment option, there is no firm commitment for

[34] The nomenclature follows the 2012 FERC DR Survey report terminology in the "Assessment of Demand Response and Advanced Metering," FERC Staff Report, December 2012.

capacity reduction. PSE could consider offering this option to its large sized C&I customers, primarily those belonging to the large C&I and extra-large C&I classes; it could also possibly consider transitioning customers out of the existing interruptible service to either this option or to C&I Curtailment. Curtailment strategies are similar to those listed under the previous options. Load reductions could be either manual or Auto-DR-enabled. Therefore, similar to C&I curtailment, the study includes two sub-options: Economic DR-Manual and Economic DR-Auto-DR.

Dynamic Pricing refers to a Critical Peak Pricing (CPP) rate offer across all customer classes. CPP impacts primarily depend on the critical peak to off-peak price ratio. They also vary by customer type and size (residential vs. C&I, and for C&I customers by size). Industry experience shows that enabling technology such as smart thermostats and Auto-DR can enhance effects when coupled with CPP offers.

Navigant considered a 4:1 peak to off-peak price ratio for unit impact assumptions. The two sub-options under Dynamic Pricing are Dynamic Pricing-without enabling technology and Dynamic pricing- with enabling technology. For the residential, small C&I, and medium C&I classes, enabling technology for dynamic pricing refers to a thermostat, while for large C&I and extra-large C&I customers, enabling technology refers to Auto-DR.

Fast DR refers to DR for providing ancillary services such as spinning reserves, non-spinning reserves, and regulation. Fast DR events can be called at any time to provide ancillary services. A subset of the customers enrolled in capacity-based DR options can help provide these services. For example, all DLC customers and non-DLC customers with Auto-DR enabled load control may be able to provide fast enough response to meet ancillary services. Fast DR potential assessment requires hourly load assessment as fast DR events may be called at any time and are not necessarily restricted to the system peak demand hours.

Hourly load analysis was outside the scope of this study. Therefore, the Fast DR potential assessment in this study is an estimate of the amount of load reduction that could potentially be realized if Fast DR events were to be called during system peak demand hours and does not provide a true estimate of Fast DR potential.

2.3.2.3 Key Assumptions for DR Potential and Cost Estimation

The two key parameters for potential estimation are participation rates and per participant load reduction (referred to as unit impact) by DR option for applicable customer segments. Additional parameters for potential estimation include DR event participation rates, percentage of customers with enabling technology, and attrition rates of enrolled customers. Development of DR program annual and levelized costs involve itemization of the various cost components such as program development costs, equipment costs, participant marketing and recruitment costs, annual program administration costs, product lifetimes, discount rate, etc. Table 16 lists the key inputs for potential and cost estimates. Appendix E presents the key assumptions for DR potential calculations.

Table 16. Key Inputs for Potential and Cost Calculations

Key Variables	Dimension
Participation Rates (Percentage of eligible load)	Percentage of eligible load by customer class and building type (also varies by average event duration)
Impacts (Percentage of participating load)	Percentage of participating load by customer class, building type, and end use (also varies by average event duration)
Costs (Unit varies depending on the type of cost)	Costs are broadly categorized into one-time program fixed costs, one-time variable costs, annual fixed costs, and annual variable costs. • One-time fixed costs related to program development • One-time variable costs for customer recruitment and program marketing, equipment installation, and enablement • Recurring variable costs such as customer incentives, O&M, etc.
Global Parameters	Program lifetime, discount rate, inflation rate, line losses

The development of potential and cost assumptions is based on PSE-specific information, Navigant's industry expertise in the area, and relevant secondary sources of information. The DSR team leaned on information and insights available from bids by DR vendors in the areas of DLC and C&I Curtailment as part of PSE's DR resource acquisition effort at the time of this study. Also, Navigant's discussions with key internal stakeholders within PSE (e.g., account executives) helped inform these assumptions. Navigant also reviewed information available from PSE's prior DR pilot efforts. In addition to the PSE-specific sources, the DSR team drew on its industry knowledge and expertise, as well as well-established secondary information sources such as publicly available DR potential studies and evaluation reports from other jurisdictions, and DR program databases such as the FERC National DR Program Survey database.[35] For participation, the study assumed that participation ramps up over a 5-year period following an S-shaped curve for all DR options. For Dynamic Pricing, participation assumptions are tied to advanced metering infrastructure (AMI) deployment. Based on consultation with PSE, Navigant assumed that Dynamic Pricing is offered from 2023 onward. All other DR options are assumed to be offered beginning in 2018.

Another key consideration for potential estimation is a program participation hierarchy to account for participation overlaps among the different DR programs or DR options. Table 17 presents the participation hierarchy considered in this study. In this case, the achievable participation estimates are applied to eligible customers only, as shown in the table below. The participation hierarchy presented here is a well-tested approach, initially established in the *National Assessment of DR Potential Study*, conducted by FERC[36] and adopted in a number of other DR potential studies for utilities and other entities such as Independent System Operators (ISOs)/Regional Transmission Organizations (RTOs). The participation hierarchy helps avoid double counting of potential through common load participation across multiple programs and is necessary to arrive at an aggregate potential estimate for the entire portfolio of DR programs.

[35] http://www.ferc.gov/industries/electric/indus-act/demand-response/dem-res-adv-metering.asp
[36] https://www.ferc.gov/legal/staff-reports/06-09-demand-response.pdf

Table 17. Program Hierarchy Example to Account for Participation Overlaps

Customer Segment	DR Options	Eligible Customers
Residential Small C&I Medium C&I	DLC *(first option applied within segment)*	Customers with electric space heating, cooling, and electric water heating
	Dynamic Pricing	Customers not enrolled in DLC
Large C&I Extra Large C&I	C&I curtailment	All customers
	Economic DR	Customers not enrolled in C&I Curtailment
	Dynamic Pricing	Customers not enrolled in C&I Curtailment and economic DR options

2.3.2.4 DR Potential and Cost Calculations

Navigant conducted DR potential calculations at two levels: technical potential and achievable technical potential.

Technical potential refers to the theoretical maximum potential under 100% participation of the eligible load. The technical potential calculation follows Equation 9 (below).

Equation 8. DR Technical Potential

$$\begin{aligned}&Technical\ Potential_{DR\ Sub\ Option,End\ Use,Year}\\ &\qquad = Eligible\ Load_{DR\ Sub\ Option,Segment,End\ Use,Year} * Unit\ Impact_{DR\ Sub\ Option,Segment,Year}\end{aligned}$$

This study calculated standalone technical potential for each DR sub-option, which assumed 100% participation of the eligible load in that particular sub-option. It is calculated by multiplying the eligible load/customers with the unit impact. An important caveat is that, by definition, technical potential calculation does not consider participation overlaps and, therefore, cannot be summed across the DR sub-options to provide a total technical potential. The technical potential estimates for each DR sub-option should be considered independently. Appendix E presents the technical potential results by DR sub-option.

The achievable technical potential calculations apply achievable participation assumptions and the program participation hierarchy, discussed above, to the technical potential estimates. The achievable technical potential calculation follows Equation 9 (below).

Equation 9. DR Achievable Technical Potential

$$\begin{aligned}&Achievable\ Tech\ Potential_{DR\ Sub\ Option,End\ Use,Year}\\ &\qquad = Technical\ Potential_{DR\ Sub\ Option,Segment,End\ Use,Year}\\ &\qquad * Achievable\ Participation\ Rate_{DR\ Sub\ Option,Segment,Year}\\ &\qquad * (1 - Event\ Opt\ Out\ Rate)_{DR\ Sub\ Option,Year}\end{aligned}$$

Appendix E presents the key assumptions for DR potential estimation.

The achievable technical potential for each customer segment by end use is summed across all eligible segments and end uses to arrive at the aggregate technical potential by year for each DR sub-option. The sum of the potential for the DR sub-options within a particular DR option provides the total technical achievable technical potential for that particular DR option. The potential for all DR options is then summed to provide the total achievable technical potential for the portfolio of DR programs.

For cost calculations, Navigant developed annual program costs based on the itemized cost assumptions discussed earlier. Using the annual program costs and annual potential numbers for each DR program, Navigant calculated the levelized cost for each DR program by dividing the Net Present Value (NPV) of the annual program costs with the NPV of annual impacts (load reduction) for each DR option. The levelized cost calculations are conducted for the 20-year time-period (2018-2037) considered in the study.

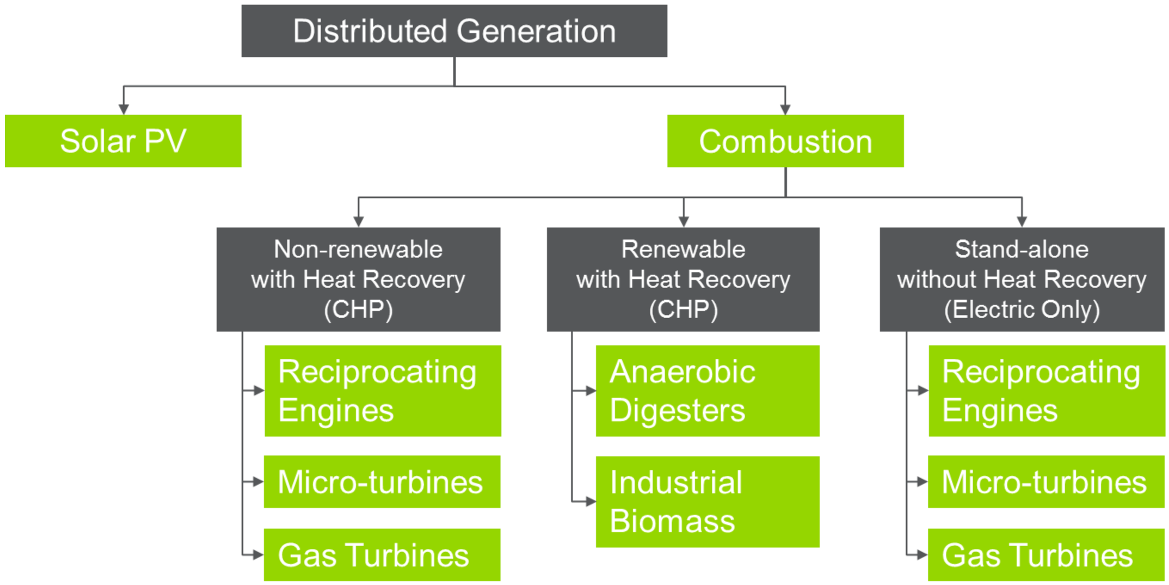
2.4 Distributed Generation – Combustion

Navigant developed forecasts of technical and achievable technical electric energy savings potential through the installation of DG combustion technology in PSE's service region from 2018 through 2037. These potential forecasts relied on disaggregated forecasts of electricity and gas energy sales net of conservation, as well as a set of detailed measure characteristics for a comprehensive list of DG combustion measures including non-renewable combustion with heat recovery, renewable combustion with heat recovery, and standalone combustion without heat recovery. This section details Navigant's approach to measure characterization and calculating the bottom-up estimates of technical and achievable technical potential over the study horizon.

2.4.1 Measure Characterization

For the present analysis, Navigant developed a model to accurately assess the potential of DG combustion technologies. The first step in model development was to input technical and economic information about the combustion measures that were within the scope of the study. Figure 10 shows the full measure list including three system designs, three fuel types, and three prime movers. Each measure is defined in greater detail below the figure.

Figure 10. DG Combustion Measure List



DG combustion system designs include:

- **Non-renewable with heat recovery:** Engine-driven combined heat and power (CHP) system fueled by natural gas
- **Renewable with heat recovery:** Typically steam engine-driven, CHP system fueled by renewable fuel sources
- **Standalone without heat recovery:** Engine-only system, converts natural gas to electricity

Fuel types include:

- **Natural gas:** Via natural gas customer connection in PSE service territory
- **Anaerobic digestion (biogas):** Via waste methane from one of three sources in PSE service territory: animal farms, landfills, or wastewater treatment plants
- **Industrial biomass:** Via waste residue from one of three industrial sources in PSE service territory: pulp and paper, wood products, or food manufacturing

Lastly, the three prime mover technologies include:

- **Reciprocating engines:** Piston or heat engine
- **Gas turbines:** Combustion engine
- **Microturbines:** Micro-combustion engine, fewer moving parts

Each of these measure combinations was characterized using various research outlets to find inputs for system characteristics, some of which are included in Table 18.

Table 18. DG Combustion Measure Characteristics List

Measure Characteristics		
Capital cost	Heat rate	Lifetime
Installed cost	Power-to-heat ratio	Typical capacity
Variable O&M	Availability	Assumed fuel cost
Fixed O&M	Annual degradation	Emissions (NOx, PM, VOC) factors

The model was developed to calculate best-fit equations for each characteristic included in the table.

2.4.2 Approach to Estimating Technical Potential

After measure characteristics were entered, the model was further developed to analyze the technical potential using information about the customer base and available resources in the service area. Figure 11 summarizes the steps taken to assess the potential of each fuel source.

Figure 11. Technical Potential Approach

1. The first step in calculating the technical potential is assessing fuel availability. For natural gas-driven technologies (non-renewable CHP and standalone generation) availability is determined using data provided by PSE on electric and gas customers and consumption. For renewable CHP, resource availability is determined by assessing the types of plants in each county with customers that receive both electric and gas service from PSE.
2. The capacity per customer for non-renewable CHP and standalone generation is based on the various measure characteristics fed into the model and the assumption that the CHP system is designed for thermal load following applications and standalone electric generators are for power only. The model then determines the megawatt capacity for each unit installed. For renewable CHP, instead of per customer, the potential capacity is calculated by plant.

After calculating the capacity per customer for non-renewable CHP and standalone electric generators, prime mover applicability is assessed based on ranges estimated from research for each natural gas-driven prime mover type. The ranges are provided in

Table 19.

Table 19. Prime Mover Technology Applicability Ranges[37,38]

MW	Gas Turbine	Reciprocating Engine	Microturbine
Low	0.5	0.001	0.03
High	300	10	0.5

As a result of the relatively small capacity range of reciprocating engines, it is the only prime mover applicable to all customer segments. The larger capacity microturbine is applicable to some C&I customer segments due to their larger energy demand. The high capacity range of the gas turbines is not applicable to any customer segments.

Table 20. Prime Mover Technology Applicability

Sector	Customer Segment	Gas Turbine	Recip. Engine	Microturbine
Residential	Single-Family		X	
Residential	Multifamily		X	
Residential	Manufactured Homes		X	
Commercial	Grocery		X	
Commercial	Hospital		X	
Commercial	Hotel		X	
Commercial	Office		X	
Commercial	Other Commercial		X	
Commercial	Restaurant		X	
Commercial	Retail		X	
Commercial	School		X	
Commercial	University		X	X
Commercial	Warehouse		X	
Industrial	Chemicals		X	X
Industrial	Food Products		X	X
Industrial	Hi Tech		X	
Industrial	Other Industrial		X	
Industrial	Pulp and Paper		X	X

[37] US Environmental Protection Agency (EPA) CHP Partnership. *Catalog of CHP Technologies.* March 2015. https://www.epa.gov/sites/production/files/2015-07/documents/catalog_of_chp_technologies.pdf.
[38] Navigant.

Sector	Customer Segment	Gas Turbine	Recip. Engine	Microturbine
Industrial	Trans. and Equip.		X	
Industrial	Wood Products		X	
Industrial	Metal Fabrication		X	X
Industrial	Publishing, Broadcasting, and Telecommunications		X	
Industrial	Non-Metallic Manufacturing		X	

X = Applicable

3. The number of potential adopters for non-renewable CHP and standalone generation comes from the disaggregated customer counts by customer segment for electric-only and electric and gas service from PSE. For renewable CHP, potential adoption is calculated at the county level based on the resource potential for plants in each county.
1. For non-renewable and standalone generators, capacity factor characteristics feed into calculations of the annual generation per installation in MWh from the unit capacity in MW. For renewable CHP, generation is calculated at the plant level in MWh/year.
2. The final calculation of the technical potential for non-renewable CHP and standalone generators is multiplication of the annual generation per installation (assuming one installation per customer) times the number of potential adopters. For renewable CHP, the generation of all plants in MWh/year is summed at the county level.

2.4.2.1 Non-Renewable CHP

Non-renewable CHP is only applicable to customers with both electric and gas service as gas connection is required for heat recovery. The average electric and thermal usage is used in the best-fit equations generated by the input characteristics. The resulting values are customer-specific average boiler size and power-to-heat ratio. The model output includes a non-renewable CHP unit size (MW) by customer segment, applying the assumption that the CHP unit is sized to follow customer thermal load. The calculated unit size is then used to select the applicable prime mover technology.

Finally, to calculate the non-renewable CHP technical potential, the unit size by customer segment is multiplied by the disaggregated number of electric and gas customers forecasted from 2018 to 2037.

2.4.2.2 Renewable CHP

For renewable CHP, the availability of the fuel source by county within PSE service territory had to be assessed before calculating a potential. Note that the forecast for renewable CHP potential remains constant through the time horizon as forecasting new sources of biogas and biomass was beyond the scope of this study.

For anaerobic digesters, the availability of biogas was determined by researching the total existing dairy cows in inventory for farms in PSE territory by county,[39,40] the existing waste in place at landfills in PSE territory by county,[41,42] and the existing wastewater treatment plants in PSE territory by county.[43,44,45] The potential capacity in MWh/year and MW based on existing waste was then calculated.

For industrial biomass, the availability of biomass was determined by researching the following in PSE's territory by county:

- Primary mill residue for the pulp and paper customer segment
- Secondary mill residue for the wood product customer segment
- Solid biomass waste from food manufacturing.

The potential capacity in MWh/year and MW based on existing waste was calculated.

2.4.2.3 Standalone Electric Generation

Standalone electric generation is applicable to all PSE customers—electric-only and electric and gas—as there is no heat recovery. For natural gas generators without heat recovery, the required generator size in kW was determined from a separate analysis of customer load. The analysis assumed the systems were sized to meet approximately 50% of the peak electric load per customer segment previously calculated. This resulted in the generators meeting 75% to 90% of total load.

Similar to non-renewable CHP, the technical potential for standalone generators was calculated by multiplying the resulting annual generation per customer segment by the number of customers forecasted from 2018 to 2037. However, for standalone generators, the combined electric and gas and electric-only customer counts were used.

2.4.3 Approach to Estimating Achievable Technical Potential

For this study, CHP program experience in other states was leveraged to assess the achievable technical potential.

The DOE completed a study on CHP technical potential across the United States. The total potential is a combination of the onsite potential, which includes industrial, commercial, and waste heat to power at the

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[39] G. Saur and A. Milbrandt, National Renewable Energy Laboratory (NREL). *Renewable Hydrogen Potential from Biogas in the United States*. July 2014. http://www.nrel.gov/docs/fy14osti/60283.pdf

[40] US Department of Agriculture. *Census of Agriculture Volume 1, Chapter 2: County Level Data.* 2012. https://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Washington/

[41] Billy J. Roberts, National Renewable Energy Laboratory (NREL). *Methane Emissions from Landfills.* August 2014. http://www.nrel.gov/gis/images/biomass_2014/National-Biomass-Landfills-2014-01.jpg

[42] EPA Landfill Methane Outreach Program (LMOP). *Landfill Gas Energy Project Data and Landfill Technical Data by State*. https://www.epa.gov/lmop/landfill-gas-energy-project-data-and-landfill-technical-data#states

[43] Billy J. Roberts, National Renewable Energy Laboratory (NREL). *Methane Generation Potential from Wastewater Treatment.* August 2014. http://www.nrel.gov/gis/images/biomass_2014/National-Biomass-Wastewater-2014-01.jpg

[44] Water Environment Federation. *Biogas Data.* 2015. http://www.resourcerecoverydata.org/biogasdata.php

[45] US DOE. *Combined Heat and Power Installation Database*. https://doe.icfwebservices.com/chpdb/state/WA

host facility, and the export potential, which includes all electricity in excess of what can be used by the host facility and that could be sold to the electric grid.[46]

Data on the existing CHP installed capacity in the United States is tracked and publicly provided by the DOE.[47] The existing capacity for each state was divided by the corresponding total CHP technical potential according to the DOE study for that state to generate a ratio of installed capacity to total potential.

The top five states in regards to policies supporting CHP development were then selected according to the American Council for an Energy-Efficient Economy (ACEEE) CHP Favorability Index.[48] Lastly, the ratio of installed capacity to total potential for these top five states was averaged, resulting in a 50% achievability, as seen in Table 21.

Table 21. Average Achievability of Top Five States for CHP Supporting Policies

Top Five States for CHP Favorability (According to ACEEE)	Ratio of Installed Capacity to Total Potential
Connecticut	44%
Massachusetts	39%
California	46%
Oregon	96%
Maryland	21%
Average	**50%**

For the residential market, an achievability of 0% was assumed because, while products are available, no vendors are targeting the residential sector, customer awareness is negligible, and there is no industry infrastructure to support installations.

A moderate ramp rate was applied to the achievable technical potential results in this study to account for the rate of adoption of these technologies starting in 2018. This rate was used based on the ramp rates available in the Council's Seventh Plan.

2.5 Incorporation of DSR into PSE's IRP

After calculating achievable technical potential for all DSRs as described above, Navigant calculated levelized costs and conservation supply curves for inclusion in PSE's IRP model. Calculating the LCOE is an important component of the CPA and allows the cost of conservation to be compared with other

[46] US DOE. *Combined Heat and Power (CHP) Technical Potential in the United States*. March 2016. https://energy.gov/eere/amo/downloads/new-release-us-doe-analysis-combined-heat-and-power-chp-technical-potential

[47] See footnote 37.

[48] ACEEE. "State-by-State CHP Favorability Index Estimate." 2015. http://aceee.org/sites/default/files/publications/otherpdfs/chp-index.pdf

distributed energy and supply-side resources in budgeting and resource planning activities. The LCOE is the discounted present value net cost of each measure over the 20-year analysis horizon divided by the discounted present value of energy savings over the same period. Navigant worked closely with both PSE and Council staff to ensure that the methodology employed in the present analysis for computing each measure's LCOE was consistent with that outlined in Appendix G of the Seventh Plan.[49]

The levelized costs were subsequently used to bundle different resources into distinct cost groups for inclusion into PSE's IRP model. This allows the IRP model to identify optimal amounts of annual DSR given projected energy prices, load growth, and supply-side resources. Navigant spread the annual savings estimates using 8,760 hourly load profiles provided by PSE to produce hourly DSR bundles for electric demand-side resources and monthly load shapes for gas. Additionally, the DSR team's IRP bundling approach ensured that savings are not acquired instantly on the first day of January but are instead split so that half the savings are allocated in one year and half to the next year.

[49] https://www.nwcouncil.org/media/7149911/7thplanfinal_appdixg_consresources.pdf

3. DEMAND-SIDE RESOURCE POTENTIAL RESULTS

3.1 Aggregate Demand-Side Resource Potential Results

This section presents a summary of the aggregate technical and achievable technical potential for each of the DSRs reviewed in this study. All values presented in this section and throughout the report are at the generator and assume line loss of 7.3% for electric resources and 0.5% for gas resources. Additionally, the numbers discussed in the rest of this report do not account for intra-year ramping, which was separately considered in the DSR bundles provided to PSE for its IRP analysis.

Table 22 summarizes the energy and capacity savings potential (cumulative in 2037) for all DSRs, excluding codes and standards and distributed solar PV. The latter are considered to be zero cost, must take resources in PSE's 2017 IRP and thus are presented separately. For electric resources, Navigant projects 1,564 aMW of cumulative achievable technical potential by 2037. The two big resources that contribute to this potential are DG combustion and energy efficiency. Roughly 60% of the achievable technical potential is expected to come from DG combustion measures, though, much of this potential comes at a relatively high cost compared to more economically-attractive energy efficiency measures. Energy efficiency is forecasted to contribute 38% of the total cumulative achievable technical potential (or 602 aMW) by 2037, with fuel conversion accounting for the remaining 2%. In terms of winter peak demand, energy efficiency and DG combustion account for 87% of the 2037 achievable technical potential with DR accounting for the remaining 13%.

Table 22. Summary of Energy and Capacity Savings Potentials, Cumulative in 2037[50]

	Energy (aMW / MMTherms)		Winter Coincident Peak Capacity (MW)	
	Technical Potential	**Achievable Technical Potential**	**Technical Potential**	**Achievable Technical Potential**
Electric Resources				
Energy Efficiency	836	598	1,305	975
Fuel Conversion	55	29	125	72
Demand Response	N/A	N/A	N/A	188
Distributed Generation - Combustion	4,280	933	N/A	522
Electric Resources Total	**5,172**	**1,560**	**1,430**	**1,757**
Natural Gas Resources				
Energy Efficiency	240	164	N/A	N/A

[50] This table excludes savings from codes and standards and distributed solar PV as they are considered to be zero cost, must take resources in PSE's 2017 IRP.

For natural gas resources, all savings come from energy efficiency, which contributes 175 million therms of achievable technical potential by 2037.

3.1.1 PSE DSR Electric Energy Potential Results

This section provides a high level overview of the aggregate electric energy potential results. Figure 12 shows the cumulative combined achievable technical potential for energy efficiency, fuel conversion, codes and standards, and DG combustion. The two big drivers of future savings are DG combustion and energy efficiency. Standalone electric generators account for two-thirds of the DG combustion achievable technical potential. For energy efficiency, whole building measures that target existing and new buildings as well as lighting measures contribute significantly to future achievable technical potential. The codes and standards savings shown below are reflective of post-2018 building codes and federal appliance standards included in this study.

Figure 12. Cumulative Achievable Technical Potential: Electric Energy Savings

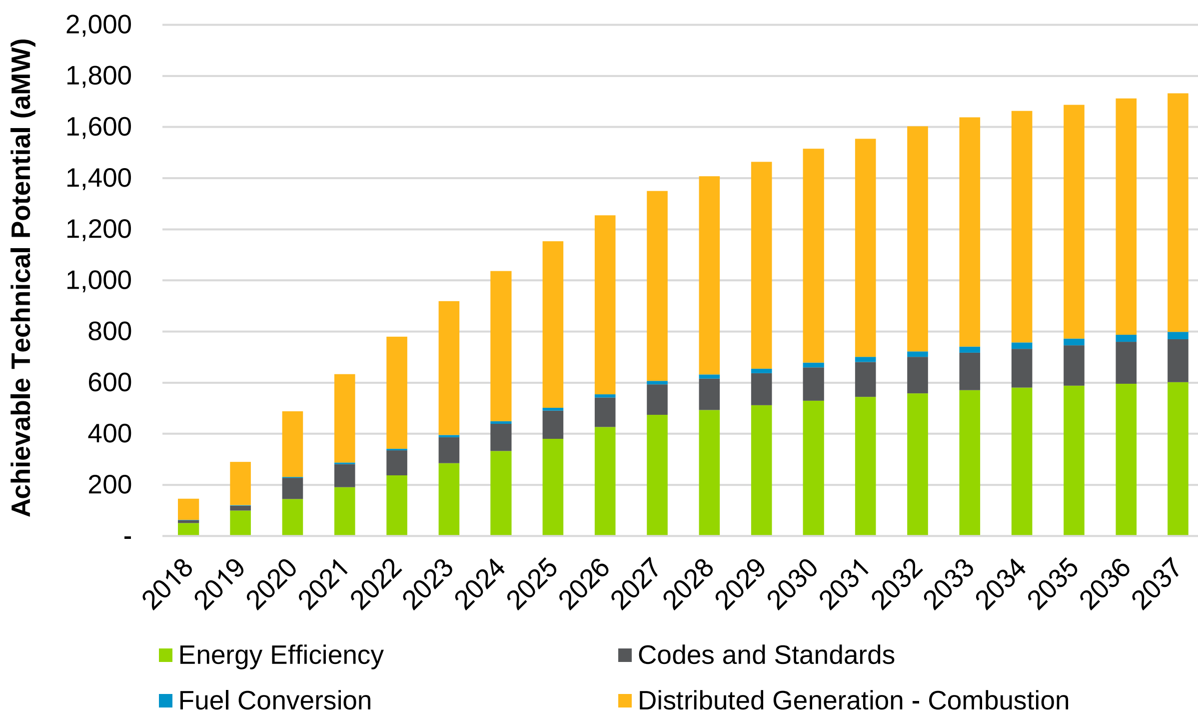
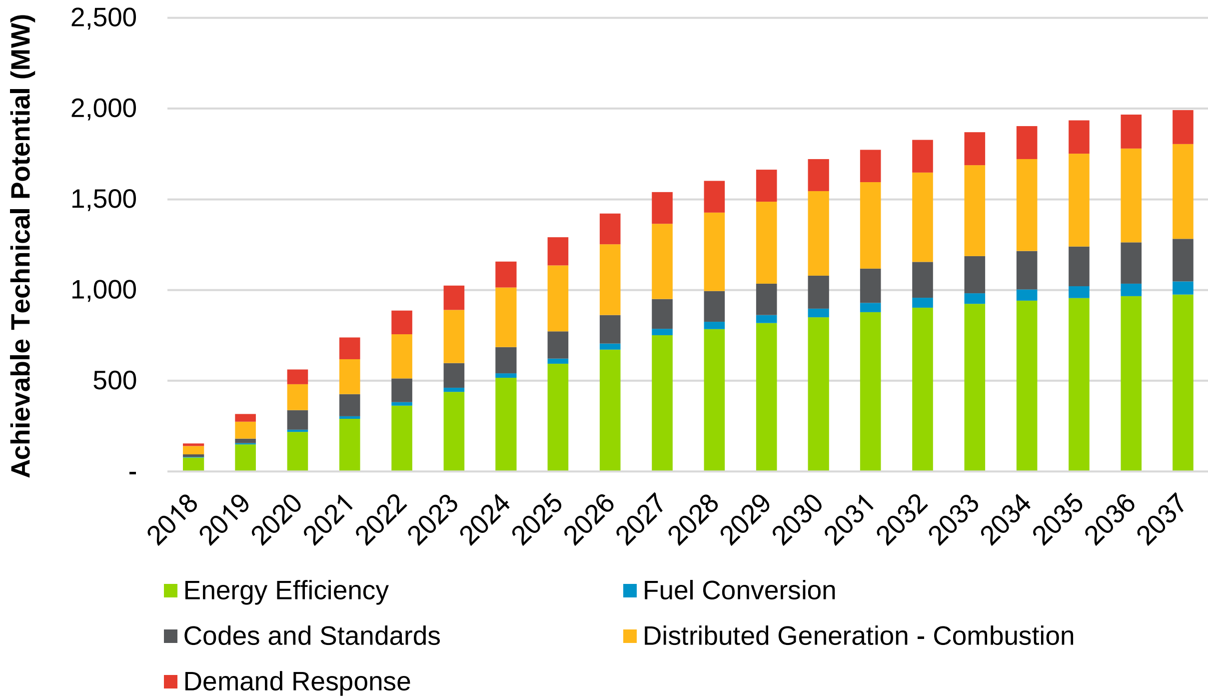


Figure 13 shows a similar output for cumulative winter peak demand savings for all electric energy resources. As discussed earlier in this section, the main sources of winter peak demand savings in 2037 are energy efficiency and DG combustion. The change in slope of the growth of achievable technical potential after 2027 is explained by the predominance of discretionary measure potential in the first 10 years, after which point lost opportunity resources account for the only remaining energy efficiency potential.

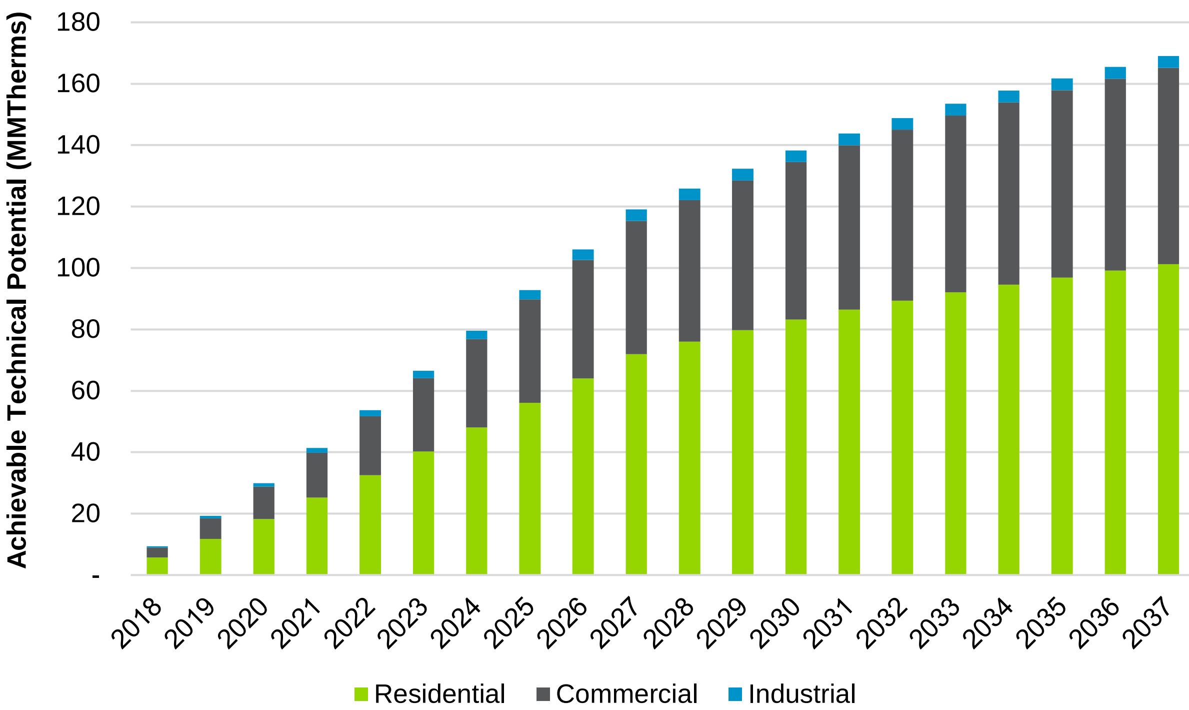
Figure 13. Cumulative Achievable Technical Potential: Winter Peak Demand Reduction



3.1.2 PSE DSR Natural Gas Potential Results

This section provides a high level overview of the natural gas potential results. All the natural gas savings in this study come from energy efficiency. In particular, whole building and direct or indirect space heating measures account for almost 90% of all natural gas achievable technical potential energy savings in 2037. The overall achievable technical potential for natural gas is driven by the residential and commercial sectors, with the industrial sector contributing relatively limited potential. Achievable technical potential in the industrial sector declines over time due to a forecasted decline in industrial energy consumption of more than 20% in PSE's load forecast through 2037. As with electric energy, there is noticeable growth in potential over time and the achievable technical potential displays the effects of the ramp rates assigned to each measure as well as the change in slope after all retrofit potential is achieved in 2027.

Figure 14. Cumulative Achievable Technical Potential: Gas Resources



3.2 Energy Efficiency Potential Results

The following sections detail the technical and achievable technical potential for electric and gas energy savings from energy efficiency measures from 2018 through 2037. The various subsections provide the breakdown of potential for each fuel type at various levels of aggregation, including sector, customer segment, and end use. In addition to these aggregated views of efficiency potential, the DSR team also provides supply curves of technical and achievable technical potential ranked by the LCOE computed according to the methodology outlined in Section 2.1.8.

3.2.1 Electric Energy Efficiency Potential Results

This section provides aggregated views of technical and achievable technical electric energy efficiency savings potential at various levels of granularity, as well as supply curves of potential ranked by LCOE. It discusses the key drivers of potential and the general trends present in the results.

3.2.1.1 Technical and Achievable Technical Potential by Sector

Figure 15 shows the cumulative technical potential for electric energy efficiency from 2018 through 2037. The overall technical potential is driven by the residential and commercial sectors, with the industrial sector contributing relatively limited potential. The residential and commercial sectors show similar technical potential, both in the magnitude of energy saved and the shape of the growth over time. The technical potential from each of these sectors grows by roughly 60% over the study horizon. Technical potential in the industrial sector declines over time due to a forecasted decline in industrial electric energy consumption of over 20% in PSE's load forecast through 2037.

The corresponding electric energy achievable technical potential shown in Figure 16phases in more gradually than the technical potential due to the application of the achievable ramp rates discussed in Section 2.1.6. The change in slope of the potential after 2027 occurs due to the difference in the speed of ramping for RET and lost opportunity measures. All RET measures were assigned an accelerated 10-year linear ramp, consistent with the 2015 IRP, and so the maximum achievable technical potential for these measures was realized by 2027. Conversely, lost opportunity (ROB and NEW) measures were assigned various ramp rates based on information in the Seventh Plan, specific measure technology, assumed available delivery channels, and past experience of PSE program staff with similar measures. The additional growth in achievable technical potential after 2027 in all sectors is due to the continued ramping of ROB and NEW measures.

Figure 15. Cumulative Electric Energy Technical Potential by Sector: 2018-2037

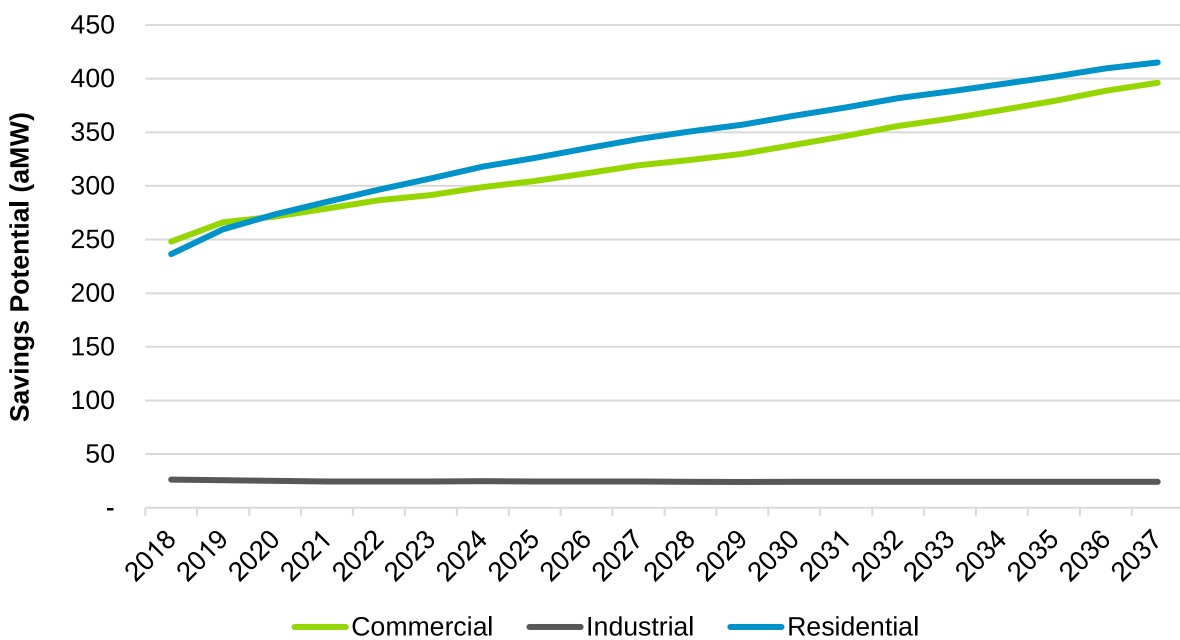
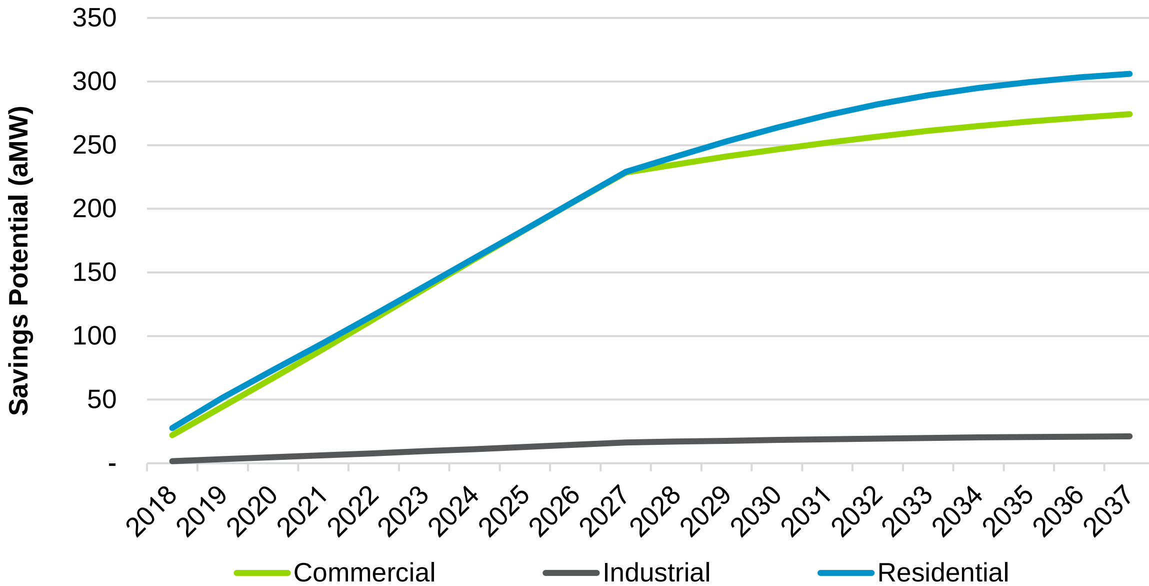


Figure 16. Cumulative Electric Energy Achievable Technical Potential by Sector: 2018-2037



3.2.1.2 Technical and Achievable Technical Potential by Customer Segment

To facilitate comparison of the electric energy savings potential for the various customer segments considered in the CPA, Figure 17 and Figure 18 provide breakouts of electric energy technical and achievable technical savings potential by customer segment. In all years, residential single-family homes provide the most savings potential, followed closely by commercial office buildings and then residential households in multifamily buildings. These segments also happen to be the largest three segments in terms of both building stock (residential households and commercial floor space) and electricity sales. Together, they account for about two-thirds of all technical and achievable technical potential in 2037. Commercial retail establishments, residential manufactured homes, and other commercial (unclassified) buildings also account for significant electric energy potential, with the remaining segments each making relatively small contributions to the balance of the total potential.

Interestingly, while multifamily homes contribute the third highest potential of any customer segment, the potential in this segment grows faster than in any other segment, more than doubling from 2018 through 2037. This is roughly reflective of forecasted growth trends in building stock and energy consumption for multifamily homes in the region. Office buildings and hospitals also show high growth in savings potential, building stock, and energy consumption through 2037.

Achievable technical potential in Figure 18 ramps in slower than technical potential in Figure 17. The relative proportions of potential coming from the various customer segments are consistent across the two potential types, and the change in slope of the growth of achievable technical potential after 2027 is explained by the predominance of RET potential in the first 10 years.

Figure 17. Cumulative Electric Energy Technical Potential by Customer Segment: 2018-2037

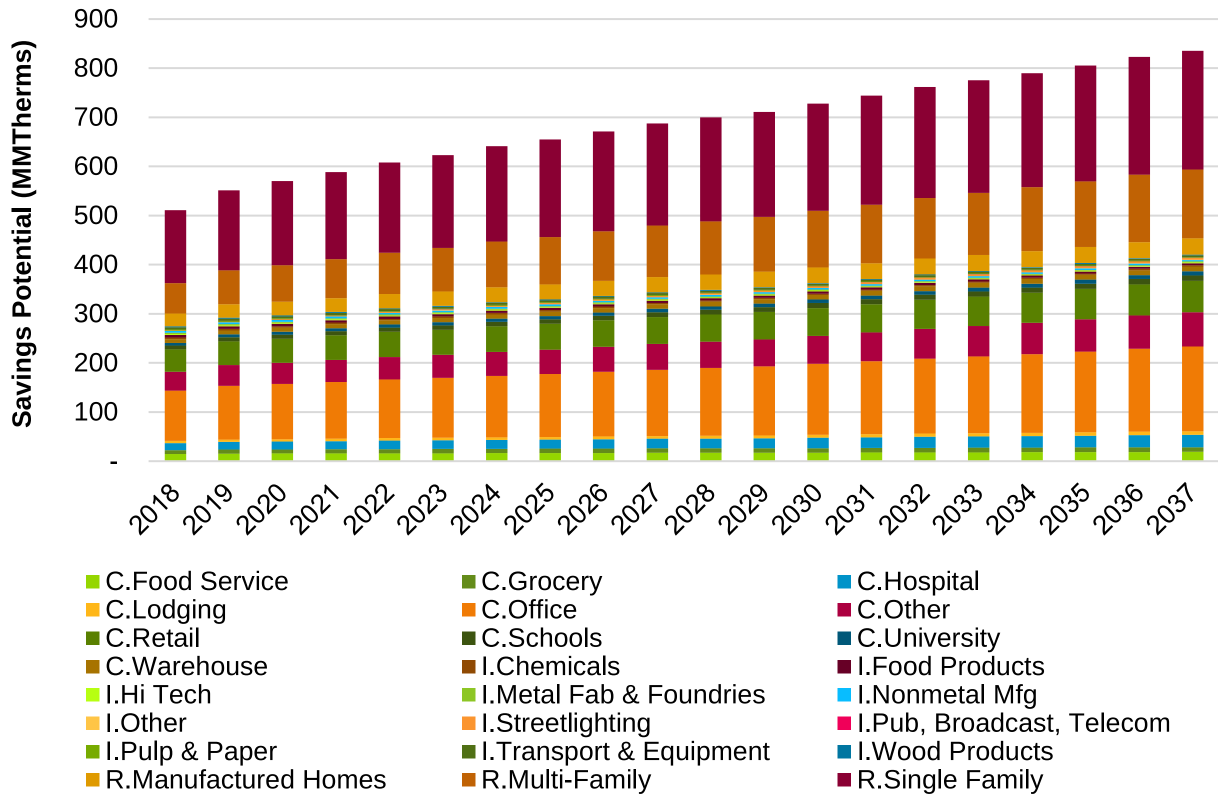
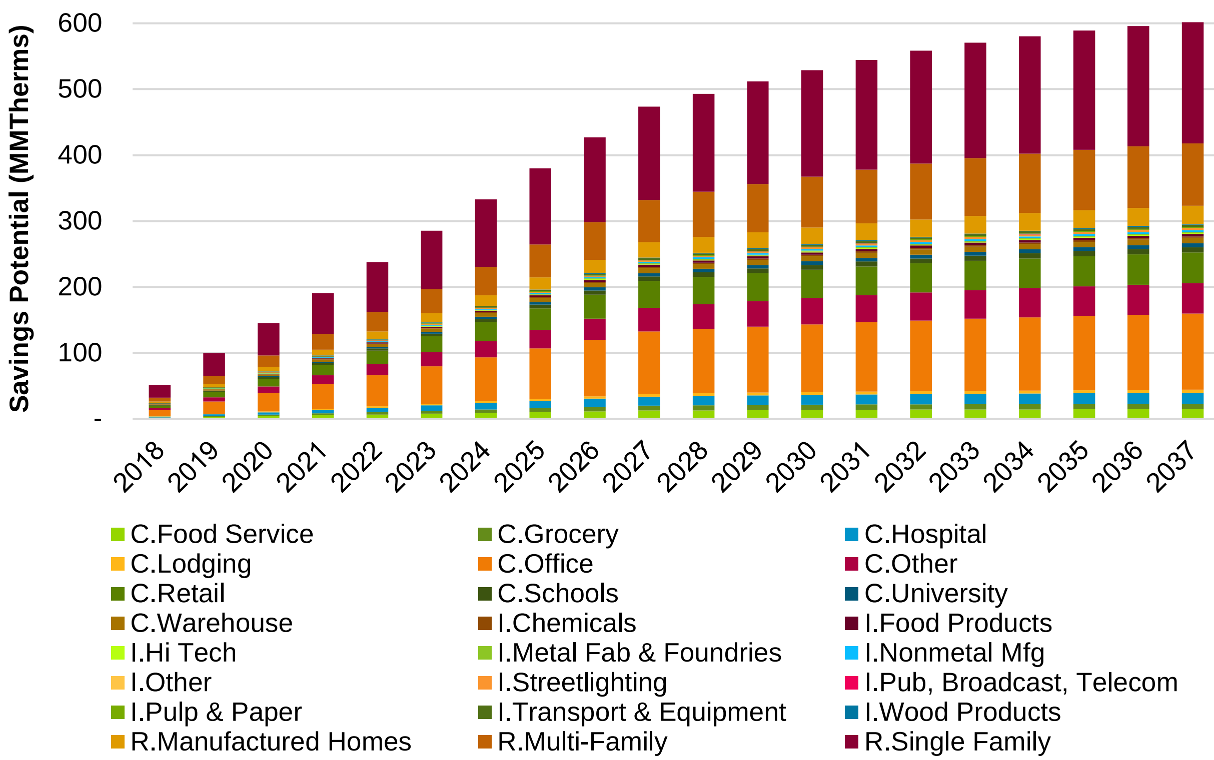


Figure 18. Cumulative Electric Energy Achievable Technical Potential by Customer Segment: 2018-2037



3.2.1.3 Technical and Achievable Technical Potential by End Use

While viewing the potential results at the customer segment level helps identify particular building types with high potential for savings from energy efficiency, viewing the potential at the end use level helps identify classes of equipment with high potential for energy savings. Figure 19 and Figure 20 show the technical and achievable technical energy savings for each of the end uses considered.

The whole building end use shows the greatest potential in the final years of the study, followed closely by lighting. The whole building end use corresponds to new construction measures and energy efficient building practices that target a variety of end uses, as well as comprehensive retrocommissioning, strategic energy management, and building automation systems that target existing buildings. As seen in the charts in Section 3.3, four of the top five measures by achievable technical potential were either lighting or whole building measures. In particular, troffer LEDs were the top measure in terms of 20-year achievable technical potential, followed by comprehensive retrocommissioning and high efficiency new construction in positions two and three, respectively.

While the whole building end use provides the most potential at the end of the study horizon, it ramps slower than the lighting end use in the early years. This is due primarily to difficulty in implementing whole building efficient new construction practices as compared to the relative ease of implementing lighting efficiency upgrades. Delivery channels for efficient lighting are more well-established and readily available than the more complicated whole building measures, which allows lighting measures to be implemented quickly. Lighting upgrades are also typically much more compartmentalized than measures like comprehensive retrocommissioning or strategic energy management, and their ease of implementation makes them more readily adopted by end users. Finally, many lighting measures are suitable for retrofit applications, allowing lighting potential to ramp in faster than many lost opportunity measures that are constrained by existing equipment burnout. For these reasons, lighting provides the most potential of any end use in the first half of the study horizon. After lighting retrofit potential is fully realized in year 10, the whole building end use overtakes lighting as the end use with the most potential.

The space heating and cooling end use also provides significantly more potential than many of the other end uses. Measures that fall into this end use provide both space heating savings in the winter and space cooling savings (when cooling equipment is present) in the summer. Smart and programmable thermostats and various insulation measures are examples that correspond to the space heating and cooling end use.

Figure 19. Cumulative Electric Energy Technical Potential by End Use: 2018-2037

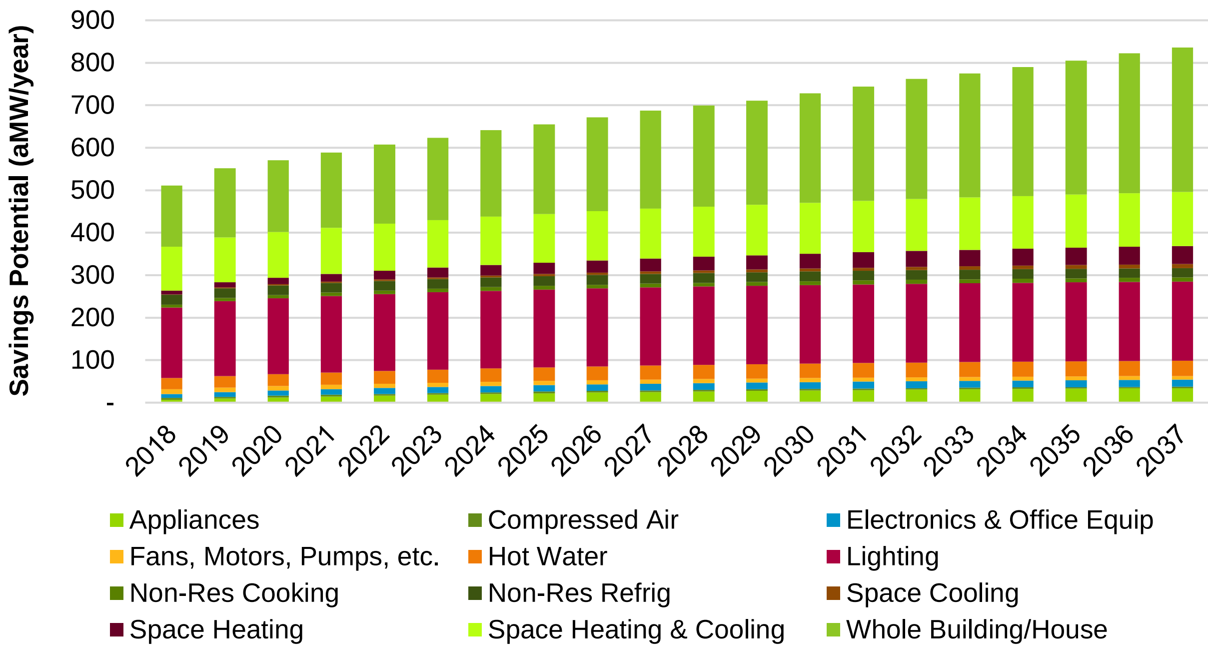
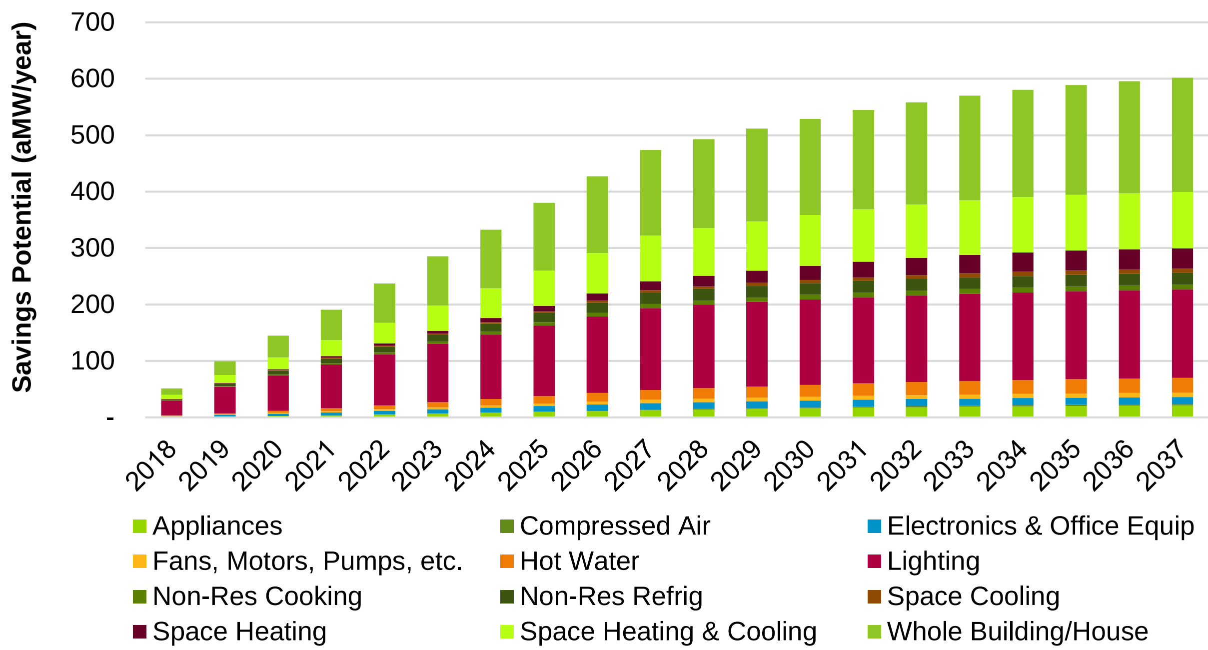


Figure 20. Cumulative Electric Energy Achievable Technical Potential by End Use: 2018-2037



3.2.1.4 Energy Efficiency Potential Supply Curves

The energy efficiency potential supply curves presented in Figure 21 and Figure 22 provide a view of cumulative measure-level electric energy efficiency savings potential in 2037 ranked by the LCOE saved by each measure. The combined view of both potential and cost of savings provides insight into the overall cost to achieve a target level of energy efficiency. Additionally, using a standardized metric such as the LCOE allows comparison of the costs of efficiency with other supply-side resources in a broader IRP process.

As can be seen at the far-left side of the technical and achievable technical potential supply curves, there is a small amount of potential from measures that have a negative LCOE. Such negative LCOE values may arise even for measures with a positive incremental cost over the baseline measure; they result from the technical handling of costs and benefits within the calculation of the total resource net levelized cost, as described in Section 2.1.8. Measures that have zero implementation cost, such as refrigerator recycling or freezer removal, also typically have negative LCOEs if they provide benefits in addition to electric energy savings, such as coincident peak demand reduction.

One example of a measure with a positive incremental cost and negative LCOE is exterior LED area and wall lights for commercial buildings. These lights are typically on during evenings in December and so their consumption is highly coincident with the hours in which PSE experiences its system peak demand. The peak demand savings are considered as a benefit in the LCOE calculation and valued at avoided cost rates for T&D system upgrade deferrals. Additionally, LED costs are forecasted to decline significantly over the next 20 years, making these lights relatively inexpensive upgrades in 2037.[51] The

[51] See Appendix F.1 for a discussion of Navigant's LED cost forecast.

low measure cost coupled with the significant peak demand reduction benefits together result in a negative LCOE for this measure in 2037.

There is roughly 530 aMW of technical potential and 400 aMW of achievable technical potential with a levelized cost of less than $300/MWh. The reduction in achievable technical potential is largely due to the imposition of the maximum achievability factors for each measure, as discussed in Section 2.1.6. For some measures, such as high efficiency comprehensive new construction, the assigned ramp rate also factors into the reduction in achievable technical potential in 2037 relative to technical potential. In both supply curves, there is a significant increase in the cost of any additional potential beyond a cost of about $1,000/MWh.

Overall, the shape of the technical and achievable technical potential LCOE supply curves is similar. One notable difference is the absence of the step-like feature on the technical potential curve at a cumulative potential, ranging from about 740 aMW to 810 aMW at an LCOE just under $1,000/MWh. This large amount of potential at a relatively fixed LCOE comes from the high efficiency comprehensive new construction measure for commercial office buildings. The commercial office building customer segment is one of the fastest growing segments in PSE's service territory, both in terms of building square footage and electricity consumption, so there is a large amount of technical potential for energy efficiency from new office construction.

Through discussions with PSE program staff, it was determined that there are several non-economic barriers to adoption of these high efficiency construction practices for office buildings that reduce the achievable technical potential relative to other measures. As such, the achievable technical supply curve has a less pronounced step in potential that corresponds to savings in new office construction. It is worth nothing here that costs and associated potential for the high efficiency comprehensive new construction measure vary widely by customer segment.

Figure 21. Electric Energy Technical Potential LCOE Supply Curve: 2037

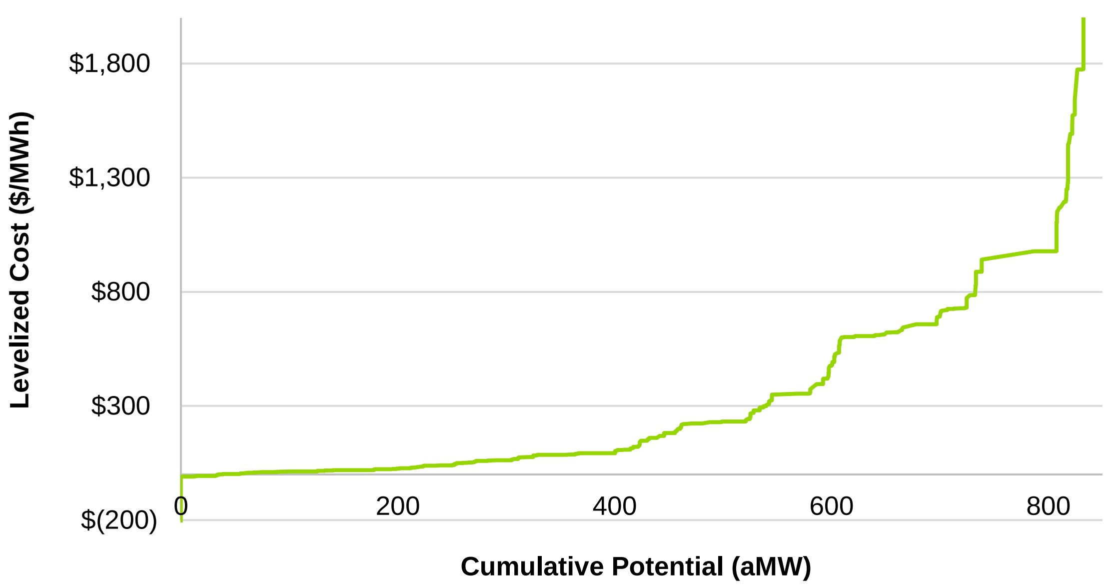
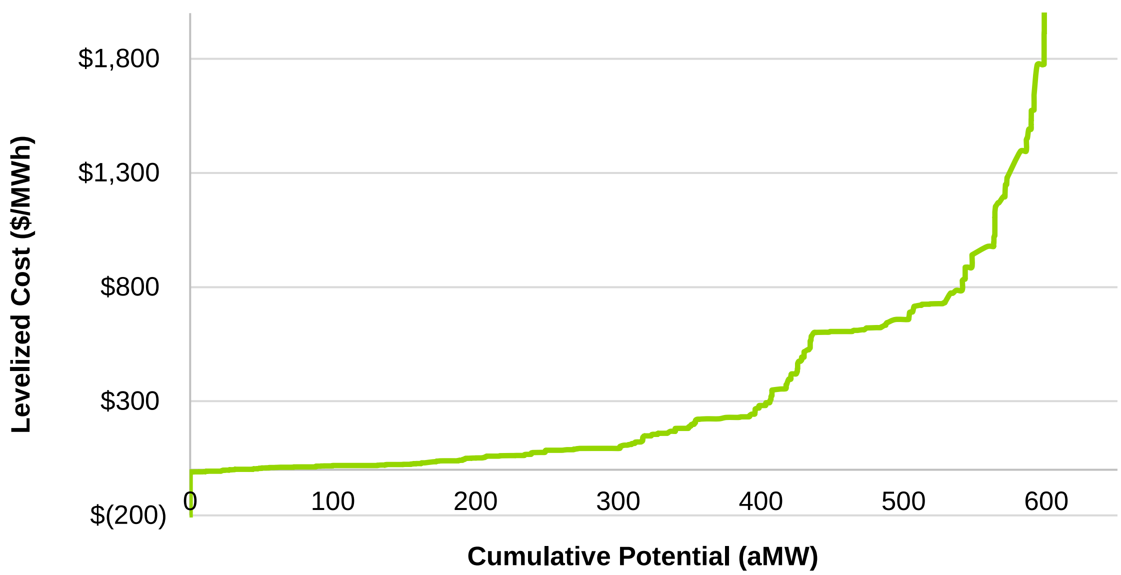


Figure 22. Electric Energy Achievable Technical Potential LCOE Supply Curve: 2037



3.2.2 Natural Gas Energy Efficiency Potential Results

This section provides aggregated views of technical and achievable technical natural gas energy efficiency savings potential at various levels of granularity, as well as supply curves of potential ranked by LCOE. It discusses the key drivers of potential and the general trends present in the results.

3.2.2.1 Technical and Achievable Technical Potential by Sector

Figure 23 and Figure 24 show the technical and achievable technical potential for each sector over the study horizon. As with electric energy, there is significant growth in potential over time and the achievable technical potential displays the effects of the ramp rates assigned to each measure as well as the change in slope after all retrofit potential is achieved in 2027. There is a total of about 175 million therms per year of achievable technical potential in 2037.

Figure 23. Cumulative Gas Energy Technical Potential by Sector: 2018-2037

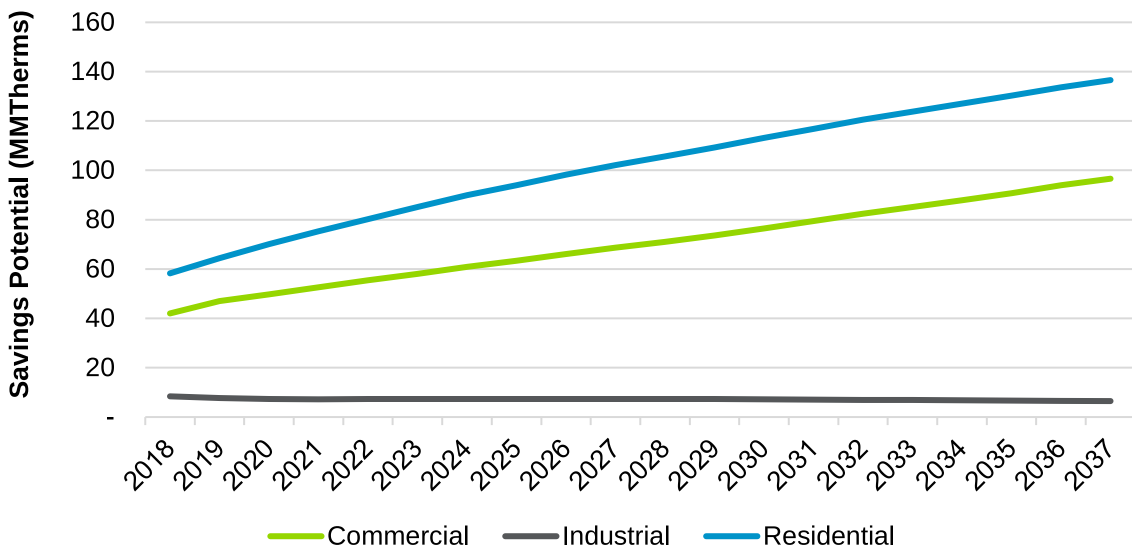
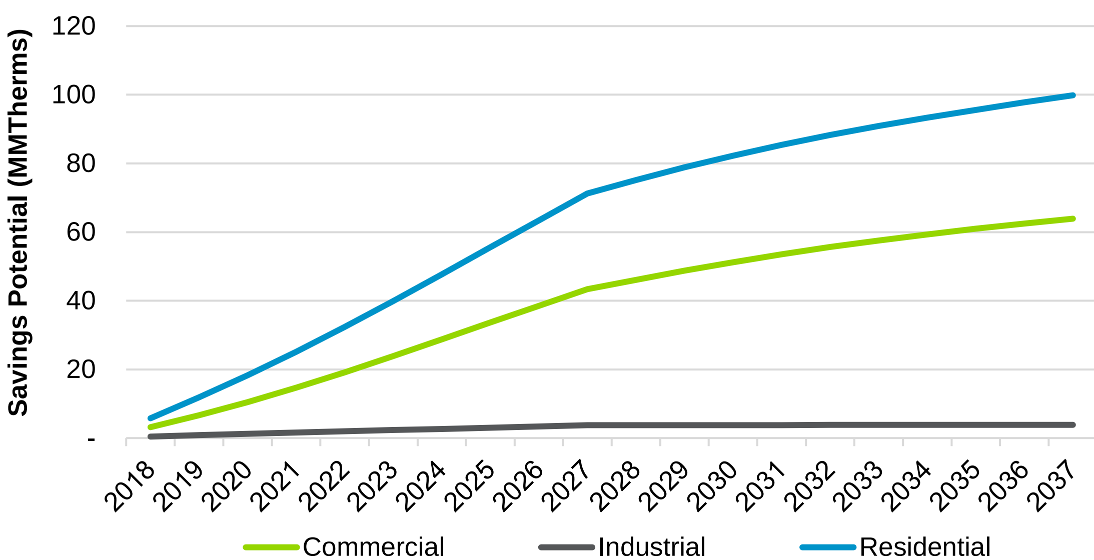


Figure 24. Cumulative Gas Energy Achievable Technical Potential by Sector: 2018-2037



3.2.2.2 Technical and Achievable Technical Potential by Customer Segment

Figure 25 and Figure 26 show the gas energy technical and achievable technical potential for each customer segment. In both cases, residential single-family homes account for more than half of all gas energy savings potential in each year. While electric energy savings potential from households in multifamily buildings was slightly over half that of single-family homes, multifamily gas savings potential is just over 10% that of single-family gas savings potential. This is primarily because multifamily homes are less likely than single-family homes to use natural gas for space and domestic hot water heating.

Commercial office buildings and other (unclassified) commercial buildings also show significant gas energy savings potential. Notably, the food service customer segment contributes significant natural gas potential, where it showed only modest electric energy potential. This gas savings potential comes mainly from efficient upgrades to various types of cooking equipment, which tend to use natural gas rather than electricity. The remaining customer segments each contribute relatively small amounts of gas energy savings to make up the balance of the overall natural gas potential.

Figure 25. Cumulative Gas Energy Technical Potential by Customer Segment: 2018-2037

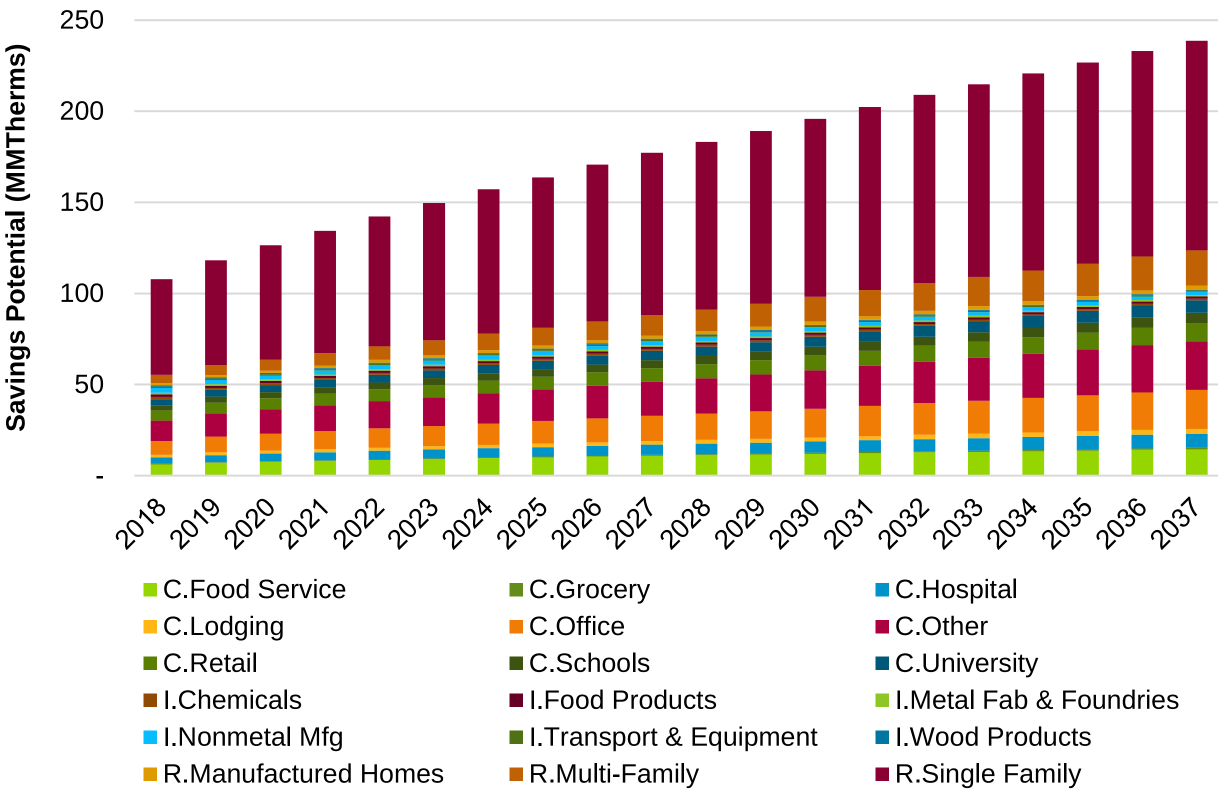
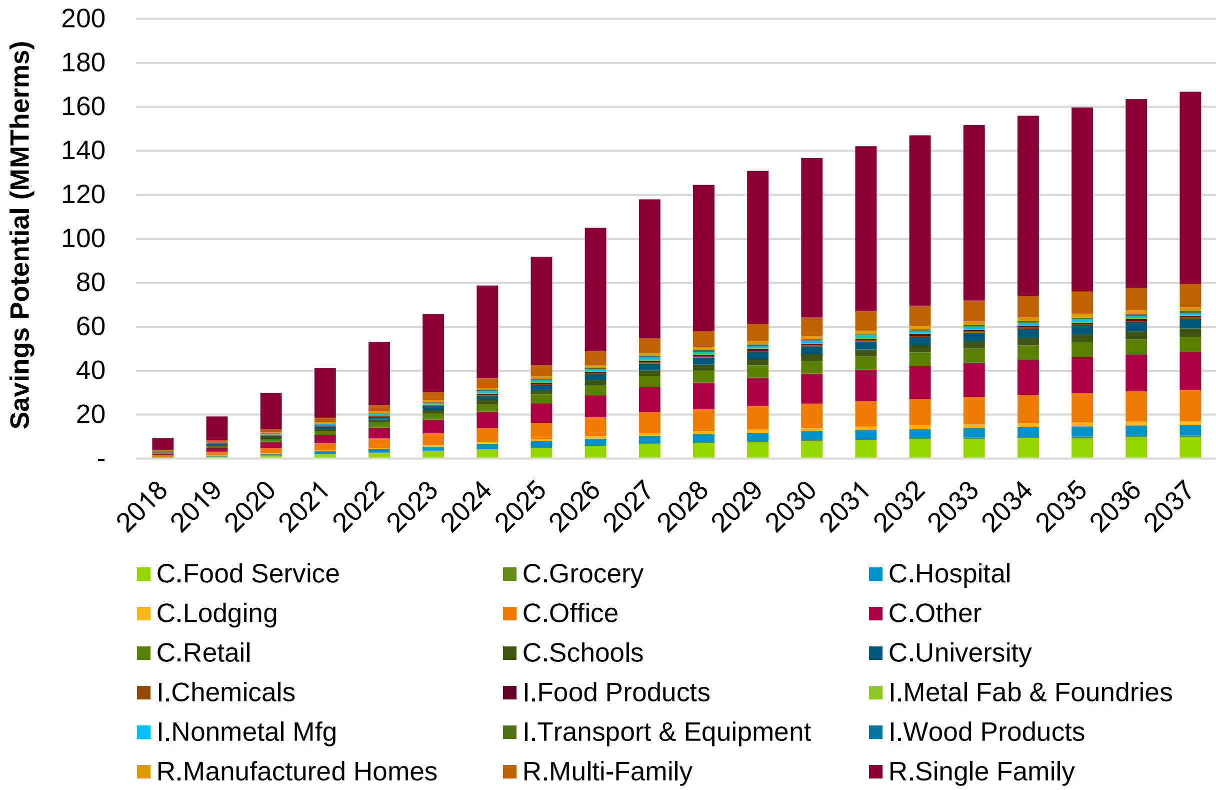


Figure 26. Cumulative Gas Energy Achievable Technical Potential by Customer Segment: 2018-2037



3.2.2.3 Technical and Achievable Technical Potential by End Use

The distribution of end uses contributing significant natural gas savings potential is significantly different than for electric energy savings potential, as should be expected based on the applicable equipment. The whole building end use again contributes the largest portion of the total cumulative potential in 2037. The space heating end use provides the second highest amount of potential, mainly from high efficiency furnace and boiler upgrades. As seen in the figures of potential by customer segment above, the bulk of these equipment upgrades occur in single-family homes.

Though there is no natural gas savings from space cooling alone, the space heating and cooling end use shows significant potential from measures like smart and programmable thermostats, various insulation measures, and high efficiency windows—all of which save significant gas energy in the winter months. The domestic hot water heating end use also shows significant gas savings potential from homes that use natural gas for their primary water heating. There is also a small amount of additional potential from industrial process heating in various industrial customer segments and from non-residential cooking.

Figure 27. Cumulative Gas Energy Technical Potential by End Use: 2018-2037

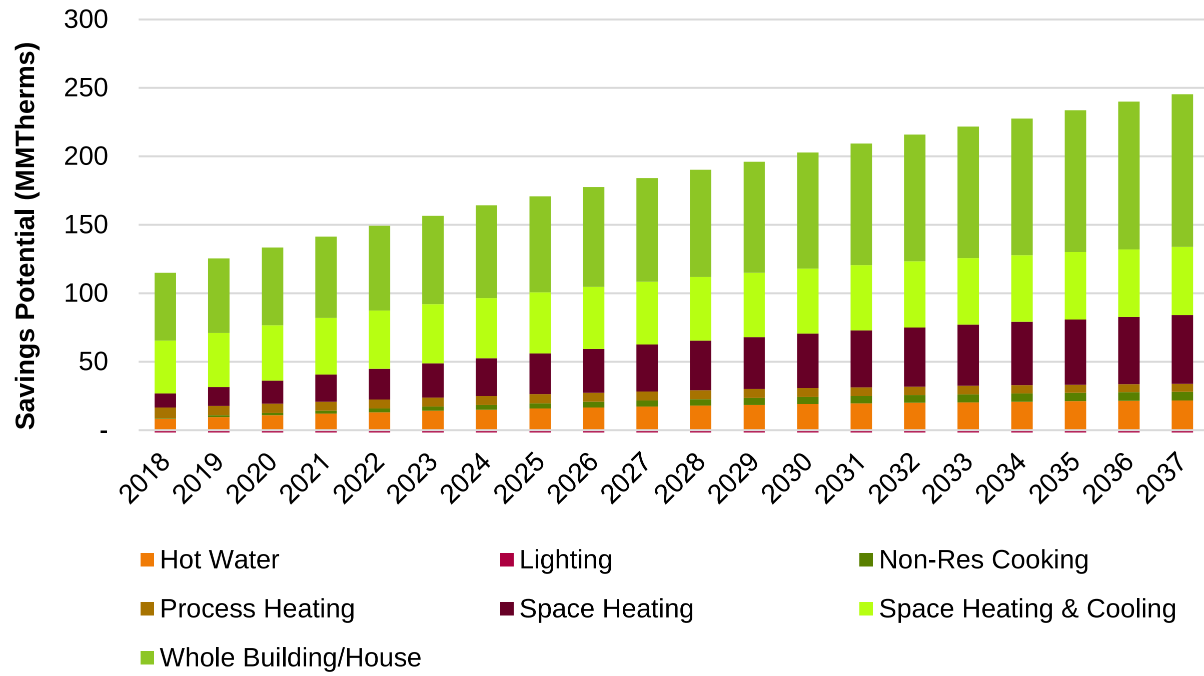
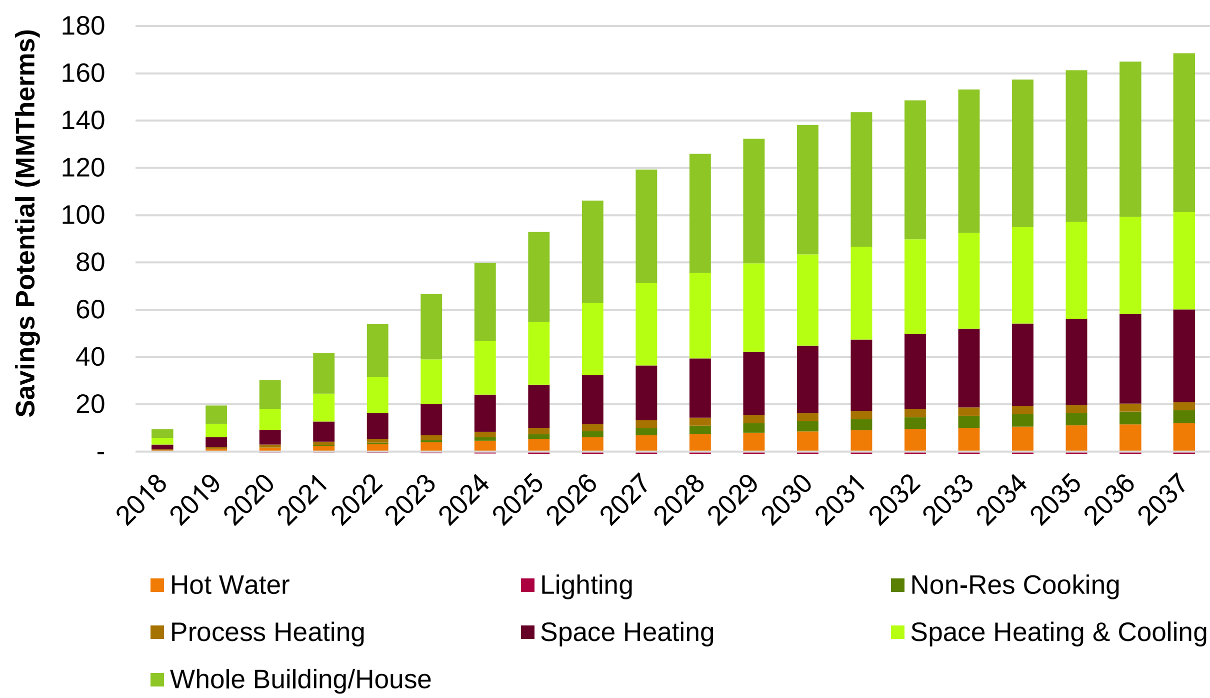


Figure 28. Cumulative Gas Energy Achievable Technical Potential by End Use: 2018-2037



3.2.2.4 Energy Efficiency Potential Supply Curves

Figure 29 and Figure 30 show the supply curves of technical and achievable technical gas energy savings potential in 2037. The gas energy supply curves have a more pronounced elbow feature than their electric energy counterparts. This generally indicates a more rapid rise in the cost of conserved gas energy than electric energy as the supply curve is traversed from left to right. Overall, the technical and achievable technical gas energy supply curves have similar shape.

The step feature discussed in Section 3.2.1.4 for the electric energy supply curves again appears in the natural gas supply curves, though to a lesser extent. It again corresponds to high efficiency comprehensive new construction in commercial office buildings and occurs at an LCOE of about $50/therm. This step is again smoothed out a bit in the achievable technical potential supply curve due to assumptions about the maximum achievability of the new construction measure.

Overall, there are roughly 190 million therms of technical potential and 140 million therms of achievable technical potential under $10/therm. The reduction from technical to achievable technical potential is almost entirely driven by the value of the maximum achievability factors assigned to each individual measure.

Figure 29. Energy Efficiency Gas Energy Technical Potential LCOE Supply Curve

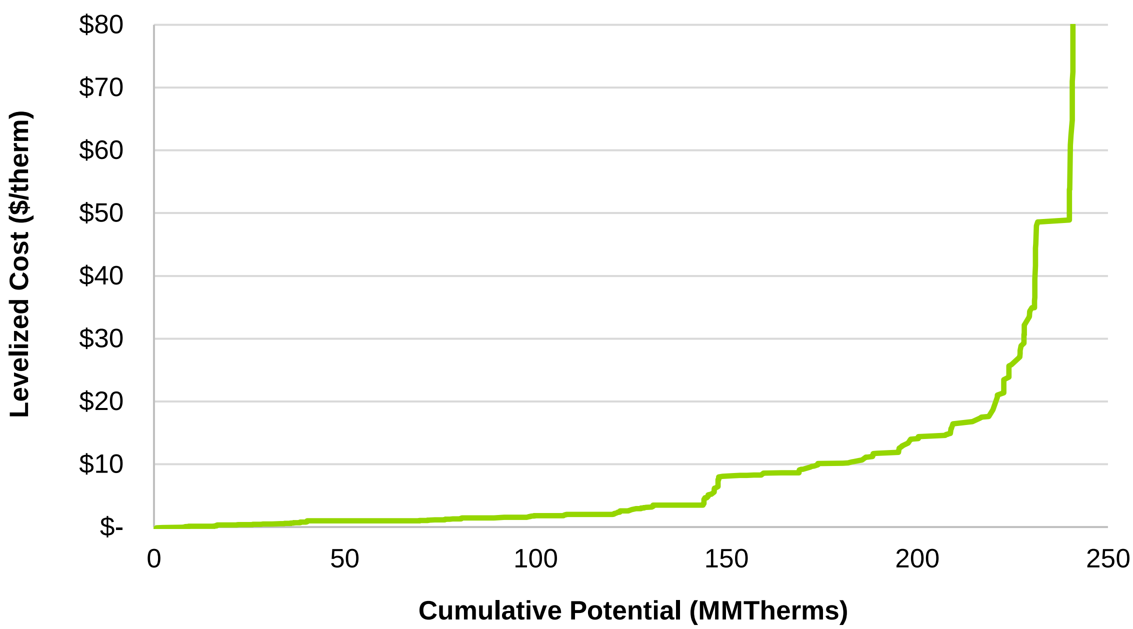
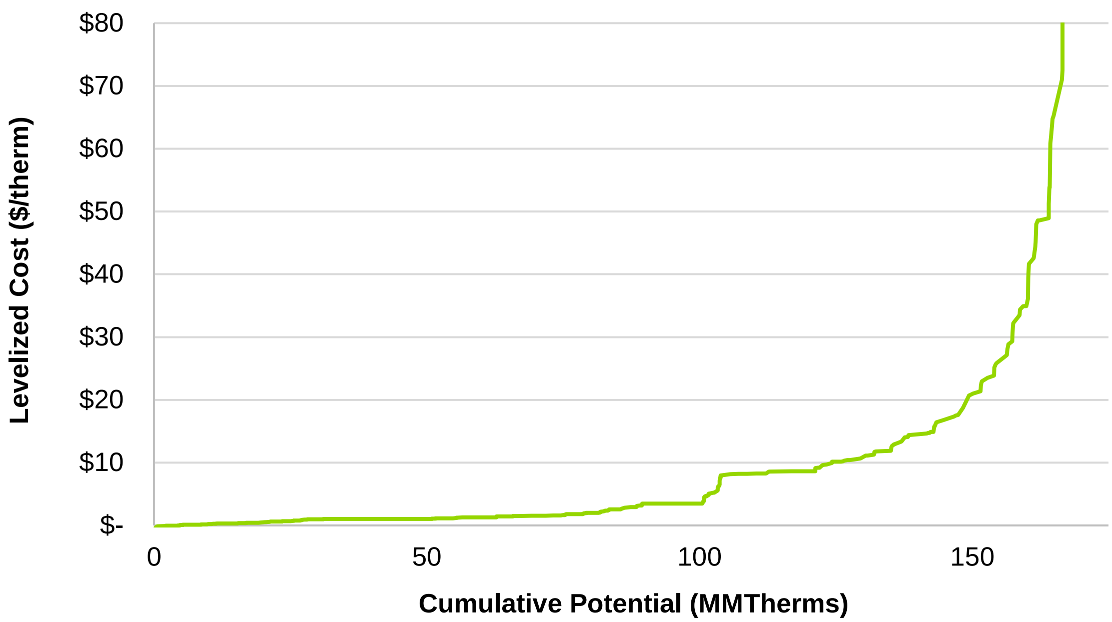


Figure 30. Energy Efficiency Gas Energy Achievable Technical Potential LCOE Supply Curve



3.3 Top Energy Efficiency Potential Measures

To identify the individual electric and natural gas efficiency measures with the highest savings potential, Navigant presents here histograms of the top 40 measures of each fuel type, ranked by both technical and achievable technical potential. Note that these rankings are by potential only, and do not consider the cost of associated energy savings. The top measures below some specified cost threshold could be different than the top measures presented here. The reader may refer to Table 24 in Appendix A to view the TRC net LCOE in real 2018 dollars for each measure. Additionally, Table 25 provides a detailed description for each energy efficiency and fuel conversion measure considered in the present analysis, and Table 26 defines abbreviations and initialisms that appear in measure names throughout the report.

Figure 31 shows the measures with the highest cumulative electric energy technical potential in 2037. Topping the chart is the commercial new construction measure for new buildings that consume 25% less energy than code. This measure's high potential primarily because of the significant forecasted growth in the commercial sector. Through 2037, PSE forecasts commercial energy consumption to grow by nearly 50% compared to 2017 levels; much of this growth is attributable to new commercial building construction to which this measure is applicable. As discussed above, conversations with PSE program staff motivated the reduction of this measure's maximum achievability factor from the default value of 85% and also suggested the use of a slow ramp rate to account for non-economic barriers to adoption. As a result, the achievable technical potential of the measure is more in line with other top saving measures, as can be seen in Figure 32.

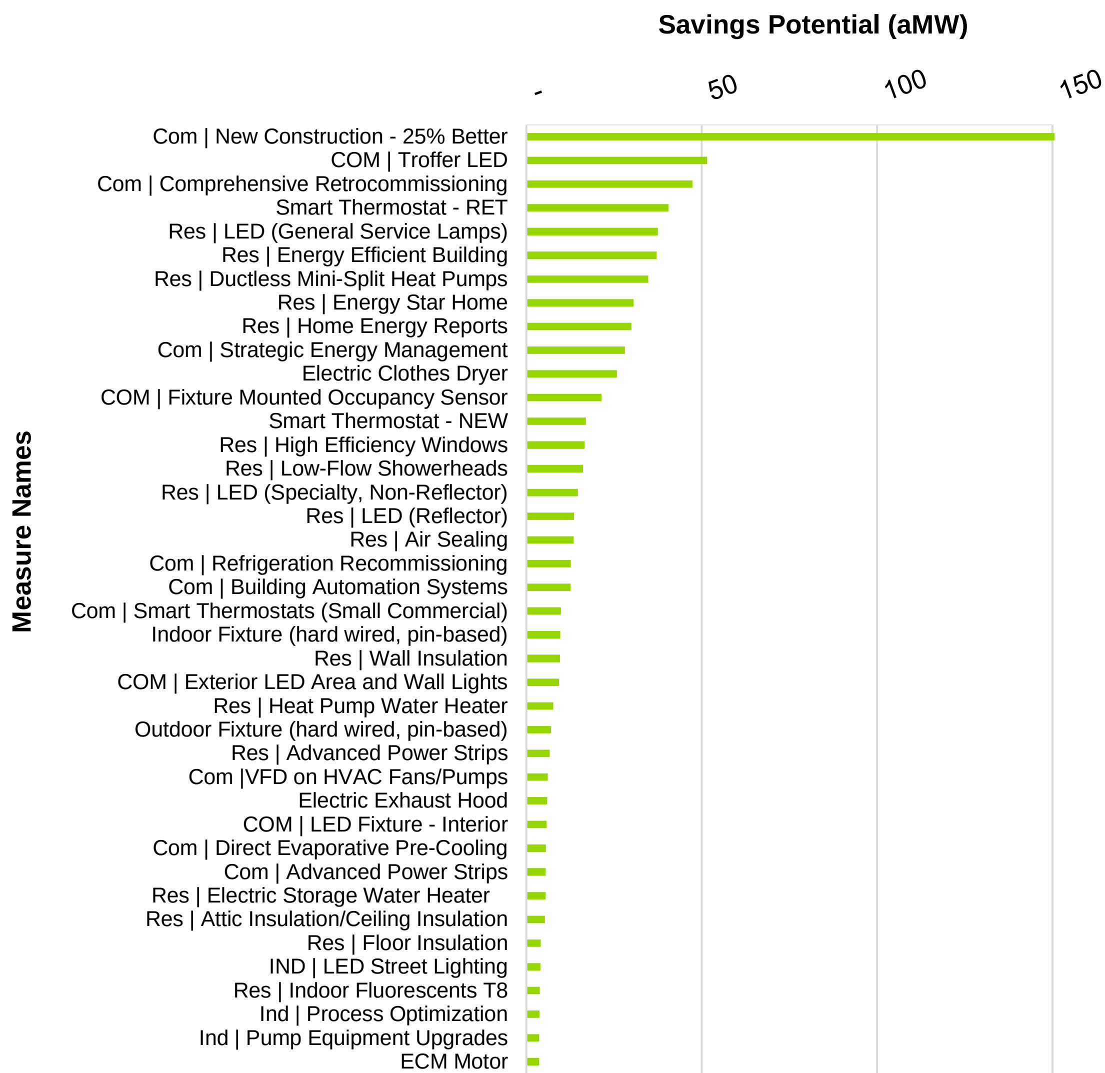
Troffer LEDs in commercial buildings provide the second highest electric energy technical potential and the highest achievable technical potential of any measure. These lighting fixture upgrades replace T8 and T12 fixtures and are installed on a retrofit basis; they show the highest potential for application in office buildings and retail establishments. In addition to having significant savings potential, the cost of these fixtures is forecasted to drop significantly over time, with a forecasted 2037 cost that is just over 50% the cost in 2017. These attributes make this LED measure especially attractive in terms of both its savings potential and its cost.

Commercial comprehensive retrocommissioning also shows high technical and achievable technical potential and is applicable to a wide variety of building types, with the highest potential coming from office buildings and retail establishments. Smart thermostats and general service LEDs round out the top five technical electric energy savings measures.

In the electric energy achievable technical potential rankings shown in Figure 32, the general order of the measure rankings remains consistent with that of the technical potential. Any changes in rank are primarily driven by differences in the maximum achievability factors applied to each measure,[52] and in the case of the new construction measures, are also due to the achievable ramp rates assigned.

[52] Adjustments to the maximum achievability factor below the suggested value of 85% were made sparingly and only after direct consultation with PSE program staff. The Council recommends using 85% as the maximum achievability factor for measures whenever feasible, as this is meant to reflect a long-run market adoption ceiling and is robust to transient influencers of market adoption like cost, technology availability, etc. These adoption influencers are accounted for by the measure-level ramp rates rather than the maximum achievability factor. See https://www.nwcouncil.org/reports/2007/2007-13/ for motivation behind the use of 85% as the maximum achievability factor for computing achievable technical potential. See Table 28 for a list of all measures whose maximum achievability factors were assumed to be less than the default value of 85%.

Figure 31. Top Energy Efficiency Measures Ranked by Electric Energy Technical Potential: 2037[53]



[53] See Table 26 for definitions of any abbreviations or initialisms used in the measures names.

Figure 32. Top Measures Ranked by Electric Energy Achievable Technical Potential: 2037[54]

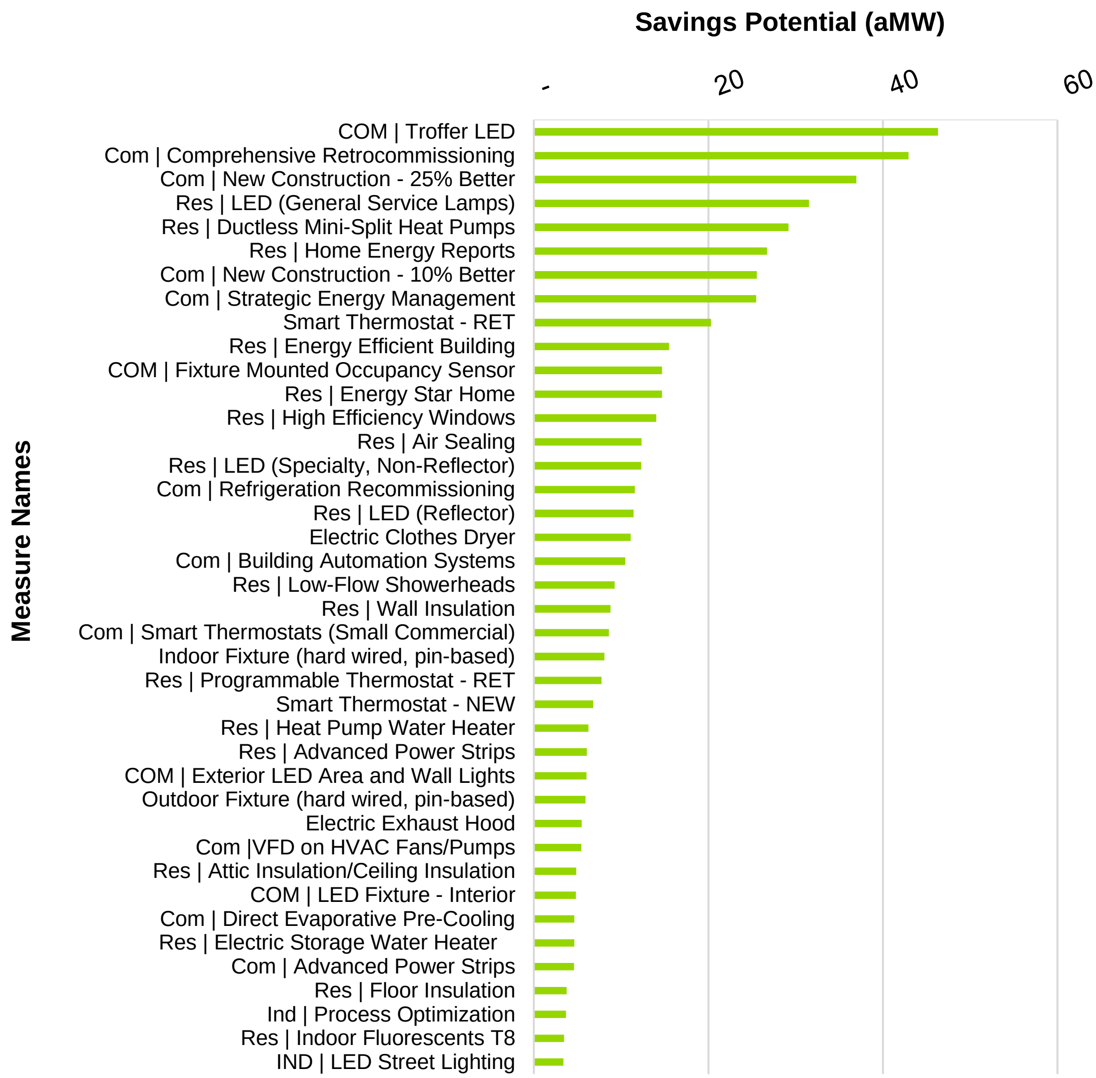


Figure 33 presents the top gas energy efficiency measures ranked by technical potential in 2037. As with electric energy potential, efficient commercial new construction is at the top, though its achievable technical potential again falls more in line with other top measures after applying the adjustments for maximum achievability and ramp rate. Comprehensive retrocommissioning for commercial buildings shows the third highest gas savings technical potential, similar to its ranking for electric energy technical potential.

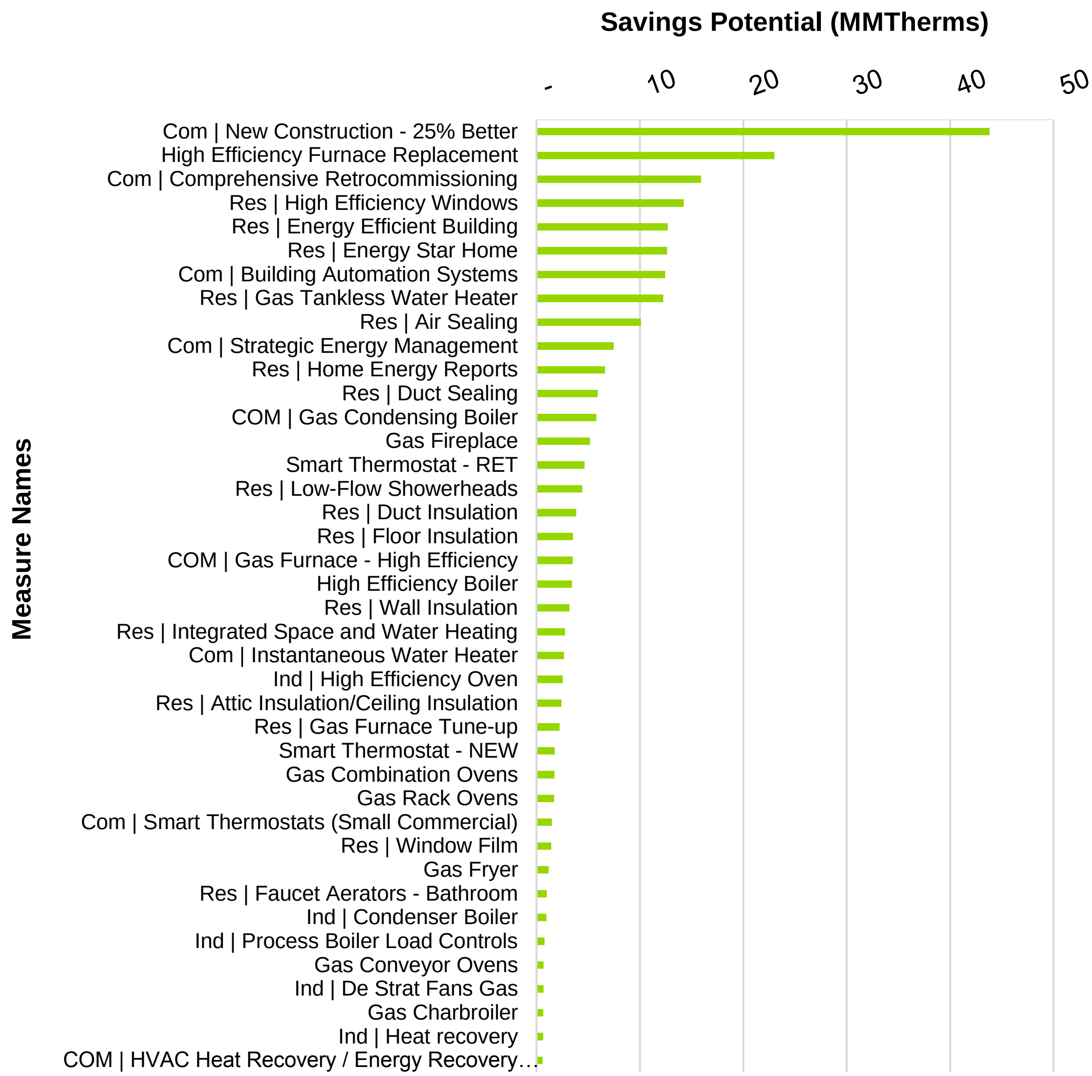
The high efficiency furnace replacement measure has the second highest gas energy technical potential and the highest achievable technical potential. This measure is primarily applicable to residential single-family homes with only a small portion of its potential coming from multifamily or manufactured homes.

[54] See Table 26 for definitions of any abbreviations or initialisms used in the measures names.

High efficiency windows and another whole building new construction measure for residential multifamily apartment buildings round out the top five gas energy measures ranked by technical potential.

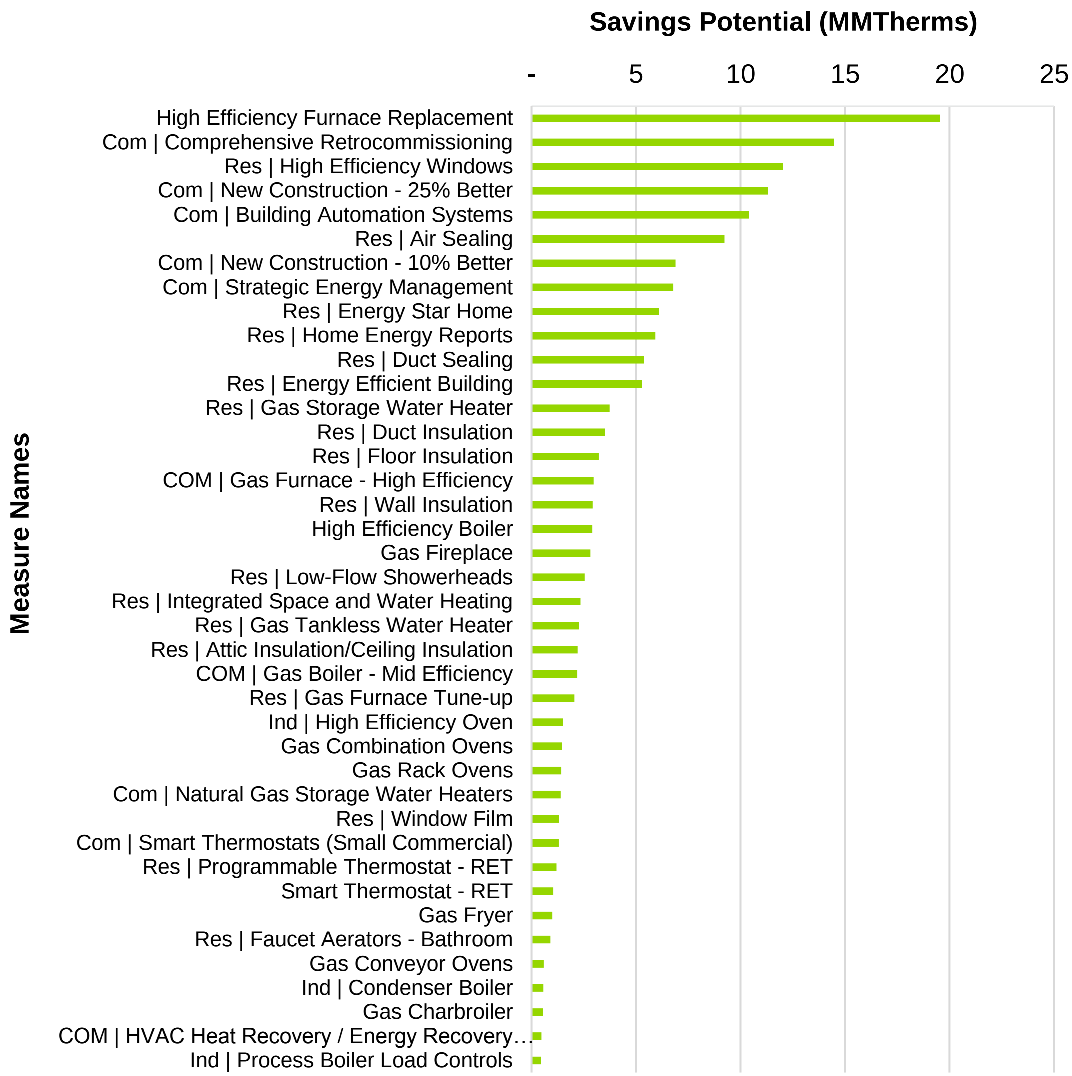
Overall, the top natural gas savings measures tend to be either whole building measures or related to space heating. Of the top 10 measures ranked by achievable technical potential, six are associated with the whole building end use and the other four produce gas energy savings either directly or indirectly from space heating. Direct space heating efficiency measures are those that improve the efficiency of the space heating equipment itself; indirect space heating measures are associated with the space heating and cooling end use and reduce the need for space heating. Together, whole building and direct or indirect space heating measures account for almost 90% of all natural gas achievable technical potential energy savings in 2037.

Figure 33. Top Measures Ranked by Gas Energy Technical Potential: 2037[55]



[55] See Table 26 for definitions of any abbreviations or initialisms used in the measures names.

Figure 34. Top Measures Ranked by Gas Energy Achievable Technical Potential: 2037[56]



3.4 Codes and Standards Results

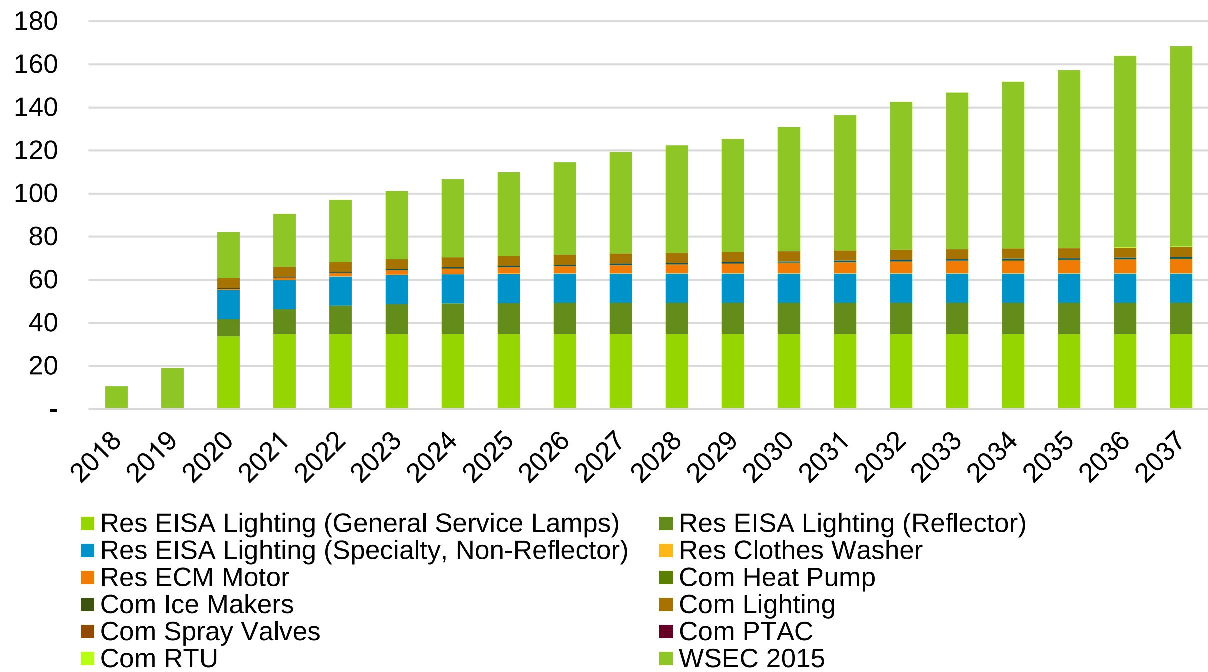
Figure 35 shows the cumulative energy savings from codes and standards[57] through 2037. The WSEC building code provides the most cumulative savings, accounting for just over half of all electric energy savings in 2037, with over 90 aMW of savings. Both the magnitude of WSEC electric energy savings and the shape of how this savings ramps over time are tied to forecasted new building construction in the residential and commercial sectors. As such, there is a relatively even ramp of this potential over time.

[56] See Table 26 for definitions of any abbreviations or initialisms used in the measures names.

[57] Refer to Table 10 for a list of the federal codes and standards reflected in the potential results in this section.

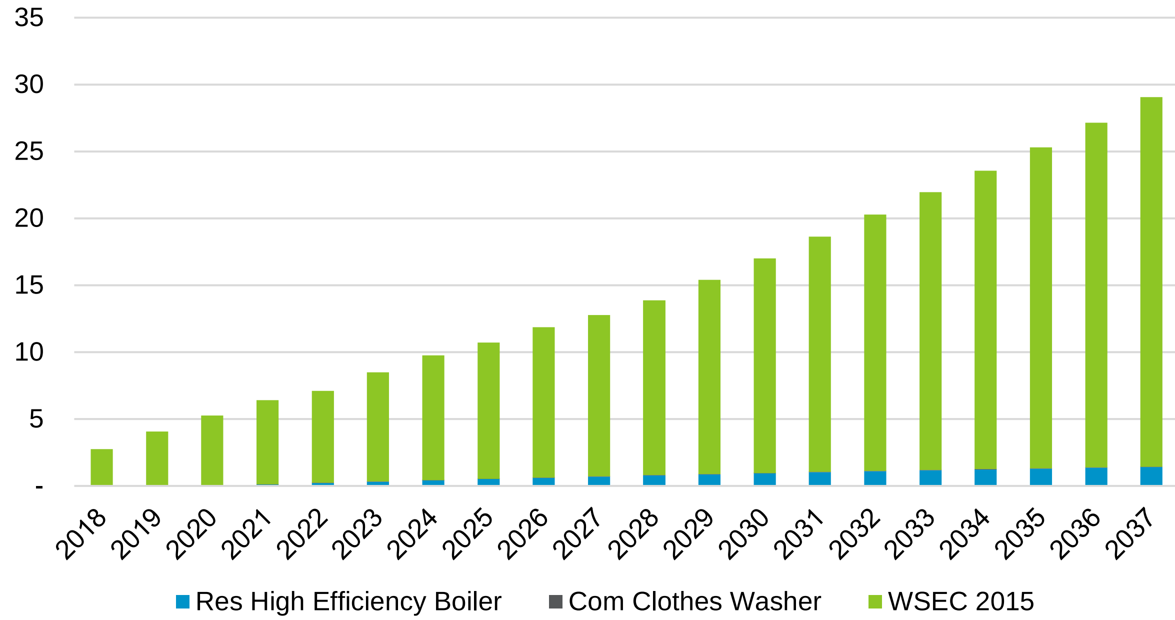
The EISA "backstop provision" for lighting that takes effect in 2020 provides the second highest cumulative codes and standards savings. EISA has already resulting in significant energy savings from lighting, with an initial provision that required an increase in minimum lighting efficiency of 27% over pre-2014 levels. However, the EISA backstop provision will again increase minimum efficiency standards for lighting by another 30% beginning in 2020, making the standard efficiency roughly equivalent to a compact fluorescent light bulb. In Figure 35. Cumulative Electric Savings Due to Codes and Standards: 2018-2037 (aMW)Figure 35, savings from the EISA standard is broken out by the type of bulb replaced and, in total, accounts for more than 60 aMW of electric energy savings by 2037. This potential ramps in quickly after the standard takes effect in 2020 because it is tied to the burn out of any remaining incandescent or halogen light bulbs, which have a relatively short useful lifetime. Together, the WSEC and EISA standard account for almost 93% of all electric energy savings potential from codes and standards by 2037.

Figure 35. Cumulative Electric Savings Due to Codes and Standards: 2018-2037 (aMW)



For natural gas, almost 90% of cumulative codes and standards savings potential comes from the WSEC building code, as can be seen in Figure 36. Again, because of the direct link to new construction, the ramp in this potential over time is consistent with the forecasted trends in building stock growth in the residential and commercial sectors through 2037. A code related to residential boilers also shows significant potential starting in 2021, with applicable boilers being found in roughly 7% of residential single family homes in PSE's service territory. Commercial washers accounting for a negligible portion of the total codes and standards savings.

Figure 36. Cumulative Gas Savings Codes and Standards: 2018-2037(MMTherms)



3.5 Fuel Conversion Potential Results

This section outlines the electric energy savings potential from converting existing and new electric appliances and space and water heating equipment to their respective efficient natural gas counterparts. The baseline equipment to which these fuel conversion measures applied varied by measure and assumed replacement type. For existing single family homes and new multi-family construction, the analysis considered converting electric baseboard space heating and electric heat pumps to efficient natural gas furnaces, as well converting electric resistance storage water heaters to tankless natural gas water heaters. For new commercial construction, the analysis considered converting electric furnaces to efficient natural gas furnaces and electric resistance storage water heaters to natural gas storage water heaters. For a full list of fuel conversion measures and baseline assumptions, refer to Table 24.

The computed fuel conversion potentials take into account all aspects of equipment suitability and availability considered in the energy efficiency analysis (e.g., equipment density, baseline/efficient equipment saturation, technical suitability, etc.) and also consider gas availability as it relates to measure applicability and cost. Customers are considered eligible for fuel conversion only if they reside in PSE's combined electric and gas service territory and if they either have an existing gas connection or do not have an existing connection but are located on a gas main. All calculations of achievable technical fuel conversion potential also account for direct competition between fuel switching measures and same fuel energy efficiency measures on the basis of relative customer economics, as described in detail in Section 2.2.1.

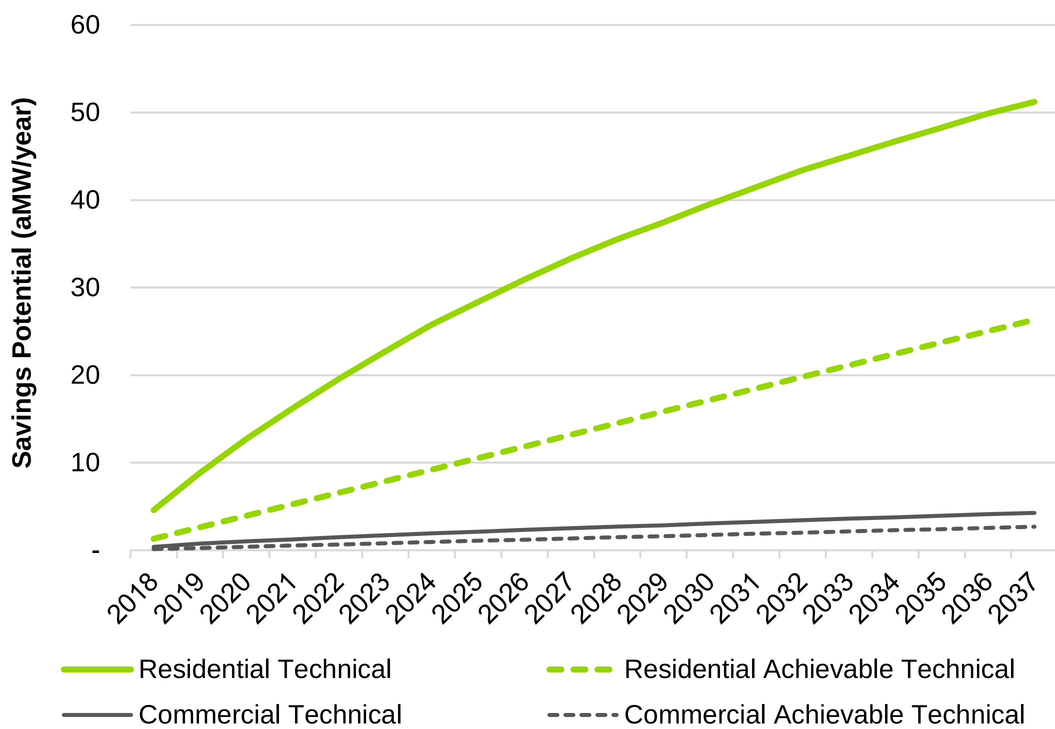
3.5.1 Fuel Conversion Potential by Sector and Potential Type

Figure 37 shows the technical and achievable technical fuel conversion electric savings potential for the residential and commercial sectors. Total cumulative achievable technical potential in 2037 is just under

30 aMW/year across the two sectors, with the residential sector accounting for over 90% of both technical and achievable technical potential. For both sectors, savings potential grows over time, with a slight trend toward market saturation seen in the technical potential. All fuel switching measures were assigned a linear achievable technical potential ramp shape over the 20-year study horizon; correspondingly, the achievable technical potential grows linearly over time, as seen in the below figures.

The maximum achievability factors for all fuel conversion measures were derived from primary data collected in PSE's 2008 fuel conversion survey and are consistent with the values used in the 2015 CPA. At the time of this report, the 2008 fuel conversion survey data was the most current data available to inform likely customer participation rates in fuel conversion programs. The primary data supported maximum achievability factors for fuel conversion that were significantly below the 85% value used for the majority of energy efficiency measures, resulting in a larger discrepancy between fuel conversion technical and achievable technical potential, as seen in Figure 37.

Figure 37. Cumulative Fuel Conversion Potential by Sector and Potential Type: 2018-2037



3.5.2 Fuel Conversion Potential by Measure

Figure 38 and Figure 39 show the technical and achievable technical potential from residential fuel conversion measures. Converting from electric resistance heating to a high efficiency natural gas furnace in single-family homes provides the greatest potential of any measure, with just over 14 aMW/year of achievable technical potential by 2037 across the single-family and multifamily residential customer segments. Converting from electric to natural gas clothes dryers provides the second highest technical potential of any fuel switching measure. However, primary data from PSE's fuel conversion survey showed that just 5% of respondents were willing to convert to a gas dryer, even if the utility paid 100% of the conversion cost. This resulted in a low maximum achievability factor for this measure and a correspondingly low achievable technical potential. Replacing electric resistance water heaters with tankless natural gas water heaters provides the second highest achievable technical fuel conversion potential, with about 8 aMW/year of savings by 2037.

Figure 38. Cumulative Residential Fuel Conversion Electric Energy Technical Potential by Measure: 2018-2037

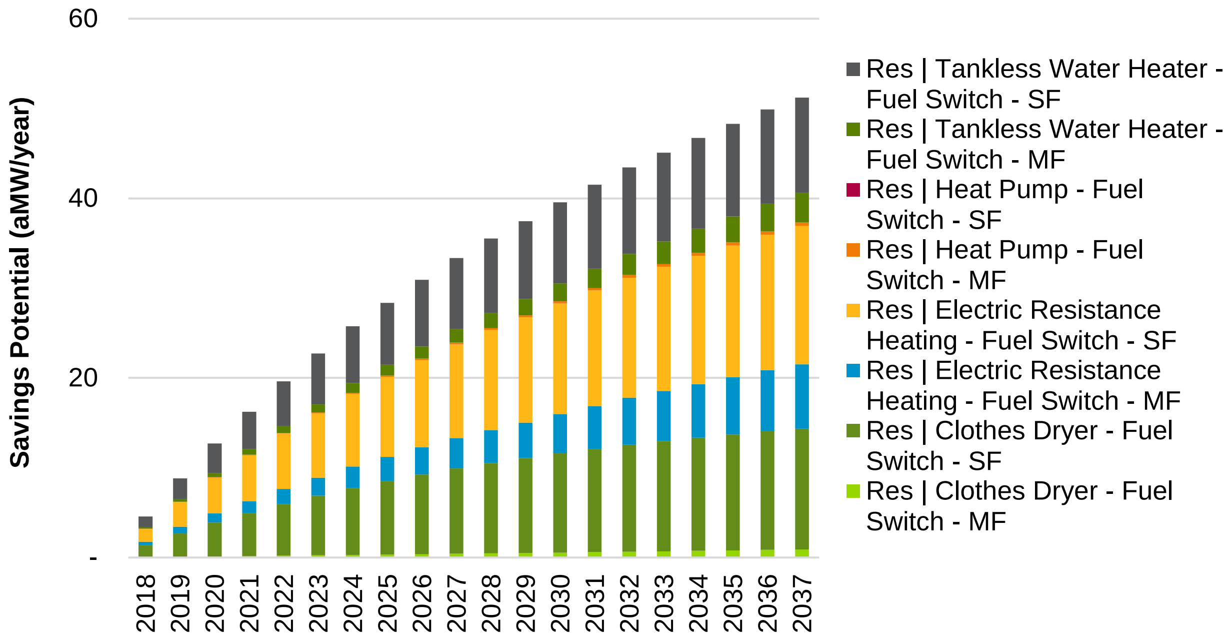


Figure 39. Cumulative Residential Fuel Conversion Electric Energy Technical Potential by Measure: 2018-2037

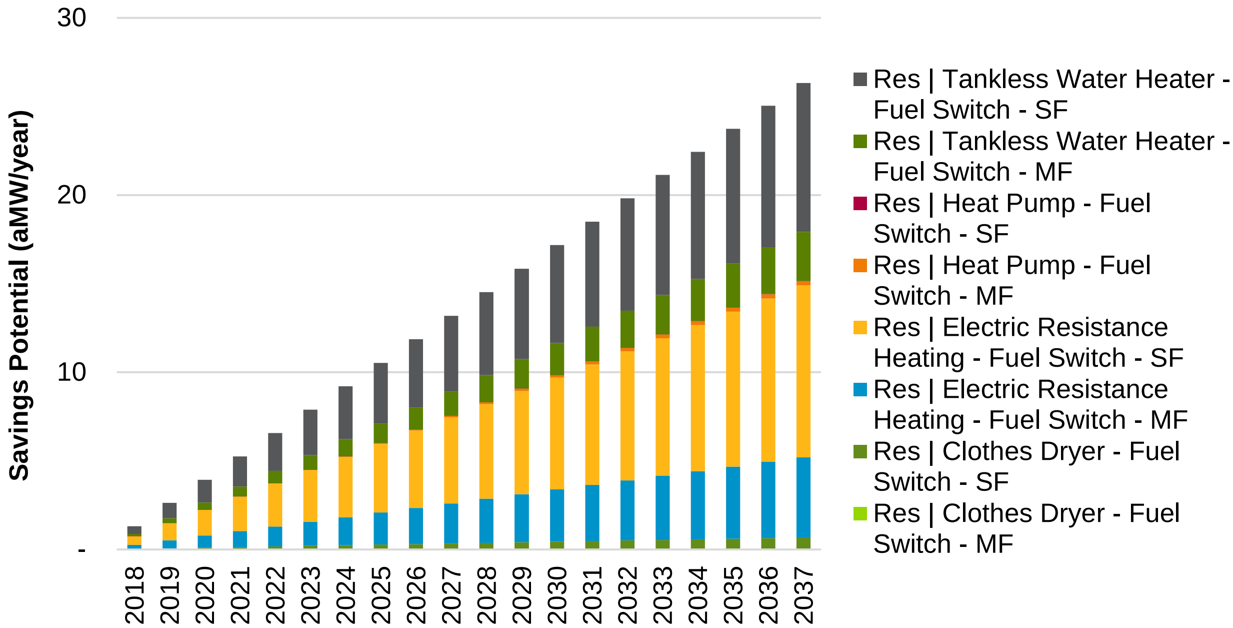


Figure 40 and Figure 41 show the technical and achievable technical fuel conversion savings potential for the commercial sector. Navigant considered two fuel conversion measures in the commercial sector applicable to new and existing construction: conversion from an electric resistance to a natural gas storage water heater and conversion from an indoor electric furnace to a natural gas furnace. The overall achievable technical savings potential for fuel conversion in the commercial sector was only about 10% that of the residential sector, with more than 85% of the commercial potential coming from the natural gas furnace conversion measure.

Figure 40. Cumulative Commercial Fuel Conversion Electric Energy Technical Potential by Measure: 2018-2037

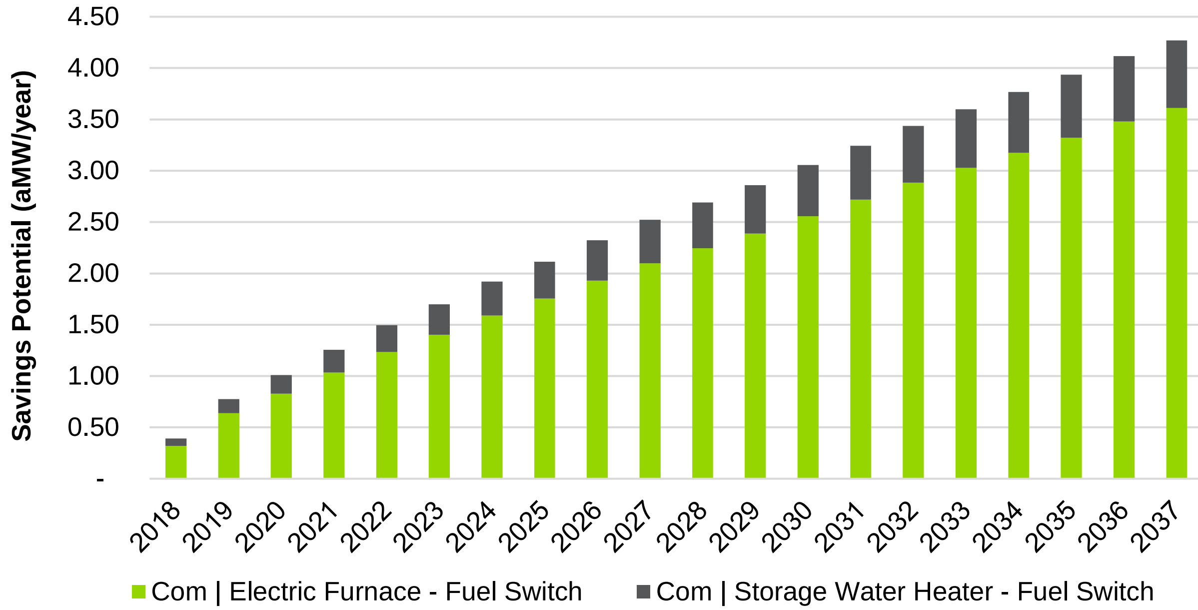
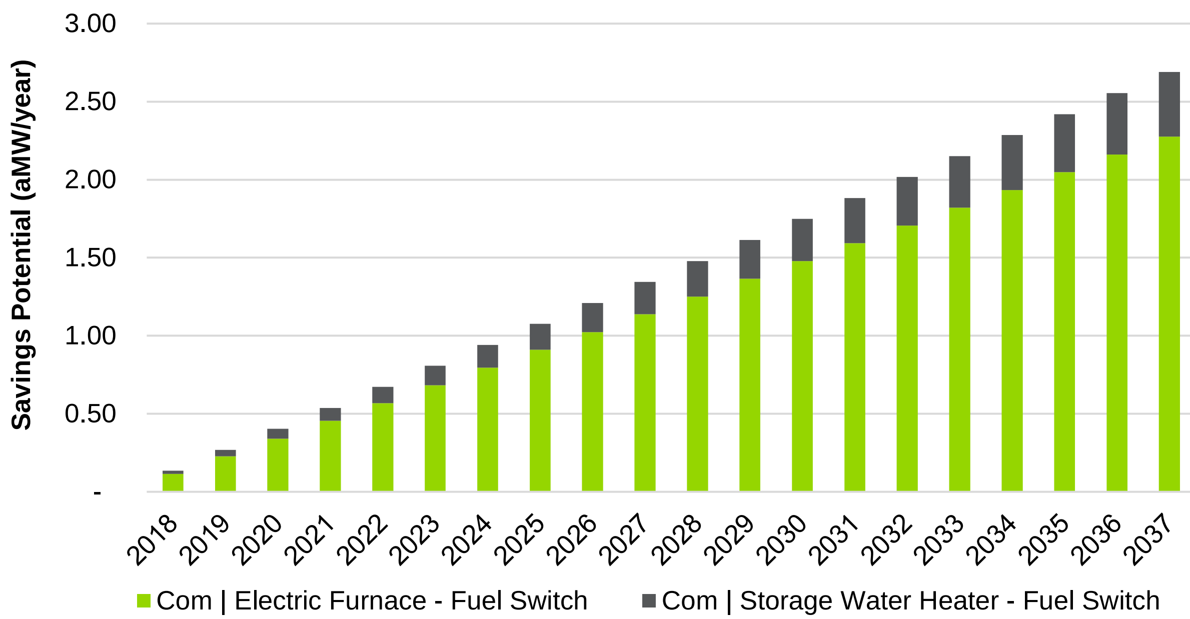


Figure 41. Cumulative Commercial Fuel Conversion Electric Energy Technical Potential by Measure: 2018-2037



3.6 Demand Response Potential Results

This section presents DR potential and cost results based on the approach described earlier in Section 2.3. This study estimated both technical and achievable technical potential results for DR. However, as described in the methodology section, technical potential results need to considered on a standalone basis for each DR sub-option and cannot be aggregated to provide a total potential. For DR, technical potential represents the theoretical maximum potential that estimates how much load reduction one could theoretically achievable if 100% of the eligible load is controllable through a DR technology in a program. Appendix E shows standalone technical potential results for each DR sub-option.

This section presents achievable technical potential results only. Note that the achievable technical potential results take into participation overlaps and program hierarchy, discussed earlier in Section 2.3[58]. Therefore, the achievable technical potential estimates are additive and can be summed up across the different options to arrive at an aggregate potential estimate.

Navigant estimated achievable technical potential for both winter and summer. However, only the winter DR potential results are of primary interest to PSE from the IRP perspective. Therefore, the DSR team presents the DR winter potential results in this section and the summer potential results in Appendix E. Both the 4-hour and 2-hour event duration results for winter DR potential are discussed.

In addition to the technical potential and summer achievable technical potential, Appendix E also includes Fast DR potential results. Fast DR potential results are not additive to the DR potential from other options and must be considered on a standalone basis because a portion of the load enrolled in other DR programs may be eligible for Fast DR if it is appropriately technology-enabled to provide fast response. Therefore, Fast DR is a subset of the other DR options. Furthermore, as described in the methodology section, a true Fast DR potential estimation requires use of hourly load profiles and assessment of potential at different times of the day, as Fast DR events may be called at any time. Hourly load analysis for Fast DR potential estimates was outside the scope of this study and, therefore, the Fast DR potential results included in this report should only be considered representative of what could be achieved during the system peak hours.

The remainder of the section presents DR achievable technical potential results by DR option and sub-option, customer class, building type and end use. It also includes annual DR program costs and levelized costs by DR option.

3.6.1 Winter DR Achievable Technical Potential by Program

Navigant's analysis considered four DR options synonymous with DR programs: DLC, C&I Curtailment, Economic DR, and Dynamic Pricing. Each DR option was further broken down into sub-options based on the type of control technology. For example, DLC included both thermostat- and switch-based control and Dynamic Pricing included with and without enabling technology sub-options. This section presents potential results first by DR option and then by sub-option for 4-hour and 2-hour event durations.

[58] For example, for residential customers, DLC participants are excluded from the CPP offer to avoid double-counting of potential from both options.

3.6.1.1 Potential by DR Option and Sub-Option: 4-Hour Event Duration

Figure 42 shows the winter achievable technical potential results by DR option over PSE's 20-year planning period (2018-2037) for the 4-hour event duration. Figure 43 shows the same results expressed as a percentage of PSE's system peak.

PSE's DR potential is estimated to grow from 14 MW in 2018 to 188 MW in 2037, representing 3.9% of PSE's forecasted peak in 2037. The study assumed that non-pricing DR programs (DLC, C&I Curtailment, and Economic DR) begin in 2018 and ramp up over a 5-year period, following an S-shaped curve, to reach steady state participation levels by 2022. Therefore, the growth in potential is steepest over that period. The start year for Dynamic Pricing is tied to AMI deployment; therefore, the study assumed that Dynamic Pricing is offered from 2023 (at which point AMI is deployed) and similarly ramps up over a 5-year period to steady state participation levels by 2027. Figure 42 and Figure 43 show that this potential remains steady from 2027 onward. Beyond 2027, the potential grows at the same rate as the customer load growth.

Among the different options included in the study, DLC has the highest potential. It grows from 8 MW in 2018 to almost 80 MW in 2022, remaining steady around this value for the rest of the forecast. DLC has almost 60% share in the total potential before dynamic pricing begins in 2023. Its contribution drops to approximately 45% once the dynamic pricing offering is included in the mix of DR options. C&I Curtailment is projected to grow from 4 MW in 2018 to a steady state value of almost 40 MW by 2022. It has close to 30% share in the total potential before Dynamic Pricing is included in the mix of DR options. Once Dynamic Pricing is offered and reaches a steady state, C&I Curtailment's share drops from 30% in 2022 to 22% in 2028. Dynamic Pricing potential steadily grows from 4 MW in 2023 to almost 45 MW within 5 years, which brings its contribution in the total potential to 25% by 2027. Economic DR has the lowest share in potential. Its potential is expected to grow from 2 MW in 2018 to steady state value of 13 MW by 2022, which leads to a 10% share in the total potential by that time. Its share drops to 8% by the time dynamic pricing participation reaches a steady state in 2027.

Figure 42. Winter DR Achievable Technical Potential by DR Option, 4-Hour Event Duration (MW)

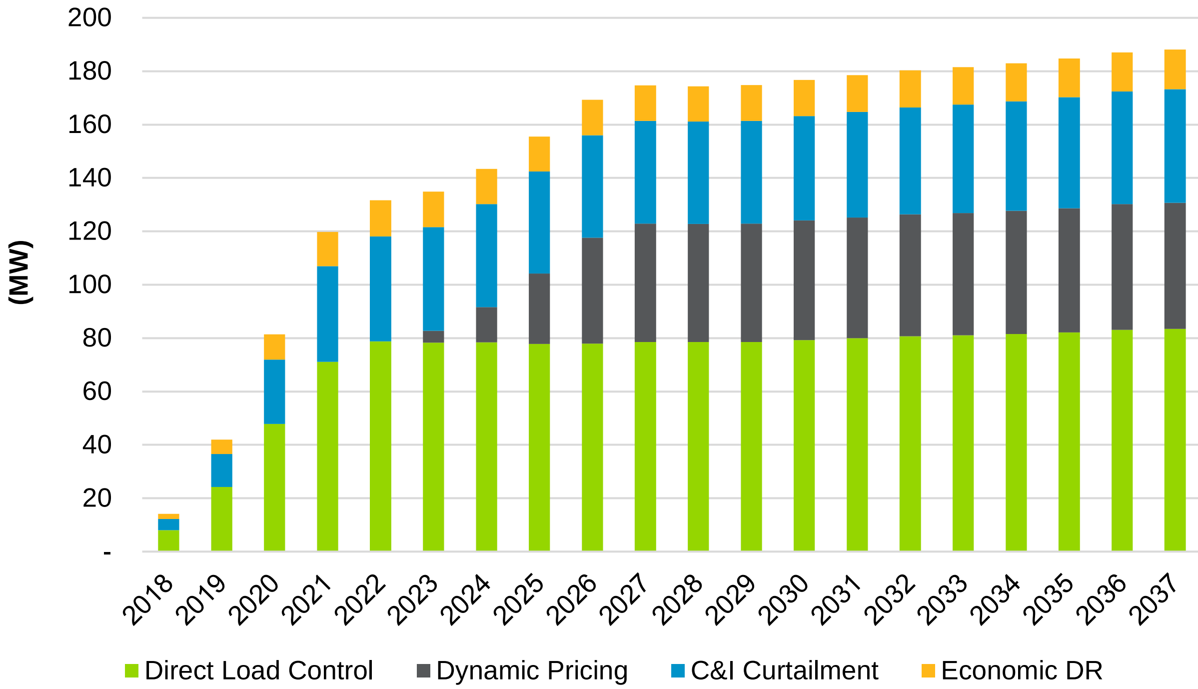


Figure 43. Winter DR Achievable Technical Potential by DR Option, 4-Hour Event Duration (Percentage of System Peak)

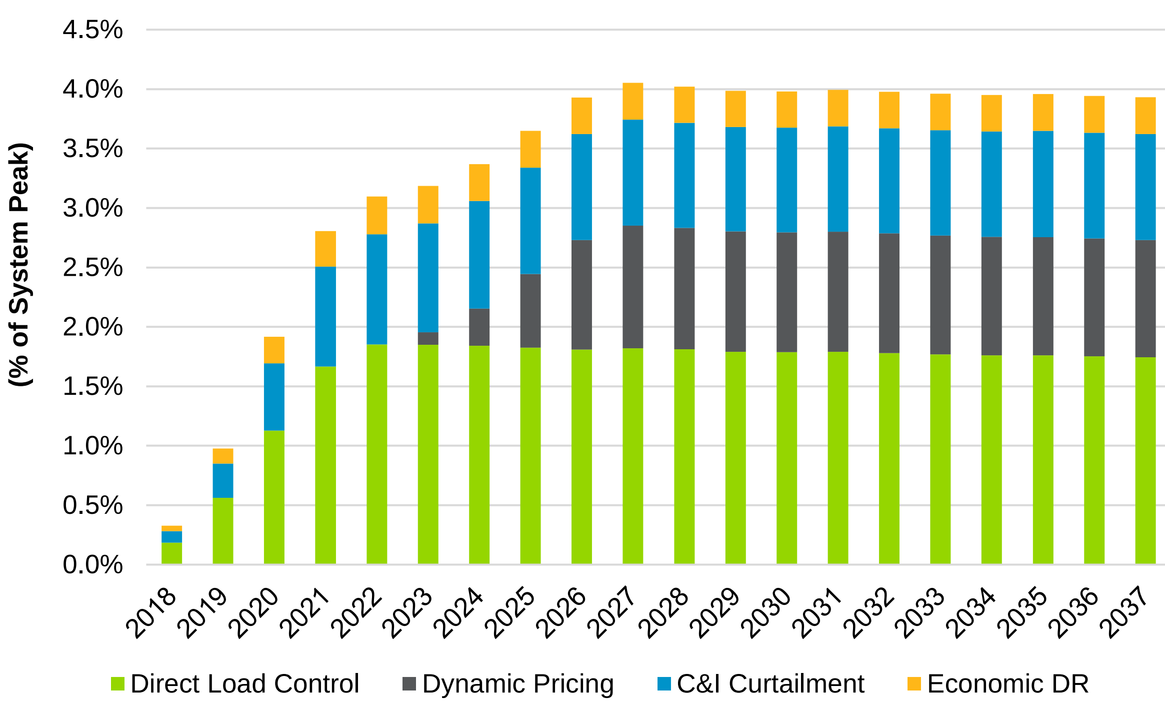


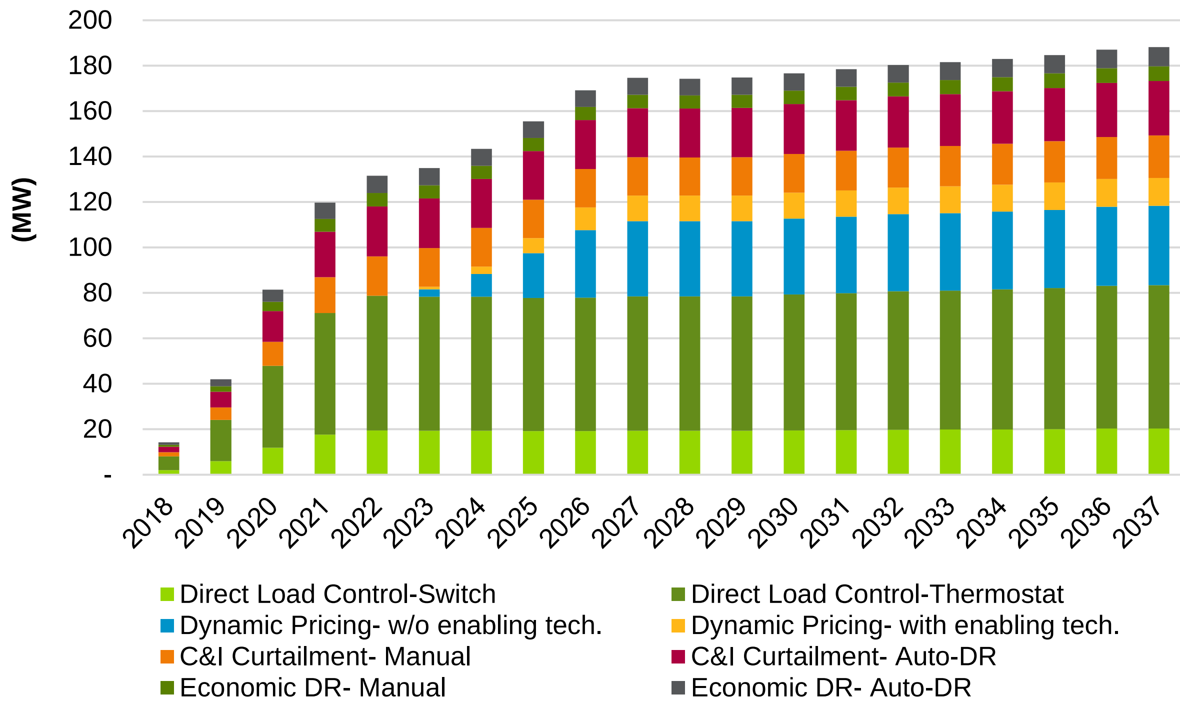
Figure 44 shows a breakdown of the DR potential by sub-option. The two sub-options under DLC are DLC-Switch and DLC-Thermostat. It is evident from the potential results in Figure 44 that DLC-Thermostat has higher potential than DLC-Switch. This study assumed that customers with eligible electric space heating (central furnaces and heat pumps) are controlled via a thermostat. Water heating load control via a switch is only considered for customers with electric space heating. This study did not consider water heating control for customers with non-electric space heating using either a furnace or a heat pump. This assumption is based on field-level knowledge gathered through the Navigant team's discussions with DLC vendors, primarily through PSE's DR resource acquisition efforts at the time of this study.[59] Therefore, the DLC-Switch potential from water heating load control represents estimated load reduction from customers that deliver electric space heating load reductions as well. DLC-thermostat potential is projected to grow from 6 MW in 2018 to almost 60 MW by 2022 and remains steady thereafter. DLC-Switch potential from water heating is much smaller in magnitude and is projected to grow from 2 MW in 2018 to almost 20 MW by 2022.

The two sub-options under both C&I Curtailment and Economic DR are Manual and Auto-DR. Realizable load reductions are greater for Auto-DR-enabled sites than for manually controlled sites; therefore, Auto-DR potential results are greater than those for manual DR for both C&I Curtailment and Economic DR. For both options, Auto-DR potential is almost 30% higher than that of manual control.

For Dynamic Pricing, two sub-options were used: without enabling technology and with enabling technology. The enabling technology for residential and small and medium C&I customer classes is a thermostat, while for the large and extra-large C&I customer classes it is Auto-DR. Load reduction impacts realizable from customers with enabling technology are significantly higher than those from customers without enabling technology. However, for residential and small and medium C&I customers, eligible customers for thermostats are those with electric space heating only, whereas the eligible customers for Dynamic Pricing without enabling technology is a much broader customer base (not restricted to customers with electric space heating). Therefore, even though the unit load reductions (on a per customer basis) are higher for those with customers with thermostats than those without thermostats, the total Dynamic Pricing potential without enabling technology is greater than that with enabling technology because the former applies to a larger customer base. Results indicate that Dynamic Pricing potential without enabling technology is almost double that of enabling technology.

[59] Navigant team members included in this study were closely involved with PSE's DR resource acquisition activities in terms of evaluating vendor bids and discussions with vendors. DLC vendor proposals indicated that they would target water heating load control only for customers with electric space heating. Unit impacts from water heating control was significantly lower than that for space heating control, whereas a vendor would need to incur a certain level of fixed costs for installing the switch and enabling it for control. Targeting a customer for water heating control only was not economical.

Figure 44. Winter DR Achievable Technical Potential by DR Sub-Option, 4-Hour Event Duration



3.6.1.2 Potential by DR Option and Sub-Option: 2-Hour Event Duration

Potential results for the 2-hour event duration are slightly higher those for 4-hour event duration due to higher participation assumptions associated with 2-hour events versus 4-hour events. Customers are more likely to sign up for shorter event duration given that these are likely to cause lower levels of discomfort, inconvenience, or disruptions in business processes than longer event durations. Also, unit load reductions or effects (on a per participant basis) are higher for the 2-hour event duration than for the 4-hour event duration. The combination of these two factors (participation and effects) result in higher potential for the 2-hour event assumption than for the 4-hour event assumption.

Figure 45 and Figure 46 show the total potential for the 2-hour event duration by DR option and sub-option, respectively. The overall potential with 2-hour events is approximately 10%-15% higher than the potential associated with 4-hour events. As shown in the two figures, total potential is expected to grow from 17 MW in 2018 to almost 220 MW by 2037.

Figure 45. Winter DR Achievable Technical Potential by DR Option, 2-Hour Event Duration

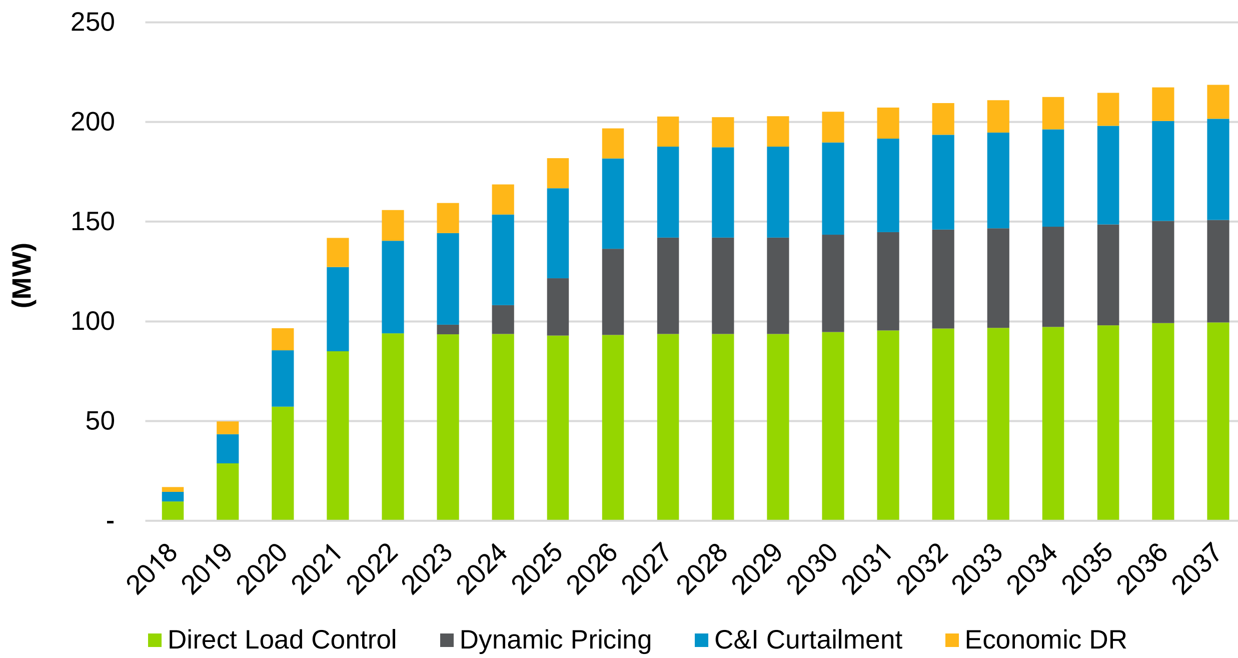
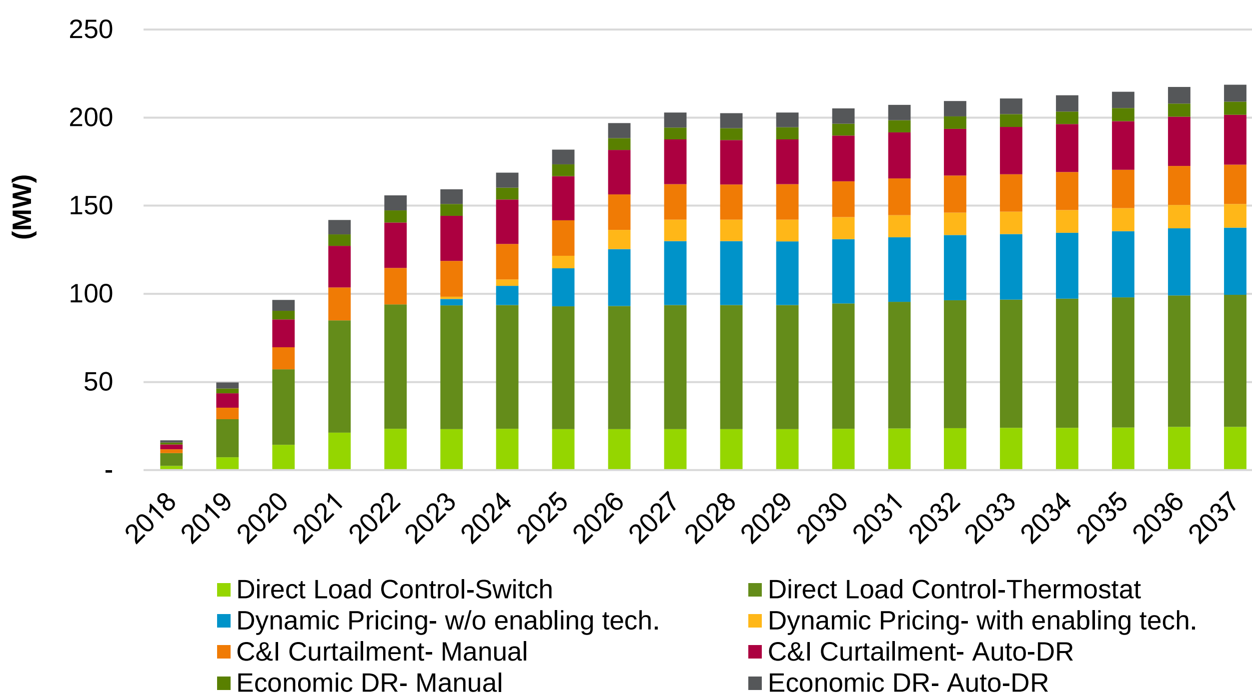


Figure 46. Winter DR Achievable Technical Potential by DR Sub-Option, 2-Hour Event Duration



A comparison of the 2-hour versus 4-hour potential results by DR option indicates that DLC potential is higher by 20% and is projected to grow from 10 MW in 2018 to 100 MW by 2037. C&I Curtailment is similarly 20% higher and is projected to grow from 5 MW in 2015 to almost 50 MW in 2037. Dynamic Pricing potential is approximately 10% higher under the 2-hour event duration and is projected to increase from 5 MW in 2023 to almost 50 MW by 2037. Economic DR potential increases by almost 15% for the 2-hour event duration and is projected to grow from 2 MW in 2018 to 17 MW in 2037. The breakdown of the potential by DR sub-options (represented in Figure 46) follows the same pattern as was described previously for the 4-hour event duration.

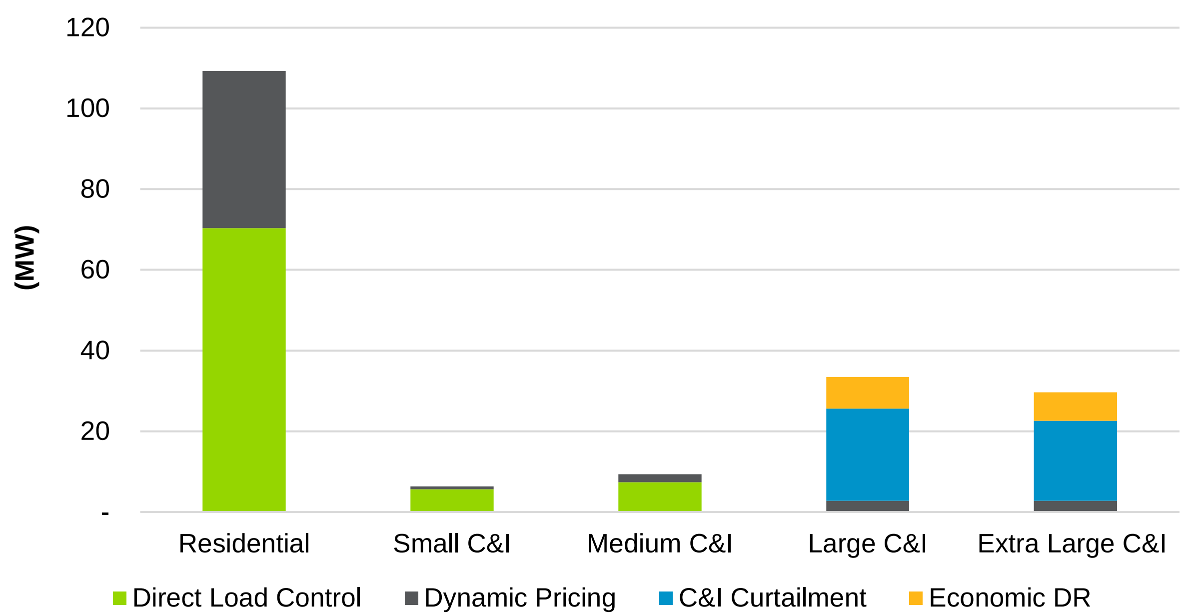
3.6.2 Winter DR Achievable Technical Potential by Customer Class

This section discusses potential results disaggregated by customer class. As described under the DR methodology section, the five customer classes included in the study were residential, small C&I, medium C&I, large C&I, and extra-large C&I. Winter potential results are presented for both 4-hour and 2-hour event durations.

3.6.2.1 Potential by Customer Class: 4-Hour Event Duration

Figure 47 presents a snapshot of the 2037 achievable technical potential by customer class for the 4-hour event duration in winter. Residential customers have almost 60% share in the total potential and C&I customers have the remaining 40%. The total potential from residential customers reaches almost 110 MW in 2037, of which the majority (70 MW) is from DLC of both electric space heating and water heating. The remaining 40 MW of residential potential is from Dynamic Pricing.

Figure 47. 2037 Winter DR Achievable Technical Potential by Customer Class, 4-Hour Event Duration



Among the four different C&I customer classes, the highest potential is from the large C&I customer class, which includes rate schedule 25 and 26 customers with greater than 150 kW maximum demand. Potential from large C&I customers is estimated at 33 MW by 2037, with a large fraction of the potential—

approximately 70%—derived from C&I Curtailment. Economic DR potential from these customers is almost one-third of the potential from C&I Curtailment. Dynamic Pricing has less than 10% share in the total potential from large C&I customers.

Extra-large C&I customers, including customers under high voltage and primary service (rate schedules 31, 40, and 49), have almost equal contribution to the total potential as large C&I customers. The total potential from the extra-large C&I category reaches 30 MW in 2037 and shows a similar breakdown of potential by DR option as the large C&I customers.

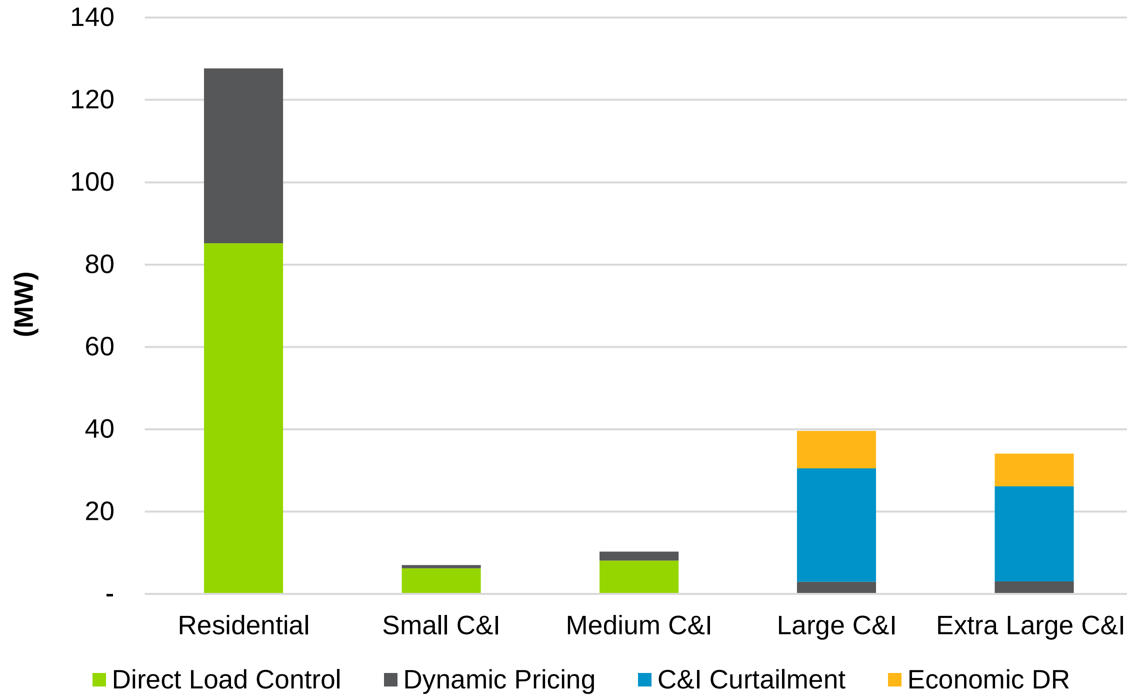
Small and medium C&I customers have relatively lower contribution in the potential than the two larger sized C&I categories. Small C&I included rate schedule 24 customers with less than 50 kW maximum demand, while medium C&I included rate schedule 25 customers with less than 150 kW maximum demand. DR potential from these two customer classes is realizable through the DLC and Dynamic Pricing options. The combined potential from these two customer classes reaches 15 MW in 2037, with a slightly higher contribution from medium C&I customers. Most of the potential from these customers is achieved through control of electric space heating in the DLC program. Dynamic Pricing potential from these two customer classes is relatively much smaller when compared with the DLC potential.

3.6.2.2 Potential by Customer Class: 2-Hour Event Duration

Figure 48 shows 2037 winter DR potential results by customer class for 2-hour event duration. As discussed earlier, 2037 potential for 2-hr. event duration is almost 15 percent higher than that for 4-hr. event duration (219 MW total potential in 2037 for 2-hr. event duration vs. 188 MW potential in 2037 for 4-hr. event duration).

Residential customer potential increases to 128 MW in 2037 for 2-hour events duration relative to 109 MW for 4-hour events. Most of the potential increase is associated with DLC. Large C&I and extra-large C&I potential also increases by 15%-20% for 2-hour events vs. 4-hour events—large C&I potential goes up to 37 MW from 33 MW and extra-large C&I potential goes up from 30 MW to 43 MW. This is primarily associated with the potential increase from the C&I Curtailment option. Small and medium C&I potential increases by 10% for 2-hour events versus 4-hour events, with a majority of the potential increase associated with DLC.

Figure 48. 2037 Winter DR Achievable Technical Potential by Customer Class, 2-Hour Event Duration



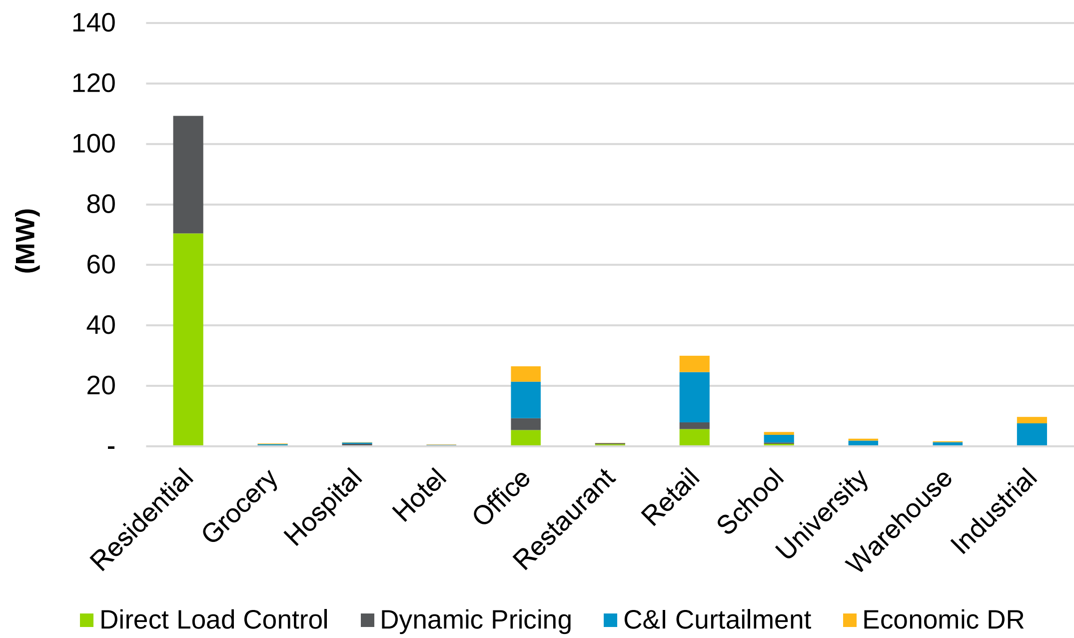
3.6.3 Winter DR Achievable Technical Potential by Building Type

This section presents winter achievable technical potential by the different building types or customer segments included in the DR potential assessment. As discussed in the methodology section, the C&I customer segments align with those included in the energy efficiency potential assessment. The DR potential assessment considers residential as a single segment; industrial customers are also considered as a single segment. Other than the residential and industrial segments, DR potential assessment included nine commercial building types (grocery, hospital, hotel, office, restaurant, retail, school, university, and warehouse).

3.6.3.1 Potential by Building Type: 4-Hour Event Duration

Figure 49 shows the 4-hour event duration winter achievable technical potential results by customer segment. As discussed in the previous section, residential has the highest contribution in load reduction, primarily from DLC. The commercial building types with highest contribution in potential are retail and office. In 2037, office potential reaches 26 MW and retail potential reaches 30 MW. These two building types constitute 70% of the total potential from all C&I customers. A large fraction of the potential from these segments is derived from C&I Curtailment. The achievable technical potential for C&I Curtailment is 12 MW from office and 17 MW from retail in 2037. Economic DR potential from each of these two segments is 5 MW. Office and retail have 4 MW and 2 MW Dynamic Pricing potential, respectively, in 2037. Industrial has the third highest contribution to potential among the C&I segments. The total industrial DR potential in 2037 reaches 10 MW, of which 7 MW is from C&I Curtailment and 2 MW is from Economic DR; the remaining 1 MW is from Dynamic Pricing. Achievable technical potential from schools is 5 MW in 2037. All remaining C&I building types have relatively low contribution in the potential at 1 MW-2 MW in 2037.

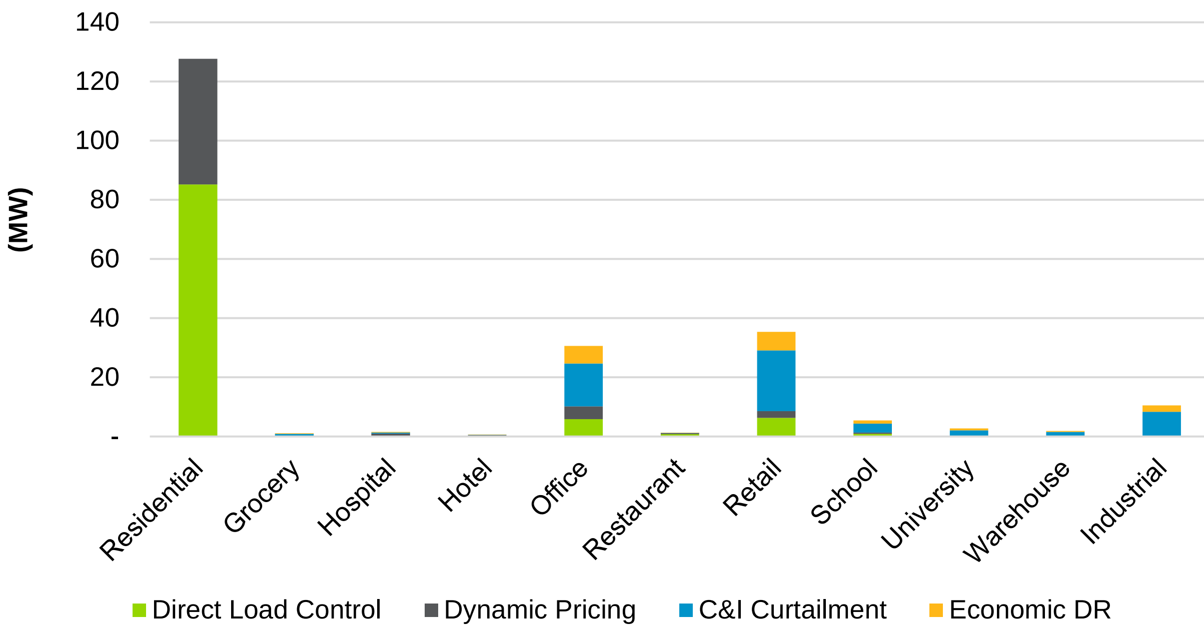
Figure 49. 2037 Winter DR Achievable Technical Potential by Building Type, 4-Hour Event Duration



3.6.3.2 Potential by Building Type: 2-Hour Event Duration

Figure 50 shows 2037 potential by building type for the 2-hour event duration. Total achievable technical potential in 2037 is up by 17% for the 2-hour event duration versus the 4-hour event duration. 2037 residential potential is higher by 17% at 128 MW for 2-hour events. Office and retail potential is higher by approximately 20% and is expected to reach 31 MW and 35 MW, respectively, in 2037. Potential from the remaining segments is higher by approximately 10%.

Figure 50. 2037 Winter DR Achievable Technical Potential by Building Type, 2-Hour Event Duration



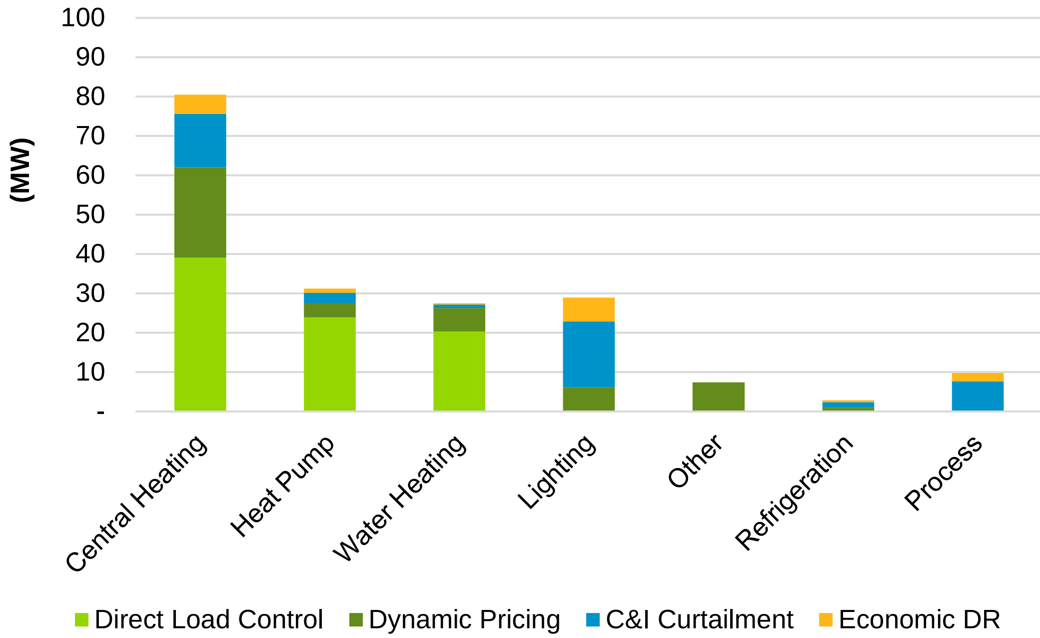
3.6.4 Winter DR Achievable Technical Potential by End Use

This study characterized the coincident peak demand by end use for the different customer classes and building types. Seven different end use types were included in the analysis: central electric furnaces, heat pumps, water heating, lighting, refrigeration, process, and everything else as other. This section presents winter technical achievable technical potential by these different end use types for both 4-hour and 2-hour event durations.

3.6.4.1 Potential by End Use: 4-Hour Event Duration

Figure 51 shows achievable technical potential by end use in 2037. Electric space heating, which consists of both central furnaces and heat pumps, has the highest contribution in potential. Central furnaces provide 80 MW of load reduction in 2037, which is 43% of the total potential in that year. Heat pump load reduction potential reaches almost 30 MW in 2037, which is 17% of PSE's total achievable technical potential. Most of the load reduction from electric space heating is derived from DLC and dynamic pricing offerings—around half of the load reduction from central electric heat is from DLC and approximately 30% is from dynamic pricing. Potential from central space heating control for large C&I and extra-large C&I customers, realized through the C&I Curtailment and Economic DR programs, is 19 MW combined in 2037, which is almost 20% of the total potential from central space heating in 2037. Similar to central heating, a large fraction of the potential from heat pumps is derived from DLC and Dynamic Pricing, with these two offers combined realizing almost 90% of the total potential from heat pumps. The remaining near 10% is from C&I Curtailment and economic DR.

Figure 51. 2037 Winter DR Achievable Technical Potential by End Use, 4-Hour Event Duration



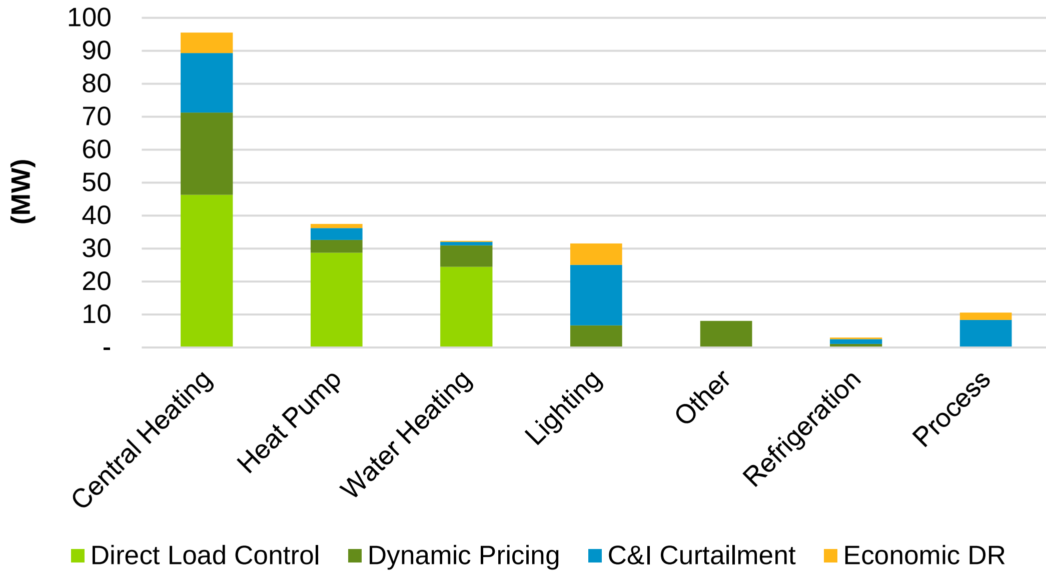
Among other end uses, electric water heating and lighting potential reach almost the same level in 2037 at 30 MW each, which translates to a 15% share in the total potential. For electric water heating, close to 75% of the potential load reduction is through DLC and 20% is from Dynamic Pricing. Lighting load reduction potential is primarily derived through either manual or automated curtailment of lighting load in large C&I and extra-large C&I customer premises through the C&I Curtailment and Economic DR programs. Almost 60% of the lighting reduction potential is associated with the C&I Curtailment program and 20% with the economic DR program. Dynamic Pricing such as CPP could potentially realize 20% of the total lighting load reduction potential.

Industrial processes have a relatively small contribution in the total potential at 10 MW in 2037, which translates into 5% share in the total potential. More than 75% of the load reduction from industrial processes could be realized through the C&I Curtailment program. Economic DR has more than 20% share in the total potential from process, while the remaining less than 5% is from Dynamic Pricing. Refrigeration and other load types have less than 10% share in the total potential.

3.6.4.2 Potential by End Use: 2-Hour Event Duration

Figure 52 shows 2037 potential by end use for the 2-hour event duration. As discussed earlier, total achievable technical potential in 2037 is higher by 17% for the 2-hour event duration versus the 4-hour event duration. 2037 potential from central heating and heat pumps is approximately 20% higher for 2-hour events versus 4-hour events. Central heating potential is almost 100 MW and heat pump potential is almost 40 MW in 2037. Also, water heating is higher by approximately 20% at 32 MW. Potential from lighting, process, refrigeration and other end uses is approximately 10% higher for 2-hour events than for 4-hour events.

Figure 52. 2037 Winter DR Achievable Technical Potential by End Use, 2-Hour Event Duration



3.6.5 Demand Response Program Levelized Costs

Table 23 shows the levelized costs by DR program and the associated 2037 achievable technical potential in winter for the 4-hour and 2-hour event durations.

Dynamic Pricing has the lowest cost among the different DR options at $64/kW-year levelized cost, with approximately 50 MW winter load reduction potential in 2037. Economic DR has the second lowest cost, with relatively small potential at less than 20 MW. DLC at a $110-$120/kW-year cost offers the highest load reduction potential between 80 MW and100 MW. C&I Curtailment is the highest cost option at $137/kW-year, with almost half of the DLC potential.

Table 23. DR Program Levelized Costs and 2037 Winter Achievable Technical Potential

DR Option	Levelized Cost ($/kW-yr.)	2037 Achievable Technical Potential (MW)
Levelized Costs and Potential for Winter 4-Hour Event Duration		
DLC	$118	83
C&I Curtailment	$137	43
Economic DR	$72	15
Dynamic Pricing	$64	47
Levelized Costs and Potential for Winter 2-Hour Event Duration		
DLC	$108	100
C&I Curtailment	$137	51
Economic DR	$75	17
Dynamic Pricing	$64	51

3.7 Distributed Generation – Combustion Potential Results

Navigant developed forecasts of technical and achievable technical electric energy savings potential through the installation of DG combustion technology in PSE's service region from 2018 through 2037. These potential forecasts are the result of an Excel-based model that determines the electric capacity for a single CHP unit or standalone electric generator based on the technical inputs provided by measure characterization. Multiplying the megawatts per unit or customer by the number of applicable customers generates the full potential forecast. This section details the results of Navigant's analysis over the study horizon.

3.7.1 Technical and Achievable Technical Potential by Sector

Based on the approach described in the previous sections, Navigant estimates that PSE's total technical potential from DG combustion installed from 2018 to 2037 is 30,500 aMW, with an additional 47,400 aMW from standalone electric generation without heat recovery. Out of the potential for DG combustion, 18,950 aMW is expected to come from the residential sector, 10,480 aMW from the commercial sector, and about 1,080 aMW from the industrial sector.

Though the technical potential for the residential sector is the largest, as mentioned earlier, the achievable technical potential for this market is 0% due to vendors not targeting the residential sector, negligible customer awareness, and a lack of industry infrastructure to support installations. Using the 50% achievability[60] for C&I, the achievable technical potential is half of the estimated technical potential.

Beyond achievability, the LO12Med ramp rate was applied to the achievable technical potential results in this study to account for the rate of adoption of these technologies starting in 2018.

3.7.1.1 DG Combustion with Heat Recovery

The forecasted realistic achievable technical potential for DG combustion with heat recovery in year 2037 is 314 aMW, with 288 aMW from the commercial sector and 26 aMW from the industrial sector.

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[60] Use of a 50% achievability factor is a result of the revised methodology used to estimate achievable technical potential compared to the 2015 IRP (See Section 2.4.3 for more a full description of the methodology used in this study). While the 2015 IRP looked at programmatic successes at the time, the 2017 IRP also took into account current installations and leveraged the CHP experience in other states, resulting in a higher estimate for achievability.

Figure 53. Technical and Achievable Technical Potential for DG Combustion with Heat Recovery: 2037

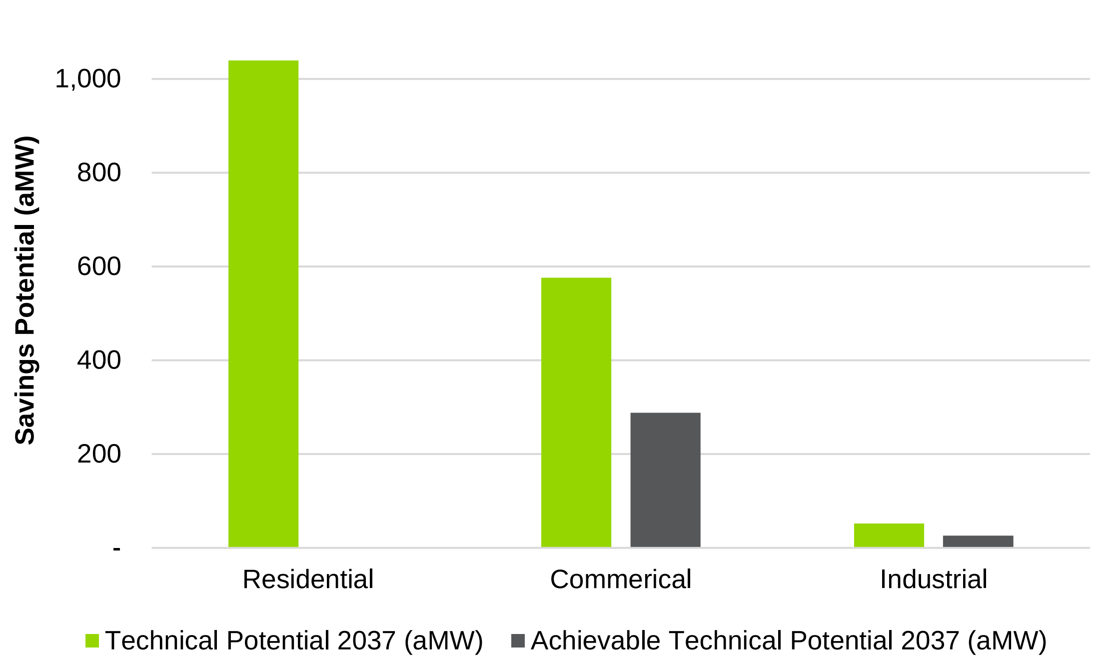
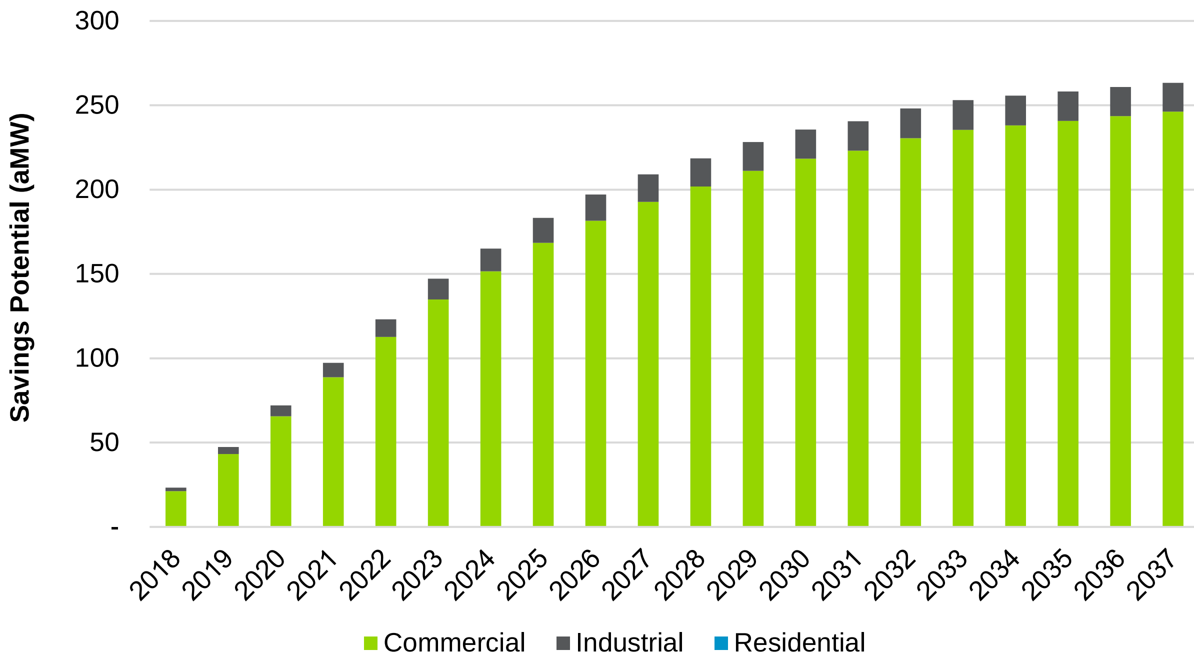


Figure 54 maps the achievable technical potential for non-renewable CHP with a reciprocating engine prime mover through 2037. The commercial sector has a larger potential savings than industrial due to the larger number of customers and growth over time. The industrial savings potential experiences a slight decline as the customer forecast for this sector is projected to decrease through the study horizon.

Figure 54. Non-Renewable CHP Achievable Technical Potential by Sector (aMW): 2018-2037



For renewable CHP, the technical and achievable technical potential is presented at the county level instead of by customer sector or segment because it relies on the locational availability of the fuel source. Renewable CHP potential savings results are presented in Section 3.7.2.1.

3.7.1.2 DG Combustion without Heat Recovery

The technical and achievable technical potential for DG combustion without heat recovery is greater than DG combustion technologies with heat recovery because this technology applies to electric-only customers in addition to the combined electric and gas customers. The forecasted realistic achievable technical potential for DG combustion without heat recovery in year 2037 is 619 aMW, with 590 aMW from the commercial sector and 29 aMW from the industrial sector.

Figure 55. Technical and Achievable Technical Potential for DG Combustion without Heat Recovery: 2037

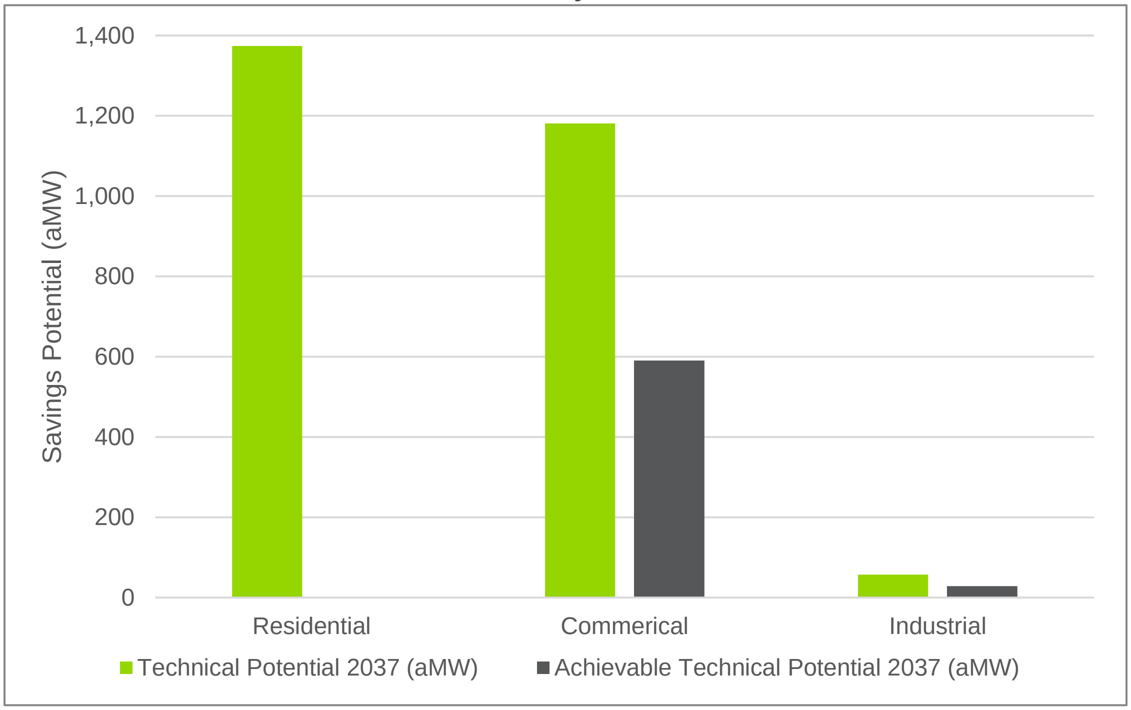
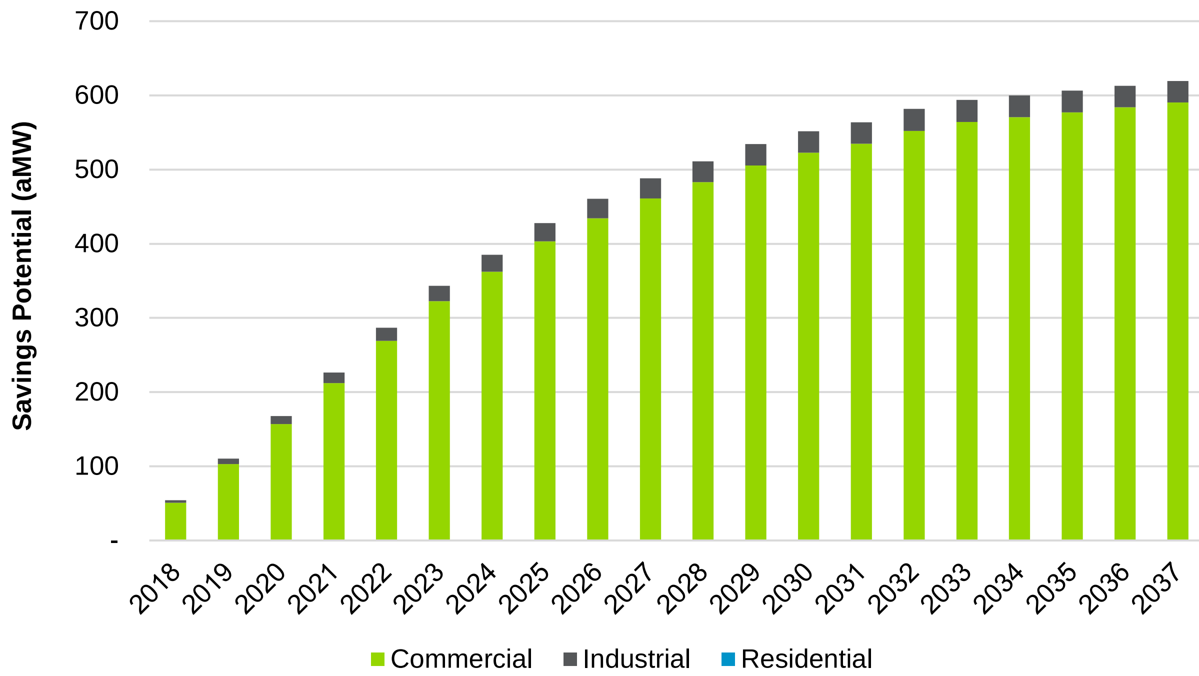


Figure 56 maps the achievable technical potential for standalone electric generation through 2037. The commercial sector has a larger potential savings than industrial due to the larger number of customers and larger overall load demand. The industrial savings potential experiences a slight decline as the customer forecast for this sector is projected to decrease through the study horizon.

Figure 56. Standalone Natural Gas Generator Achievable Technical Potential by Sector (aMW): 2018-2037



3.7.2 Technical and Achievable Technical Potential by Customer Segment

With the proper disaggregation of customers by segment in PSE territory, the total technical and achievable technical potential across sectors could be divided into customer segments.

3.7.2.1 DG Combustion with Heat Recovery

The residential sector, particularly single-family homes, shows the greatest technical potential for non-renewable CHP because of the large number of customers. However, because the achievability for residential customers is 0%, the achievable technical potential results follow a different trend.

Commercial office customers have the greatest achievable savings potential for non-renewable CHP in PSE territory at approximately 77 aMW by 2037. The commercial other category also shows substantial achievable technical potential at approximately 51 aMW by 2037. These segments are large in customer size and also offer a significant opportunity for potential savings based on energy demand.

Figure 57. Gas and Electric Customers Non-Renewable CHP Technical Potential by Segment (aMW): 2018-2037

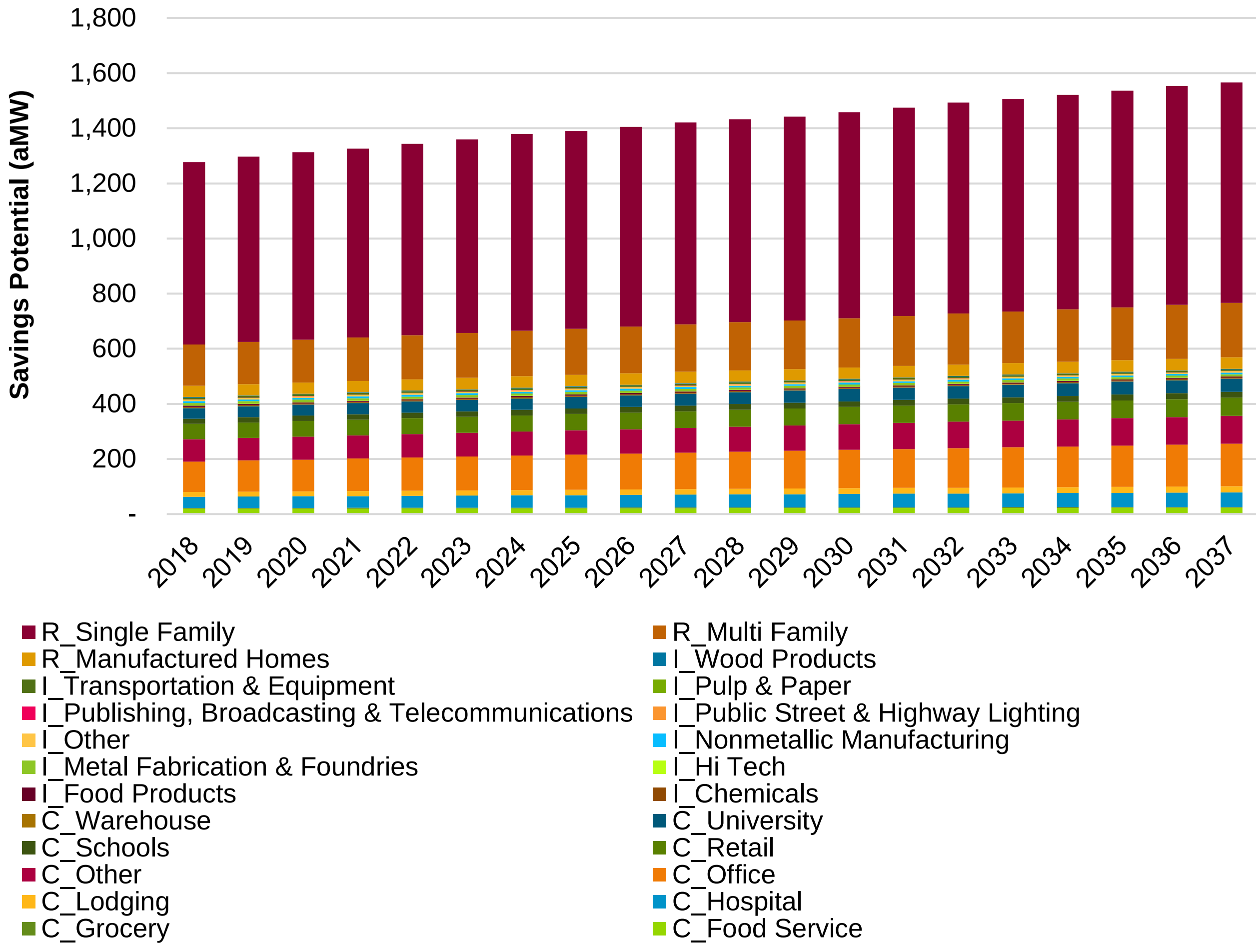
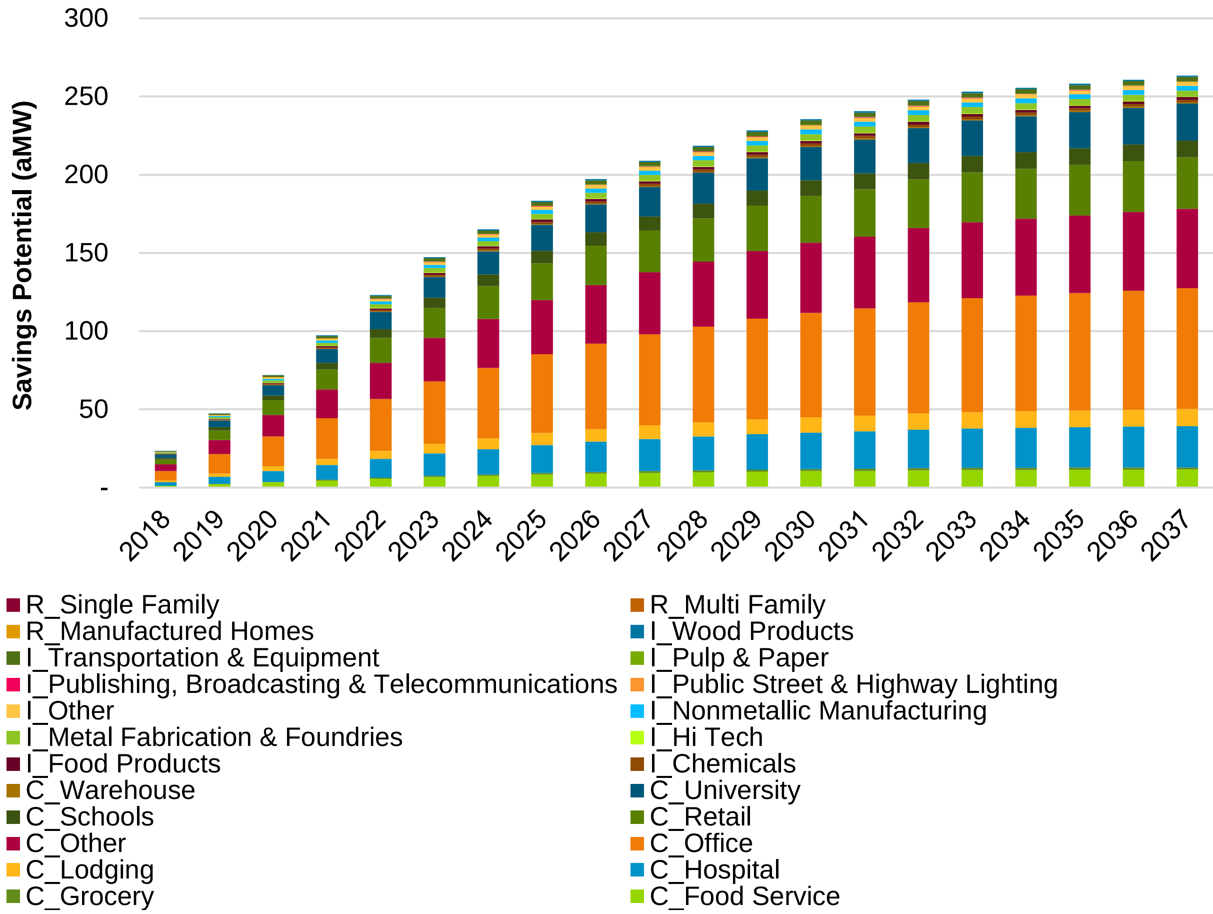


Figure 58. Gas and Electric Customers Non-Renewable CHP Achievable Technical Potential by Segment (aMW): 2018-2037



For renewable CHP, the technical and achievable technical potential is greatest in King County from anaerobic digestion, likely due to a large number of waste facilities. The greatest achievable savings potential from industrial biomass is in Whatcom County, likely due to a large number of manufacturing facilities.

The technical and achievable technical potential for renewable CHP is assumed constant through 2037 as forecasts for new farms, landfills, wastewater treatment plants, and manufacturing plants is outside the scope of this study. The ramp rate is applied to the realistic achievable technical potential as a projection of renewable CHP adoption.

Figure 59. Renewable CHP Technical Potential by County: 2037

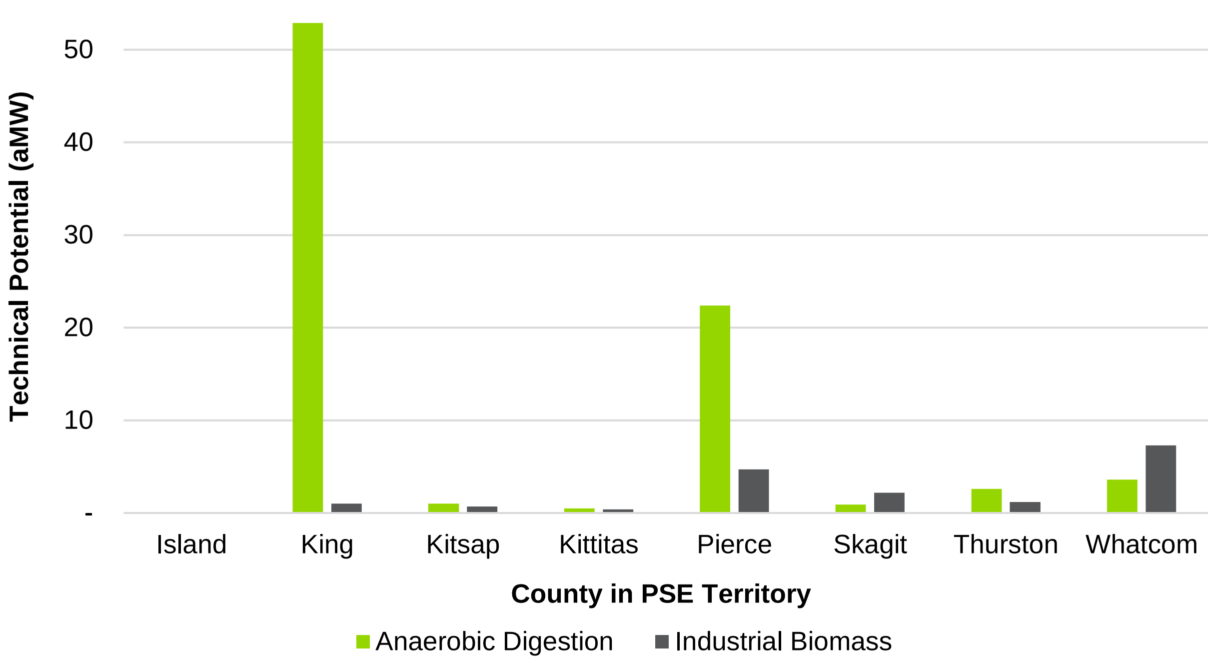
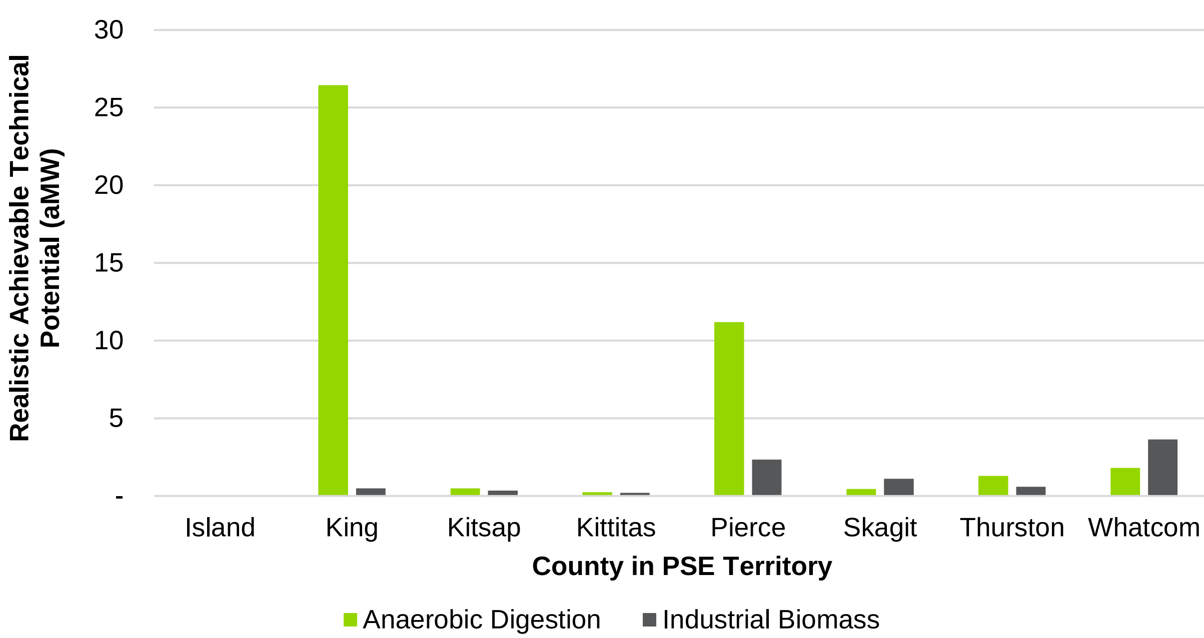


Figure 60. Renewable CHP Realistic Achievable Technical Potential by County: 2037



3.7.2.2 DG Combustion without Heat Recovery

Similar technical and achievable technical potential trends exist for standalone electric generators. Commercial office customers have the greatest achievable savings potential for non-renewable CHP in

PSE territory at approximately 218 aMW by 2037. The commercial other category also shows substantial achievable technical potential at approximately 128 aMW by 2037.

Figure 61. Electric-Only and Gas and Electric Customers Standalone Generation Technical Potential by Segment (aMW): 2018-2037

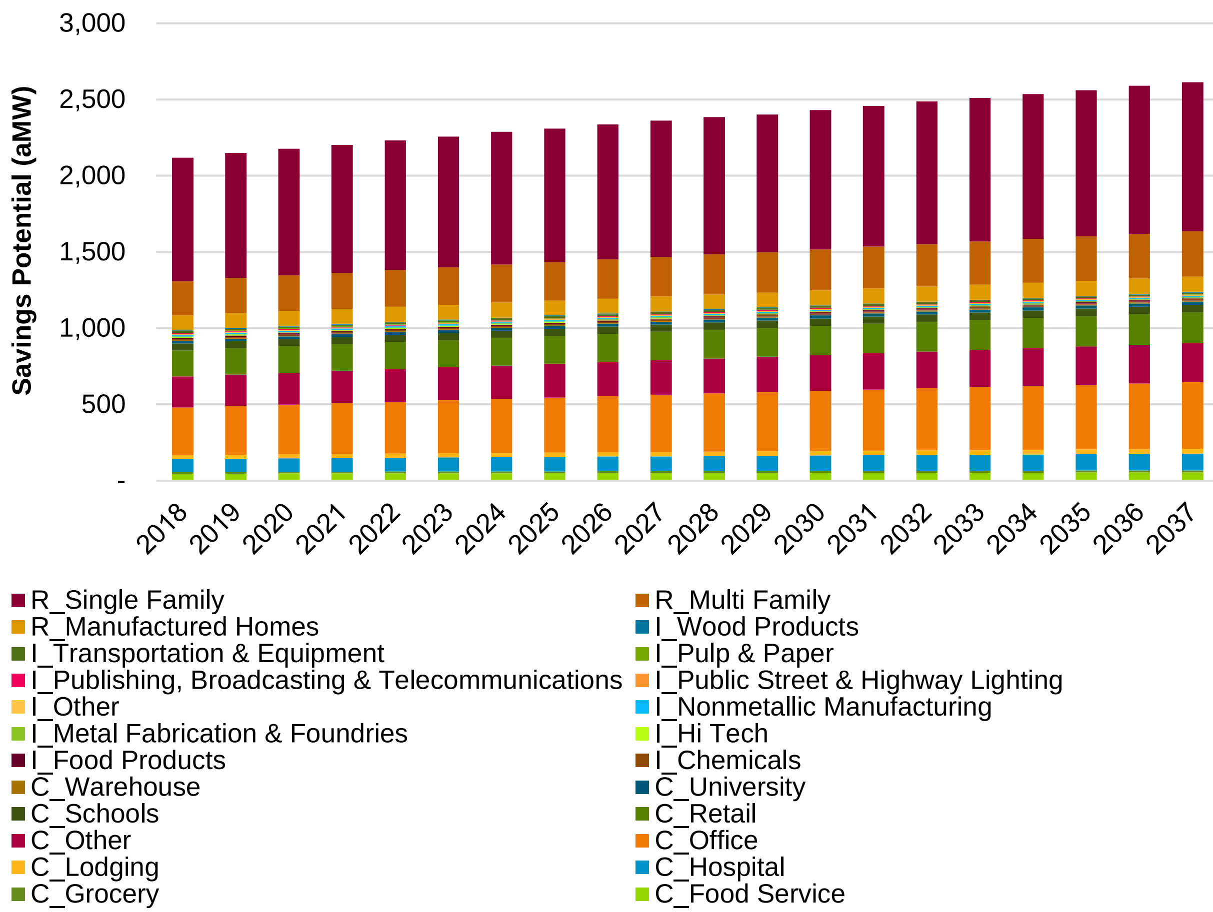
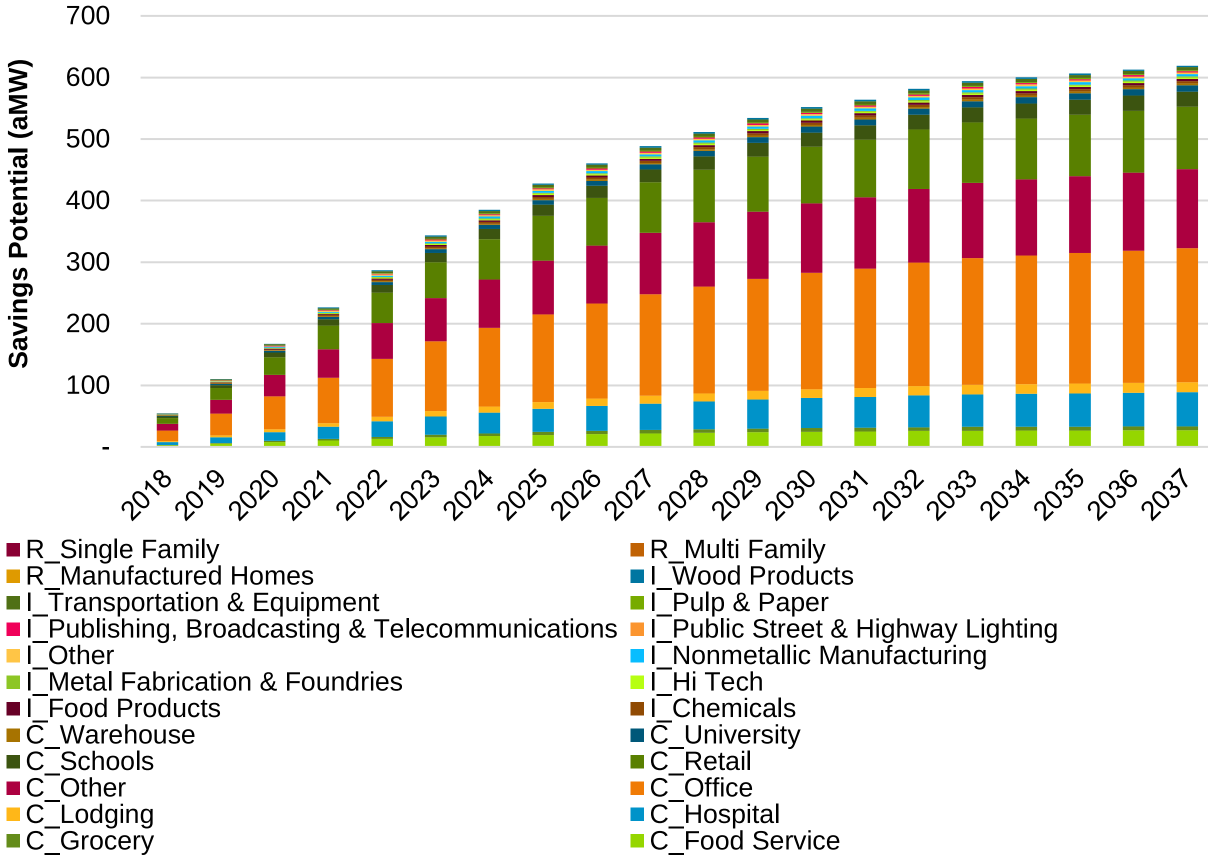


Figure 62. Electric-Only and Gas and Electric Customers Standalone Generation Achievable Technical Potential by Segment (aMW): 2018-2037



3.7.3 Distributed Generation – Combustion Supply Curves

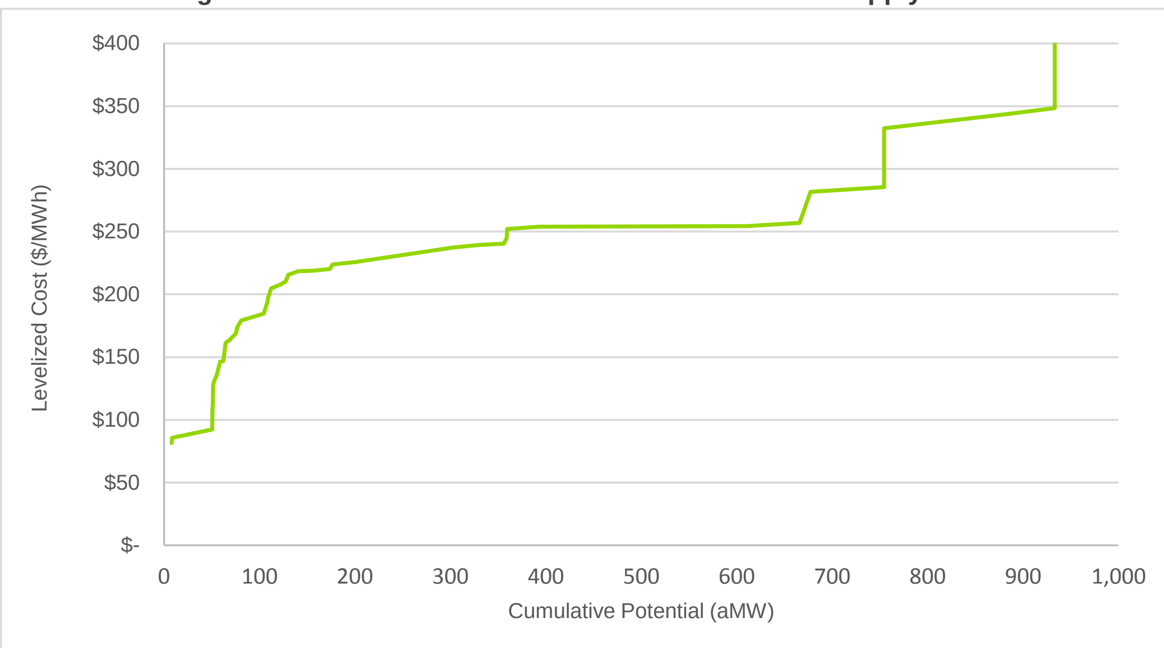
The DG combustion potential supply curve presented in Figure 63 provides a view of cumulative customer segment-level electric DG combustion savings potential in 2037 ranked by the LCOE saved by each customer segment and CHP design. As can be seen at the far-left side of the achievable technical potential supply curve, the overall cost of CHP systems that have less than 100 aMW potential are at relatively low cost.

All renewable CHP systems included in this study appear below an LCOE of $110/MWh for two reasons. For one, although the per-unit costs are much higher than for non-renewable CHP systems due to additional equipment needed, renewable CHP systems receive cost benefits from Renewable Energy Credits (RECs).[61] Second, the electric megawatt production is also higher for renewable versus non-renewable systems in this study because it was calculated at the county level, as described initially in Section 2.4.2.2. Therefore, the resulting megawatt-hour values used in the denominator of the LCOE calculation are higher, and the final LCOE value is lower.

[61] Navigant calculated the yearly REC value by converting the CO_2 prices ($/ton) from the Seventh Plan to the $/MWh REC benefit. The $/MWh values were multiplied by the yearly megawatt-hour potential electric generation of the renewable CHP plants included in this study to determine the savings to be applied in the LCOE calculation.

The middle of the curve contains the majority of non-renewable CHP and all standalone electric generation systems. These systems have a high electricity production potential that helps balance out costs. However, the non-renewable CHP systems on the far-right side of the supply curve—the sharp peak upwards—represent customer types with low electricity production potential compared to costs. These customer types include warehouses and other commercial types. Standalone electric generators do not tend to appear along this peak because even if the customer type has low electric production potential, the system costs are much lower as compared to CHP systems.

Figure 63. DG Achievable Technical Potential LCOE Supply Curve



APPENDIX A. MEASURE DETAILS, ABBREVIATIONS, AND UNITS

This section provides details about the measures considered in the energy efficiency and fuel conversion portions of the DER potential study analysis. It is organized as follows:

- Table 24 provides the full measure list and detailed input for each measure, as well as 20-year savings potential results and TRC net LCOE values.
- Table 25 provides a list of detailed descriptions for each measure considered in the energy efficiency and fuel conversion analysis.
- Table 26 provides a list of abbreviations used in the below tables and throughout the report, along with a definition for each.
- Table 27 provides a list of units used throughout this report and defines conversions between these and other commonly-encountered units for electric energy, electric demand, and gas energy.

Descriptions of the columns in the measure list given in Table 24 are provided below:

- Measure Name – Unique name for each measure.
- Baseline Assumption – Baseline against which the measure's savings is measured.
- End Use Category – End use to which the measure applies.
- Customer Segment – Customer segment to which the measure applies.
- Replacement Type – The assumed replacement type for the measure: ROB (replace on burnout), RET (retrofit), or NEW (new construction).
- Unit Basis – Basis on which the measure's savings are specified.
- Lifetime (years) – Estimated useful measure lifetime.
- Incremental Cost ($/Unit) – Incremental cost over baseline for ROB & NEW measures; full efficient measure cost for RET.
- Electric Energy Savings (kWh/year/unit) – Annual per unit electricity savings from the efficient measure, relative to baseline.
- Gas Energy Savings (Therms/year/unit) – Annual per unit natural gas savings from the efficient measure, relative to baseline.
- Measure Applicability (dimensionless) – Dimensionless applicability percentage related to technical suitability and initial baseline market saturation.
- Electric TRC Net LCOE ($/kWh, real 2018 dollars) – Total resource net levelized cost of electric energy savings in real 2018 dollars.
- 2037 Cumulative Achievable Technical Electric Savings Potential (MWh) – Cumulative 20-year achievable technical electric energy savings potential.

- Gas TRC Net LCOE ($/Therm, real 2018 dollars) – Total resource net levelized cost of natural gas energy savings in real 2018 dollars.
- 2037 Cumulative Achievable Technical Gas Savings Potential (Therms) – Cumulative 20-year achievable technical natural gas energy savings potential.

Table 24. Full Measure List and Details

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Food Service	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	566	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Grocery	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	392	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Hospital	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	973	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Lodging	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	678	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Office	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	7,991	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Other	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	11,948	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Retail	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	6,569	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Schools	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	2,086	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_University	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	2,237	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Warehouse	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	6,939	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_Grocery	ROB	Ton	20	$275.54	42.9	0.0	0.85	$0.45	1	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_Hospital	ROB	Ton	20	$275.54	67.8	0.0	0.85	$0.28	195	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_Lodging	ROB	Ton	20	$275.54	39.0	0.0	0.85	$0.49	23	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_Office	ROB	Ton	20	$275.54	46.1	0.0	0.85	$0.42	2,688	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_Other	ROB	Ton	20	$275.54	53.4	0.0	0.85	$0.36	572	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_Schools	ROB	Ton	20	$275.54	34.4	0.0	0.85	$0.56	106	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_University	ROB	Ton	20	$275.54	34.4	0.0	0.85	$0.56	59	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_Warehouse	ROB	Ton	20	$275.54	22.9	0.0	0.85	$0.84	5	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Food Service	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.44	$0.03	170	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Grocery	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.67	$0.03	5,982	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Hospital	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.01	$0.03	0	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Lodging	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.01	$0.03	0	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Office	RET	Linear foot of display case	8	$74.98	265.0	0.0	1.00	$0.03	17	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Other	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.01	$0.03	0	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Retail	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.55	$0.03	2,845	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Schools	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.75	$0.03	107	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_University	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.75	$0.03	29	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Warehouse	RET	Linear foot of display case	8	$74.98	265.0	0.0	1.00	$0.03	85	Inf	-
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Food Service	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	0.84	Inf	-	$0.32	3,735

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Grocery	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	1.00	Inf	-	$0.32	2,731
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Hospital	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	0.89	Inf	-	$0.32	25,701
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Lodging	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	0.89	Inf	-	$0.32	102,969
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Office	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	0.89	Inf	-	$0.32	40,409
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Other	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	0.89	Inf	-	$0.32	140,861
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Retail	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	1.00	Inf	-	$0.32	1,225
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Schools	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	0.76	Inf	-	$0.32	50,888
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_University	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	0.76	Inf	-	$0.32	17,781

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Warehouse	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	1.00	Inf	-	$0.32	9,964
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Food Service	RET	kWh saved	15	$0.62	0.0	0.0	0.32	$1.28	3,291	$5.59	650,472
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Grocery	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.57	816	$22.33	40,126
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Hospital	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.45	5,945	$10.67	435,535
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Lodging	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.45	1,937	$9.65	221,485
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Office	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.20	36,238	$21.39	1,385,791
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Other	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.58	16,344	$13.36	1,353,041
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Retail	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.17	19,870	$18.69	865,984
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Schools	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.15	5,027	$11.12	370,607
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_University	RET	kWh saved	15	$0.62	0.0	0.0	0.32	$0.99	1,608	$3.15	408,054
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Warehouse	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.20	625	$25.14	20,274
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Food Service	RET	therm saved	15	$0.68	0.4	0.1	0.31	Inf	-	$0.54	692,224
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Grocery	RET	therm saved	15	$1.33	1.4	0.1	0.31	Inf	-	$1.07	32,292
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Hospital	RET	therm saved	15	$0.88	0.7	0.1	0.31	Inf	-	$0.70	449,106

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Lodging	RET	therm saved	15	$0.84	0.6	0.1	0.31	Inf	-	$0.67	131,574
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Office	RET	therm saved	15	$1.59	1.8	0.1	0.31	Inf	-	$1.27	849,060
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Other	RET	therm saved	15	$0.98	0.9	0.1	0.31	Inf	-	$0.78	1,103,773
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Retail	RET	therm saved	15	$1.45	1.6	0.1	0.31	Inf	-	$1.16	658,363
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Schools	RET	therm saved	15	$1.04	1.0	0.1	0.31	Inf	-	$0.83	320,081
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_University	RET	therm saved	15	$0.58	0.2	0.1	0.31	Inf	-	$0.47	415,172
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Warehouse	RET	therm saved	15	$1.79	2.2	0.1	0.31	Inf	-	$1.43	16,719
Com | Centrifugal Chillers	Centrifugal Chiller Code Avg Eff: 0.60 FLV, 0.54 IPLV	Space Cooling	C_Hospital	ROB	Ton	20	$274.30	33.5	0.0	0.85	$0.57	48	Inf	-
Com | Centrifugal Chillers	Centrifugal Chiller Code Avg Eff: 0.60 FLV, 0.54 IPLV	Space Cooling	C_Lodging	ROB	Ton	20	$274.30	19.2	0.0	0.85	$1.00	6	Inf	-
Com | Centrifugal Chillers	Centrifugal Chiller Code Avg Eff: 0.60 FLV, 0.54 IPLV	Space Cooling	C_Office	ROB	Ton	20	$274.30	22.8	0.0	0.85	$0.84	624	Inf	-
Com | Centrifugal Chillers	Centrifugal Chiller Code Avg Eff: 0.60 FLV, 0.54 IPLV	Space Cooling	C_Other	ROB	Ton	20	$274.30	26.4	0.0	0.85	$0.73	245	Inf	-
Com | Centrifugal Chillers	Centrifugal Chiller Code Avg Eff: 0.60 FLV, 0.54 IPLV	Space Cooling	C_Schools	ROB	Ton	20	$274.30	17.0	0.0	0.85	$1.13	15	Inf	-
Com | Centrifugal Chillers	Centrifugal Chiller Code Avg Eff: 0.60 FLV, 0.54 IPLV	Space Cooling	C_University	ROB	Ton	20	$274.30	17.0	0.0	0.85	$1.13	8	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Food Service	ROB	Fixture	20	$47.96	398.4	0.0	0.79	$0.00	396	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Grocery	ROB	Fixture	20	$47.96	398.4	0.0	0.48	$0.00	108	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Hospital	ROB	Fixture	20	$47.96	398.4	0.0	0.72	$0.00	277	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Lodging	ROB	Fixture	20	$47.96	398.4	0.0	0.57	$0.00	88	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Office	ROB	Fixture	20	$47.96	398.4	0.0	0.66	$0.00	6,417	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Other	ROB	Fixture	20	$47.96	398.4	0.0	0.76	$0.00	548	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Retail	ROB	Fixture	20	$47.96	398.4	0.0	0.75	$0.00	1,366	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Schools	ROB	Fixture	20	$47.96	398.4	0.0	0.70	$0.00	228	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_University	ROB	Fixture	20	$47.96	398.4	0.0	0.70	$0.00	301	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Warehouse	ROB	Fixture	20	$47.96	398.4	0.0	0.80	$0.00	1,219	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Food Service	ROB	Fixture	18	$0.00	0.0	0.0	0.54	$0.01	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Grocery	ROB	Fixture	18	$0.00	0.0	0.0	0.47	$0.01	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Hospital	ROB	Fixture	18	$0.00	0.0	0.0	0.08	$0.01	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Lodging	ROB	Fixture	18	$0.00	0.0	0.0	0.13	$0.02	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Office	ROB	Fixture	18	$0.00	0.0	0.0	0.18	$0.01	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Other	ROB	Fixture	18	$0.00	0.0	0.0	0.32	$0.02	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Retail	ROB	Fixture	18	$0.00	0.0	0.0	0.10	$0.01	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Schools	ROB	Fixture	18	$0.00	0.0	0.0	0.10	$0.02	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_University	ROB	Fixture	18	$0.00	0.0	0.0	0.16	$0.02	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Warehouse	ROB	Fixture	18	$0.00	0.0	0.0	0.12	$0.01	-	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Food Service	NEW	Ton	20	$1,032.70	65.3	0.0	0.95	$1.10	120	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Food Service	ROB	Ton	20	$1,032.70	65.3	0.0	0.95	$1.10	222	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Grocery	NEW	Ton	20	$1,032.70	37.8	0.0	0.95	$1.91	23	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Grocery	ROB	Ton	20	$1,032.70	37.8	0.0	0.95	$1.91	38	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Hospital	NEW	Ton	20	$1,032.70	59.7	0.0	0.95	$1.20	131	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Hospital	ROB	Ton	20	$1,032.70	59.7	0.0	0.95	$1.20	165	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Lodging	NEW	Ton	20	$1,032.70	34.3	0.0	0.95	$2.10	11	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Lodging	ROB	Ton	20	$1,032.70	34.3	0.0	0.95	$2.10	19	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Office	NEW	Ton	20	$1,032.70	40.6	0.0	0.95	$1.78	5,237	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Office	ROB	Ton	20	$1,032.70	40.6	0.0	0.95	$1.78	5,124	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Other	NEW	Ton	20	$1,032.70	47.1	0.0	0.95	$1.53	291	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Other	ROB	Ton	20	$1,032.70	47.1	0.0	0.95	$1.53	362	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Retail	NEW	Ton	20	$1,032.70	47.7	0.0	0.95	$1.51	116	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Retail	ROB	Ton	20	$1,032.70	47.7	0.0	0.95	$1.51	209	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Schools	NEW	Ton	20	$1,032.70	30.3	0.0	0.95	$2.38	18	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Schools	ROB	Ton	20	$1,032.70	30.3	0.0	0.95	$2.38	45	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_University	NEW	Ton	20	$1,032.70	30.3	0.0	0.95	$2.38	16	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_University	ROB	Ton	20	$1,032.70	30.3	0.0	0.95	$2.38	25	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Warehouse	NEW	Ton	20	$1,032.70	20.2	0.0	0.95	$3.57	42	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Warehouse	ROB	Ton	20	$1,032.70	20.2	0.0	0.95	$3.57	74	Inf	-
Com | Clothes Washer_Edry,EDHW	Current Practice	Appliances	C_Other	ROB	washer	7.1	$604.03	270.3	0.0	0.60	$0.16	1,542	Inf	-
Com | Clothes Washer_Edry,GDHW	Current Practice	Appliances	C_Other	ROB	washer	7.1	$604.03	0.0	0.4	0.60	Inf	-	$122.10	28
Com | Clothes Washer_Gdry,EDHW	Current Practice	Appliances	C_Other	ROB	washer	7.1	$604.03	23.4	0.0	0.60	$1.96	34	Inf	(0)
Com | Clothes Washer_Gdry,GDHW	Current Practice	Appliances	C_Other	ROB	washer	7.1	$604.03	-513.8	16.1	0.60	Inf	(14)	$6.02	285

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Food Service	ROB	Ice maker	10	$893.65	27.2	0.0	0.29	$3.47	11	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Grocery	ROB	Ice maker	10	$2,374.00	0.0	0.0	0.46	Inf	-	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Hospital	ROB	Ice maker	10	$893.65	28.8	0.0	0.25	$3.28	6	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Lodging	ROB	Ice maker	10	$498.78	32.0	0.0	0.25	$1.64	6	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Office	ROB	Ice maker	10	$473.20	13.9	0.0	0.09	$3.60	20	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Other	ROB	Ice maker	10	$473.20	12.8	0.0	0.02	$3.92	4	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Retail	ROB	Ice maker	10	$473.20	12.1	0.0	0.02	$4.13	3	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Schools	ROB	Ice maker	10	$473.20	12.8	0.0	0.07	$3.92	0	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_University	ROB	Ice maker	10	$893.65	28.8	0.0	0.25	$3.28	7	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Warehouse	ROB	Ice maker	10	$473.20	12.8	0.0	0.03	$3.92	2	Inf	-
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Food Service	RET	kWh saved	5	$0.44	0.1	0.0	0.39	$0.61	16,281	$8.06	904,555
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Grocery	RET	kWh saved	5	$0.38	0.1	0.0	0.39	$0.60	4,089	$27.67	56,548
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Hospital	RET	kWh saved	5	$0.40	0.1	0.0	0.39	$0.60	28,974	$14.00	596,769
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Lodging	RET	kWh saved	5	$0.40	0.1	0.0	0.39	$0.61	9,440	$12.85	303,479

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Office	RET	kWh saved	5	$0.38	0.1	0.0	0.39	$0.61	133,131	$27.10	1,908,232
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Other	RET	kWh saved	5	$0.39	0.1	0.0	0.39	$0.62	81,803	$17.33	1,903,705
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Retail	RET	kWh saved	5	$0.38	0.1	0.0	0.39	$0.60	73,718	$23.86	1,204,250
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Schools	RET	kWh saved	5	$0.40	0.1	0.0	0.39	$0.62	18,560	$14.89	512,847
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_University	RET	kWh saved	5	$0.49	0.1	0.0	0.39	$0.63	7,916	$5.21	564,667
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Warehouse	RET	kWh saved	5	$0.38	0.1	0.0	0.39	$0.61	2,308	$31.62	28,055
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Food Service	RET	therms saved	8	$8.41	1.3	0.1	0.38	Inf	-	$9.92	962,616
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Grocery	RET	therms saved	8	$9.85	5.3	0.1	0.38	Inf	-	$11.46	45,508
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Hospital	RET	therms saved	8	$8.84	2.5	0.1	0.38	Inf	-	$10.39	615,364
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Lodging	RET	therms saved	8	$8.75	2.3	0.1	0.38	Inf	-	$10.28	180,283
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Office	RET	therms saved	8	$9.78	5.1	0.1	0.38	Inf	-	$11.24	1,169,155
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Other	RET	therms saved	8	$9.07	3.2	0.1	0.38	Inf	-	$10.61	1,552,990

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Retail	RET	therms saved	8	$9.55	4.5	0.1	0.38	Inf	-	$11.11	915,529
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Schools	RET	therms saved	8	$8.89	2.7	0.1	0.38	Inf	-	$10.41	442,929
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_University	RET	therms saved	8	$8.20	0.7	0.1	0.38	Inf	-	$9.70	574,517
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Warehouse	RET	therms saved	8	$10.11	6.1	0.1	0.38	Inf	-	$11.72	23,135
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Food Service	NEW	Ton	20	$326.12	165.8	0.0	0.95	$0.14	180	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Food Service	ROB	Ton	20	$326.12	165.8	0.0	0.95	$0.14	334	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Grocery	NEW	Ton	20	$326.12	96.1	0.0	0.95	$0.24	154	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Grocery	ROB	Ton	20	$326.12	96.1	0.0	0.95	$0.24	258	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Hospital	NEW	Ton	20	$326.12	151.7	0.0	0.95	$0.15	1,166	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Hospital	ROB	Ton	20	$326.12	151.7	0.0	0.95	$0.15	1,471	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Lodging	NEW	Ton	20	$326.12	87.2	0.0	0.95	$0.26	334	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Lodging	ROB	Ton	20	$326.12	87.2	0.0	0.95	$0.26	588	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Office	NEW	Ton	20	$326.12	103.2	0.0	0.95	$0.22	9,786	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Office	ROB	Ton	20	$326.12	103.2	0.0	0.95	$0.22	9,576	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Other	NEW	Ton	20	$326.12	119.6	0.0	0.95	$0.19	3,166	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Other	ROB	Ton	20	$326.12	119.6	0.0	0.95	$0.19	3,947	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Retail	NEW	Ton	20	$326.12	121.2	0.0	0.95	$0.19	1,974	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Retail	ROB	Ton	20	$326.12	121.2	0.0	0.95	$0.19	3,538	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Schools	NEW	Ton	20	$326.12	77.0	0.0	0.95	$0.30	243	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Schools	ROB	Ton	20	$326.12	77.0	0.0	0.95	$0.30	612	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_University	NEW	Ton	20	$326.12	77.0	0.0	0.95	$0.30	517	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_University	ROB	Ton	20	$326.12	77.0	0.0	0.95	$0.30	806	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Warehouse	NEW	Ton	20	$326.12	51.5	0.0	0.95	$0.44	725	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Warehouse	ROB	Ton	20	$326.12	51.5	0.0	0.95	$0.44	1,269	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Grocery	ROB	Ton	15	$700.12	54.9	0.0	0.85	$1.02	0	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Hospital	ROB	Ton	15	$700.12	86.8	0.0	0.85	$0.64	5	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Lodging	ROB	Ton	15	$700.12	114.0	0.0	0.85	$0.48	1	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Office	ROB	Ton	15	$700.12	59.1	0.0	0.85	$0.94	399	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Other	ROB	Ton	15	$700.12	155.7	0.0	0.85	$0.35	14	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Retail	ROB	Ton	15	$700.12	62.7	0.0	0.85	$0.89	0	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Schools	ROB	Ton	15	$700.12	76.3	0.0	0.85	$0.72	1	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_University	ROB	Ton	15	$700.12	76.3	0.0	0.85	$0.72	1	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Warehouse	ROB	Ton	15	$700.12	62.6	0.0	0.85	$0.87	3	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Food Service	RET	Motor	15	$409.67	961.7	0.0	0.96	$0.03	2,131	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Grocery	RET	Motor	15	$409.67	961.7	0.0	0.66	$0.03	2,676	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Hospital	RET	Motor	15	$409.67	961.7	0.0	0.80	$0.03	397	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Lodging	RET	Motor	15	$409.67	961.7	0.0	0.57	$0.03	195	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Office	RET	Motor	15	$409.67	961.7	0.0	1.00	$0.03	790	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Other	RET	Motor	15	$409.67	961.7	0.0	1.00	$0.03	1,124	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Retail	RET	Motor	15	$409.67	961.7	0.0	0.41	$0.03	312	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Schools	RET	Motor	15	$409.67	961.7	0.0	1.00	$0.03	297	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_University	RET	Motor	15	$409.67	961.7	0.0	0.75	$0.03	439	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Warehouse	RET	Motor	15	$409.67	961.7	0.0	0.86	$0.03	2,986	Inf	-
Com | Efficient Dryer_Electric	Compact, 120V; Electric Dryer	Appliances	C_Other	ROB	dryer	7.1	$242.99	310.2	0.0	0.85	$0.06	5,801	Inf	-
Com | Efficient Dryer_Gas	Compact, 120V; Gas Dryer	Appliances	C_Other	ROB	dryer	7.1	$242.99	46.5	8.3	0.83	$0.27	214	$2.17	24,905
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Food Service	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	1,073	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Grocery	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	780	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Hospital	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	561	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Lodging	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	9	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Other	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	4,058	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Retail	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	121	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Schools	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	546	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_University	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	3,152	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Warehouse	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	819	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Food Service	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	132	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Grocery	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	68	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Hospital	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	135	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Lodging	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	42	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Office	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	919	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Other	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	563	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Retail	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	25	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Schools	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	102	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_University	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	591	Inf	-
Com | Electric Exhaust Hood	Exhaust Hood	Non-Res Cooking	C_Food Service	RET	HP	15	$3,183.21	3348.9	0.0	0.90	$0.07	6,052	Inf	-
Com | Electric Exhaust Hood	Exhaust Hood	Non-Res Cooking	C_Grocery	RET	HP	15	$3,183.21	4196.6	0.0	0.90	$0.05	1,831	Inf	-
Com | Electric Exhaust Hood	Exhaust Hood	Non-Res Cooking	C_Hospital	RET	HP	15	$3,183.21	4196.6	0.0	0.90	$0.05	7,998	Inf	-
Com | Electric Exhaust Hood	Exhaust Hood	Non-Res Cooking	C_Lodging	RET	HP	15	$3,183.21	5530.6	0.0	0.90	$0.04	1,025	Inf	-
Com | Electric Exhaust Hood	Exhaust Hood	Non-Res Cooking	C_Other	RET	HP	15	$3,183.21	4196.6	0.0	0.90	$0.05	26,138	Inf	-
Com | Electric Exhaust Hood	Exhaust Hood	Non-Res Cooking	C_Schools	RET	HP	15	$3,183.21	3028.9	0.0	0.90	$0.07	2,134	Inf	-
Com | Electric Exhaust Hood	Exhaust Hood	Non-Res Cooking	C_University	RET	HP	15	$3,183.21	3028.9	0.0	0.90	$0.07	2,811	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_Food Service	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	269	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_Grocery	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	161	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_Hospital	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	30	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_Lodging	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	4	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_Other	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	85	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_Retail	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	50	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_Schools	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	18	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_University	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	9	Inf	-
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Food Service	NEW	kBtuh capacity	16.5	$0.00	478.6	-17.6	0.25	$0.01	368	Inf	(12,592)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Food Service	ROB	kBtuh capacity	16.5	$0.00	478.6	-17.6	0.25	$0.01	759	Inf	(25,946)

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Grocery	NEW	kBtuh capacity	16.5	$0.00	175.0	-6.4	0.25	$0.01	43	Inf	(1,469)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Grocery	ROB	kBtuh capacity	16.5	$0.00	175.0	-6.4	0.25	$0.01	80	Inf	(2,741)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Hospital	NEW	kBtuh capacity	16.5	$0.00	276.7	-10.2	0.25	$0.02	87	Inf	(2,990)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Hospital	ROB	kBtuh capacity	16.5	$0.00	276.7	-10.2	0.25	$0.02	123	Inf	(4,196)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Lodging	NEW	kBtuh capacity	16.5	$0.00	522.9	-19.2	0.25	$0.02	54	Inf	(1,842)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Lodging	ROB	kBtuh capacity	16.5	$0.00	522.9	-19.2	0.25	$0.02	106	Inf	(3,614)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Office	NEW	kBtuh capacity	16.5	$0.00	188.2	-6.9	0.25	$0.02	3,962	Inf	(135,408)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Office	ROB	kBtuh capacity	16.5	$0.00	188.2	-6.9	0.25	$0.02	4,312	Inf	(147,396)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Other	NEW	kBtuh capacity	16.5	$0.00	712.8	-26.2	0.25	$0.00	3,443	Inf	(117,672)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Other	ROB	kBtuh capacity	16.5	$0.00	712.8	-26.2	0.25	$0.00	4,774	Inf	(163,189)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Retail	NEW	kBtuh capacity	16.5	$0.00	183.5	-6.7	0.25	$0.00	312	Inf	(10,655)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Retail	ROB	kBtuh capacity	16.5	$0.00	183.5	-6.7	0.25	$0.00	622	Inf	(21,243)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Schools	NEW	kBtuh capacity	16.5	$0.00	323.6	-11.9	0.25	$0.02	47	Inf	(1,603)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Schools	ROB	kBtuh capacity	16.5	$0.00	323.6	-11.9	0.25	$0.02	131	Inf	(4,491)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_University	NEW	kBtuh capacity	16.5	$0.00	323.6	-11.9	0.25	$0.02	72	Inf	(2,462)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_University	ROB	kBtuh capacity	16.5	$0.00	323.6	-11.9	0.25	$0.02	125	Inf	(4,265)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Warehouse	NEW	kBtuh capacity	16.5	$0.00	281.9	-10.3	0.25	$0.00	173	Inf	(5,912)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Warehouse	ROB	kBtuh capacity	16.5	$0.00	281.9	-10.3	0.25	$0.00	337	Inf	(11,514)
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_Food Service	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	383	Inf	-
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_Grocery	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	71	Inf	-
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_Hospital	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	88	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_Lodging	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	25	Inf	-
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_Other	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	349	Inf	-
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_Retail	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	23	Inf	-
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_Schools	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	54	Inf	-
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_University	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	6	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Food Service	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	2,456	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Grocery	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	545	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Hospital	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	2,187	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Lodging	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	315	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Office	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	38	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Other	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	2,194	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Retail	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	422	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Schools	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	781	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_University	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	475	Inf	-
Com | ENERGY STAR Commercial Dishwashers - Elec HW	Standard Commercial Dishwasher	Non-Res Cooking	C_Food Service	ROB	Dishwasher	15	$3,579.81	8201.3	0.0	0.33	$0.02	810	Inf	-
Com | ENERGY STAR Commercial Dishwashers - Gas HW	Standard Commercial Dishwasher	Non-Res Cooking	C_Food Service	ROB	Dishwasher	15	$4,099.58	438.6	362.9	0.33	-$0.10	2	$0.78	1,045
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Food Service	RET	Motor	16	$418.88	263.4	0.0	0.88	$0.11	538	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Grocery	RET	Motor	16	$418.88	263.4	0.0	0.72	$0.11	795	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Hospital	RET	Motor	16	$418.88	263.4	0.0	0.69	$0.11	94	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Lodging	RET	Motor	16	$418.88	263.4	0.0	0.81	$0.11	76	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Office	RET	Motor	16	$418.88	263.4	0.0	0.88	$0.11	190	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Other	RET	Motor	16	$418.88	263.4	0.0	0.02	$0.11	5	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Retail	RET	Motor	16	$418.88	263.4	0.0	0.46	$0.11	96	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Schools	RET	Motor	16	$418.88	263.4	0.0	0.58	$0.11	47	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_University	RET	Motor	16	$418.88	263.4	0.0	0.58	$0.11	93	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Warehouse	RET	Motor	16	$418.88	263.4	0.0	0.27	$0.11	260	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Food Service	ROB	Fixture	20	$0.00	813.8	0.0	0.79	-$0.01	1,914	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Grocery	ROB	Fixture	20	$0.00	813.8	0.0	0.48	-$0.01	523	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Hospital	ROB	Fixture	20	$0.00	813.8	0.0	0.72	-$0.01	1,339	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Lodging	ROB	Fixture	20	$0.00	813.8	0.0	0.57	-$0.01	424	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Office	ROB	Fixture	20	$0.00	813.8	0.0	0.66	-$0.01	30,974	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Other	ROB	Fixture	20	$0.00	813.8	0.0	0.76	-$0.01	2,646	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Retail	ROB	Fixture	20	$0.00	813.8	0.0	0.75	-$0.01	6,591	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Schools	ROB	Fixture	20	$0.00	813.8	0.0	0.70	-$0.01	1,101	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_University	ROB	Fixture	20	$0.00	813.8	0.0	0.70	-$0.01	1,451	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Warehouse	ROB	Fixture	20	$0.00	813.8	0.0	0.80	-$0.01	5,882	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Food Service	ROB	Fixture	15	$79.93	665.3	0.0	0.67	$0.00	5,732	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Grocery	ROB	Fixture	15	$79.93	665.3	0.0	0.33	$0.00	159	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Hospital	ROB	Fixture	15	$79.93	665.3	0.0	0.95	$0.00	960	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Lodging	ROB	Fixture	15	$79.93	665.3	0.0	0.51	$0.00	475	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Office	ROB	Fixture	15	$79.93	665.3	0.0	0.31	$0.00	6,710	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Other	ROB	Fixture	15	$79.93	665.3	0.0	0.52	$0.00	962	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Retail	ROB	Fixture	15	$79.93	665.3	0.0	0.09	$0.00	140	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Schools	ROB	Fixture	15	$79.93	665.3	0.0	0.30	$0.00	230	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_University	ROB	Fixture	15	$79.93	665.3	0.0	0.55	$0.00	559	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Warehouse	ROB	Fixture	15	$79.93	665.3	0.0	0.32	$0.00	562	Inf	-
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Food Service	RET	Watt Controlled	8	$0.55	1.3	0.0	1.00	$0.06	3,080	Inf	(20,896)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Grocery	RET	Watt Controlled	8	$0.55	2.0	0.0	0.99	$0.04	3,290	Inf	(19,953)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Hospital	RET	Watt Controlled	8	$0.55	1.2	0.0	0.99	$0.06	4,625	Inf	(25,821)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Lodging	RET	Watt Controlled	8	$0.55	0.8	0.0	0.98	$0.09	1,874	Inf	(13,422)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Office	RET	Watt Controlled	8	$0.55	0.9	0.0	0.86	$0.08	72,873	Inf	(461,689)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Other	RET	Watt Controlled	8	$0.55	0.7	0.0	0.73	$0.09	4,417	Inf	(27,699)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Retail	RET	Watt Controlled	8	$0.55	1.4	0.0	0.96	$0.05	25,566	Inf	(156,968)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Schools	RET	Watt Controlled	8	$0.55	0.6	0.0	0.84	$0.12	1,732	Inf	(11,803)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_University	RET	Watt Controlled	8	$0.55	0.7	0.0	0.97	$0.10	2,606	Inf	(11,717)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Warehouse	RET	Watt Controlled	8	$0.55	0.8	0.0	0.77	$0.09	8,733	Inf	(59,562)
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Food Service	RET	Hp	15	$434.83	692.5	0.0	1.00	$0.04	643	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Grocery	RET	Hp	15	$434.83	692.5	0.0	0.63	$0.04	4,471	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Hospital	RET	Hp	15	$434.83	692.5	0.0	1.00	$0.04	53	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Lodging	RET	Hp	15	$434.83	692.5	0.0	1.00	$0.04	95	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Office	RET	Hp	15	$434.83	692.5	0.0	1.00	$0.04	6,462	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Other	RET	Hp	15	$434.83	692.5	0.0	0.02	$0.04	45	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Retail	RET	Hp	15	$434.83	692.5	0.0	0.28	$0.04	642	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Schools	RET	Hp	15	$434.83	692.5	0.0	1.00	$0.04	53	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_University	RET	Hp	15	$434.83	692.5	0.0	1.00	$0.04	70	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Warehouse	RET	Hp	15	$434.83	692.5	0.0	0.36	$0.04	1,848	Inf	-
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_Hospital	ROB	kBtuh capacity	20	$6.78	0.0	0.7	0.85	Inf	-	$0.73	65,595
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_Lodging	ROB	kBtuh capacity	20	$6.78	0.0	1.3	0.85	Inf	-	$0.39	26,834
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_Office	ROB	kBtuh capacity	20	$6.78	0.0	0.5	0.85	Inf	-	$1.08	400,304
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_Other	ROB	kBtuh capacity	20	$6.78	0.0	1.8	0.85	Inf	-	$0.28	887,086
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_Retail	ROB	kBtuh capacity	20	$6.78	0.0	0.5	0.85	Inf	-	$1.10	34,315
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_Schools	ROB	kBtuh capacity	20	$6.78	0.0	0.8	0.85	Inf	-	$0.63	436,095
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_University	ROB	kBtuh capacity	20	$6.78	0.0	0.8	0.85	Inf	-	$0.63	324,306
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_Warehouse	ROB	kBtuh capacity	20	$6.78	0.0	0.7	0.85	Inf	-	$0.72	13,900
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Food Service	ROB	Broiler	12	$3,029.97	0.0	992.5	0.79	Inf	-	$0.31	407,108
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Grocery	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	Inf	-	$0.31	27,538
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Hospital	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	Inf	-	$0.31	13,829
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Lodging	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	Inf	-	$0.31	7,018

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Office	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	Inf	-	$0.31	1,861
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Other	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	Inf	-	$0.31	84,437
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Retail	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	Inf	-	$0.31	6,763
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Schools	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	Inf	-	$0.31	3,940
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_University	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	Inf	-	$0.31	733
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Food Service	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	Inf	-	$0.59	479,001
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Grocery	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	Inf	-	$0.59	54,387
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Hospital	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	Inf	-	$0.59	232,519
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Lodging	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	Inf	-	$0.59	34,559
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Office	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	Inf	-	$0.59	6,320
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Other	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	Inf	-	$0.59	529,738
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Retail	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	Inf	-	$0.59	21,177
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Schools	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	Inf	-	$0.59	75,433
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_University	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	Inf	-	$0.59	15,707
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Warehouse	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	Inf	-	$0.59	9,757
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_Hospital	ROB	kBtuh capacity	20	$24.75	0.0	1.5	0.85	Inf	-	$1.21	20,013
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_Lodging	ROB	kBtuh capacity	20	$24.75	0.0	2.9	0.85	Inf	-	$0.64	1,818
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_Office	ROB	kBtuh capacity	20	$24.75	0.0	1.0	0.85	Inf	-	$1.77	197,741
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_Other	ROB	kBtuh capacity	20	$24.75	0.0	4.0	0.85	Inf	-	$0.47	17,700
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_Retail	ROB	kBtuh capacity	20	$24.75	0.0	1.0	0.85	Inf	-	$1.82	17,364
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_Schools	ROB	kBtuh capacity	20	$24.75	0.0	1.8	0.85	Inf	-	$1.03	101,324

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_University	ROB	kBtuh capacity	20	$24.75	0.0	1.8	0.85	Inf	-	$1.03	75,350
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_Warehouse	ROB	kBtuh capacity	20	$24.75	0.0	1.6	0.85	Inf	-	$1.18	4,115
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Food Service	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	Inf	-	$1.02	43,296
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Grocery	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	Inf	-	$1.02	4,992
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Hospital	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	Inf	-	$1.02	9,406
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Lodging	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	Inf	-	$1.02	1,290
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Office	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	Inf	-	$1.02	15,659
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Other	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	Inf	-	$1.02	40,361
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Retail	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	Inf	-	$1.02	2,197
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Schools	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	Inf	-	$1.02	9,186
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_University	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	Inf	-	$1.02	1,913
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Food Service	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	Inf	-	$0.13	195,908
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Grocery	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	Inf	-	$0.13	22,589
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Hospital	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	Inf	-	$0.13	42,559
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Lodging	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	Inf	-	$0.13	5,839
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Office	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	Inf	-	$0.13	70,856
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Other	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	Inf	-	$0.13	182,627
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Retail	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	Inf	-	$0.13	9,939
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Schools	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	Inf	-	$0.13	41,566
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_University	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	Inf	-	$0.13	8,655
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Food Service	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	Inf	-	$0.36	736,503

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Grocery	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	Inf	-	$0.36	49,820
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Hospital	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	Inf	-	$0.36	25,019
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Lodging	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	Inf	-	$0.36	12,697
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Office	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	Inf	-	$0.36	3,367
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Other	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	Inf	-	$0.36	152,756
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Retail	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	Inf	-	$0.36	12,236
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Schools	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	Inf	-	$0.36	7,128
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_University	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	Inf	-	$0.36	1,325
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Food Service	ROB	kBtuh capacity	16.5	$21.77	0.0	2.7	0.85	Inf	-	$0.65	528,340
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Grocery	ROB	kBtuh capacity	16.5	$21.77	0.0	1.0	0.85	Inf	-	$1.79	25,762
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Hospital	ROB	kBtuh capacity	16.5	$21.77	0.0	1.5	0.85	Inf	-	$1.13	14,432
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Lodging	ROB	kBtuh capacity	16.5	$21.77	0.0	2.9	0.85	Inf	-	$0.60	14,490
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Office	ROB	kBtuh capacity	16.5	$21.77	0.0	1.0	0.85	Inf	-	$1.66	429,488
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Other	ROB	kBtuh capacity	16.5	$21.77	0.0	4.0	0.85	Inf	-	$0.44	1,656,005
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Retail	ROB	kBtuh capacity	16.5	$21.77	0.0	1.0	0.85	Inf	-	$1.70	95,803
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Schools	ROB	kBtuh capacity	16.5	$21.77	0.0	1.8	0.85	Inf	-	$0.97	54,720
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_University	ROB	kBtuh capacity	16.5	$21.77	0.0	1.8	0.85	Inf	-	$0.97	40,693
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Warehouse	ROB	kBtuh capacity	16.5	$21.77	0.0	1.6	0.85	Inf	-	$1.11	105,671
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Food Service	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	Inf	-	$0.32	482,524
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Grocery	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	Inf	-	$0.32	55,638
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Hospital	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	Inf	-	$0.32	104,823

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Lodging	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	Inf	-	$0.32	14,381
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Office	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	Inf	-	$0.32	174,520
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Other	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	Inf	-	$0.32	449,813
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Retail	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	Inf	-	$0.32	24,481
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Schools	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	Inf	-	$0.32	102,379
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_University	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	Inf	-	$0.32	21,318
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Food Service	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	Inf	-	$0.44	84,380
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Grocery	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	Inf	-	$0.44	10,662
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Hospital	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	Inf	-	$0.44	29,429
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Lodging	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	Inf	-	$0.44	8,937
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Office	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	Inf	-	$0.44	850
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Other	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	Inf	-	$0.44	75,483
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Retail	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	Inf	-	$0.44	2,134
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Schools	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	Inf	-	$0.44	10,734
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_University	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	Inf	-	$0.44	7,983
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Food Service	ROB	Ton	15	$299.06	89.5	0.0	0.85	$0.14	53	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Grocery	ROB	Ton	15	$299.06	52.8	0.0	0.85	$0.28	5	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Hospital	ROB	Ton	15	$299.06	83.5	0.0	0.85	$0.17	10	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Lodging	ROB	Ton	15	$299.06	44.2	0.0	0.85	$0.20	2	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Office	ROB	Ton	15	$299.06	56.8	0.0	0.85	$0.25	2,260	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Other	ROB	Ton	15	$299.06	60.7	0.0	0.85	$0.14	195	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Retail	ROB	Ton	15	$299.06	67.0	0.0	0.85	$0.22	2	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Schools	ROB	Ton	15	$299.06	40.5	0.0	0.85	$0.26	6	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_University	ROB	Ton	15	$299.06	40.5	0.0	0.85	$0.26	7	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Warehouse	ROB	Ton	15	$299.06	26.3	0.0	0.85	$0.35	12	Inf	-
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Food Service	ROB	Fixture	20	$139.40	480.5	-5.0	1.00	$0.02	13	Inf	(89)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Grocery	ROB	Fixture	20	$139.40	727.8	-6.8	0.35	$0.02	41	Inf	(248)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Hospital	ROB	Fixture	20	$139.40	432.6	-5.2	0.35	$0.03	237	Inf	(1,323)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Lodging	ROB	Fixture	20	$139.40	284.4	-3.1	1.00	$0.04	3	Inf	(19)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Office	ROB	Fixture	20	$139.40	332.3	-3.2	1.00	$0.03	2,645	Inf	(16,758)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Other	ROB	Fixture	20	$139.40	270.7	-2.6	0.29	$0.04	435	Inf	(2,727)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Retail	ROB	Fixture	20	$139.40	508.8	-4.8	0.11	$0.02	1,167	Inf	(7,168)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Schools	ROB	Fixture	20	$139.40	219.2	-2.3	0.37	$0.05	133	Inf	(907)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_University	ROB	Fixture	20	$139.40	250.4	-2.4	0.27	$0.04	148	Inf	(664)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Warehouse	ROB	Fixture	20	$139.40	298.7	-3.1	0.18	$0.04	834	Inf	(5,689)
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Food Service	NEW	kWh Saved	15	$0.34	0.1	0.0	1.00	$0.16	1,548	$2.37	84,605
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Grocery	NEW	kWh Saved	15	$0.27	0.1	0.0	1.00	$0.18	685	$6.95	9,206
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Hospital	NEW	kWh Saved	15	$1.11	0.1	0.0	1.00	$0.83	16,748	$20.81	324,093

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Lodging	NEW	kWh Saved	15	$0.91	0.1	0.0	1.00	$0.67	3,637	$14.39	114,771
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Office	NEW	kWh Saved	15	$1.78	0.1	0.0	1.00	$1.39	116,179	$70.96	1,536,164
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Other	NEW	kWh Saved	15	$1.02	0.1	0.0	1.00	$0.77	47,880	$23.48	1,052,434
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Retail	NEW	kWh Saved	15	$0.70	0.1	0.0	1.00	$0.53	26,475	$21.03	422,232
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Schools	NEW	kWh Saved	15	$1.36	0.1	0.0	1.00	$1.03	5,805	$22.95	177,997
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_University	NEW	kWh Saved	15	$0.96	0.1	0.0	1.00	$0.59	3,620	$5.11	246,518
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Warehouse	NEW	kWh Saved	15	$2.41	0.1	0.0	1.00	$1.91	1,099	$108.15	13,193
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Food Service	NEW	therms saved	15	$4.69	1.4	0.1	1.00	Inf	-	$3.91	52,300
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Grocery	NEW	therms saved	15	$14.47	5.6	0.1	1.00	Inf	-	$11.97	4,343
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Hospital	NEW	therms saved	15	$51.55	2.6	0.1	1.00	Inf	-	$44.41	335,659
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Lodging	NEW	therms saved	15	$37.46	2.5	0.1	1.00	Inf	-	$32.18	63,311

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Office	NEW	therms saved	15	$455.21	5.2	0.1	1.00	Inf	-	$393.58	943,698
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Other	NEW	therms saved	15	$49.57	3.3	0.1	1.00	Inf	-	$42.57	843,838
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Retail	NEW	therms saved	15	$42.29	4.8	0.1	1.00	Inf	-	$36.07	281,425
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Schools	NEW	therms saved	15	$75.64	2.9	0.1	1.00	Inf	-	$65.18	119,980
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_University	NEW	therms saved	15	$29.73	0.8	0.1	1.00	Inf	-	$25.67	256,629
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Warehouse	NEW	therms saved	15	$107.47	6.3	0.1	1.00	Inf	-	$92.43	9,048
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Food Service	NEW	kWh saved	15	$0.39	0.3	0.0	1.00	$0.01	14,860	$0.51	811,941
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Grocery	NEW	kWh saved	15	$0.31	0.3	0.0	1.00	$0.07	3,921	$0.79	52,713
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Hospital	NEW	kWh saved	15	$1.42	0.3	0.0	1.00	$0.40	25,559	$9.57	494,608
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Lodging	NEW	kWh saved	15	$1.17	0.3	0.0	1.00	$0.31	6,225	$6.46	196,460
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Office	NEW	kWh saved	15	$3.15	0.3	0.0	1.00	$0.98	131,718	$48.92	1,741,622

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Other	NEW	kWh saved	15	$1.26	0.3	0.0	1.00	$0.35	75,942	$10.16	1,669,265
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Retail	NEW	kWh saved	15	$0.85	0.3	0.0	1.00	$0.23	50,312	$8.17	802,413
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Schools	NEW	kWh saved	15	$1.87	0.3	0.0	1.00	$0.53	7,892	$11.76	242,012
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_University	NEW	kWh saved	15	$1.60	0.3	0.0	1.00	$0.32	5,827	$3.18	396,856
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Warehouse	NEW	kWh saved	15	$2.67	0.3	0.0	1.00	$0.83	1,351	$45.10	16,223
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Food Service	NEW	therms saved	15	$4.69	3.5	0.3	1.00	Inf	-	$1.47	804,036
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Grocery	NEW	therms saved	15	$14.47	13.9	0.3	1.00	Inf	-	$4.45	41,580
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Hospital	NEW	therms saved	15	$51.55	6.5	0.3	1.00	Inf	-	$17.61	480,919
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Lodging	NEW	therms saved	15	$37.46	6.3	0.3	1.00	Inf	-	$12.70	102,782
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Office	NEW	therms saved	15	$455.21	13.1	0.3	1.00	Inf	-	$156.92	1,057,575
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Other	NEW	therms saved	15	$49.57	8.1	0.3	1.00	Inf	-	$16.80	1,309,688

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Retail	NEW	therms saved	15	$42.29	12.1	0.3	1.00	Inf	-	$14.08	563,208
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Schools	NEW	therms saved	15	$75.64	7.3	0.3	1.00	Inf	-	$25.85	156,721
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_University	NEW	therms saved	15	$29.73	2.0	0.3	1.00	Inf	-	$10.21	357,729
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Warehouse	NEW	therms saved	15	$107.47	15.8	0.3	1.00	Inf	-	$36.55	12,713
Com | Hot Food Holding Cabinets	Standard Hot Food Holding Cabinet	Non-Res Cooking	C_Food Service	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	501	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_Grocery	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	218	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_Hospital	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	126	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_Lodging	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	58	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_Office	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	4	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_Other	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	405	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_Retail	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	60	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_Schools	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	155	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_University	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	204	Inf	-
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Food Service	NEW	per CFM	15	$9.59	0.0	0.5	0.10	Inf	-	$1.82	244
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Hospital	NEW	per CFM	15	$9.59	0.0	0.3	0.10	Inf	-	$3.15	566

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Lodging	NEW	per CFM	15	$9.59	0.0	0.5	0.08	Inf	-	$1.67	1,784
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Office	NEW	per CFM	15	$9.59	0.0	0.2	0.06	Inf	-	$4.64	185,151
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Other	NEW	per CFM	15	$9.59	0.0	0.7	0.09	Inf	-	$1.22	40,068
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Retail	NEW	per CFM	15	$9.59	0.0	0.2	0.10	Inf	-	$4.76	1,027
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Schools	NEW	per CFM	15	$9.59	0.0	0.3	0.09	Inf	-	$2.70	8,865
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_University	NEW	per CFM	15	$9.59	0.0	0.3	0.10	Inf	-	$2.70	10,808
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Warehouse	NEW	per CFM	15	$9.59	0.0	0.3	0.10	Inf	-	$3.10	17,512
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Food Service	RET	per CFM	15	$9.59	0.0	0.5	0.10	Inf	-	$1.82	689
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Hospital	RET	per CFM	15	$9.59	0.0	0.3	0.10	Inf	-	$3.15	1,103
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Lodging	RET	per CFM	15	$9.59	0.0	0.5	0.08	Inf	-	$1.67	4,859
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Office	RET	per CFM	15	$9.59	0.0	0.2	0.06	Inf	-	$4.64	278,643

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Other	RET	per CFM	15	$9.59	0.0	0.7	0.09	Inf	-	$1.22	75,323
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Retail	RET	per CFM	15	$9.59	0.0	0.2	0.10	Inf	-	$4.76	2,806
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Schools	RET	per CFM	15	$9.59	0.0	0.3	0.09	Inf	-	$2.70	34,182
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_University	RET	per CFM	15	$9.59	0.0	0.3	0.10	Inf	-	$2.70	25,771
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Warehouse	RET	per CFM	15	$9.59	0.0	0.3	0.10	Inf	-	$3.10	46,943
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Food Service	ROB	kbtuh	15	$31.67	0.0	7.2	0.83	Inf	-	$0.38	3,276
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Grocery	ROB	kbtuh	15	$31.67	0.0	1.3	0.54	Inf	-	$2.16	1,624
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Hospital	ROB	kbtuh	15	$31.67	0.0	4.3	0.23	Inf	-	$0.64	1,601
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Lodging	ROB	kbtuh	15	$31.67	0.0	1.5	0.30	Inf	-	$1.82	3,226
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Office	ROB	kbtuh	15	$31.67	0.0	0.9	0.47	Inf	-	$3.01	9,639
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Other	ROB	kbtuh	15	$31.67	0.0	0.8	0.59	Inf	-	$3.30	27,605
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Retail	ROB	kbtuh	15	$31.67	0.0	1.2	0.55	Inf	-	$2.37	3,152
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Schools	ROB	kbtuh	15	$31.67	0.0	0.3	0.72	Inf	-	$10.14	6,922

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_University	ROB	kbtuh	15	$31.67	0.0	0.5	0.73	Inf	-	$5.66	3,432
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Warehouse	ROB	kbtuh	15	$31.67	0.0	0.8	0.88	Inf	-	$3.47	2,797
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Food Service	RET	Exit Sign	16	$127.89	32.2	-0.3	0.34	$0.31	8	Inf	(53)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Grocery	RET	Exit Sign	16	$127.89	36.1	-0.3	0.49	$0.28	1	Inf	(6)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Hospital	RET	Exit Sign	16	$127.89	27.9	-0.3	0.49	$0.36	10	Inf	(58)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Lodging	RET	Exit Sign	16	$127.89	30.5	-0.3	0.29	$0.33	4	Inf	(28)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Office	RET	Exit Sign	16	$127.89	34.5	-0.3	0.16	$0.29	59	Inf	(377)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Other	RET	Exit Sign	16	$127.89	34.9	-0.3	0.30	$0.29	24	Inf	(148)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Retail	RET	Exit Sign	16	$127.89	35.6	-0.3	0.92	$0.28	125	Inf	(770)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Schools	RET	Exit Sign	16	$127.89	32.1	-0.3	0.41	$0.31	4	Inf	(30)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_University	RET	Exit Sign	16	$127.89	35.1	-0.3	0.49	$0.29	8	Inf	(34)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Warehouse	RET	Exit Sign	16	$127.89	32.1	-0.3	0.21	$0.31	44	Inf	(299)
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Food Service	ROB	Fixture	20	$0.00	82.6	-0.9	0.54	$0.01	7,246	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Grocery	ROB	Fixture	20	$0.00	125.1	-1.2	0.47	$0.00	958	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Hospital	ROB	Fixture	20	$0.00	74.3	-0.9	0.08	$0.01	1,160	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Lodging	ROB	Fixture	20	$0.00	48.9	-0.5	0.13	$0.01	1,718	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Office	ROB	Fixture	20	$0.00	57.1	-0.6	0.18	$0.00	20,062	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Other	ROB	Fixture	20	$0.00	46.5	-0.4	0.32	$0.01	6,555	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Retail	ROB	Fixture	20	$0.00	87.4	-0.8	0.10	$0.00	3,094	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Schools	ROB	Fixture	20	$0.00	37.7	-0.4	0.10	$0.01	131	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_University	ROB	Fixture	20	$0.00	43.0	-0.4	0.16	$0.01	432	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Warehouse	ROB	Fixture	20	$0.00	51.3	-0.5	0.12	$0.01	881	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Food Service	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	23	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Grocery	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	528	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Hospital	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	0	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Lodging	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	1	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Office	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	1	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Other	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	0	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Retail	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	301	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Schools	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	8	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_University	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	2	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Warehouse	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	5	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Food Service	ROB	Per Valve	5	$71.94	256.3	0.0	0.80	$0.03	74	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Grocery	ROB	Per Valve	5	$71.94	256.3	0.0	0.80	$0.03	25	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Hospital	ROB	Per Valve	5	$71.94	256.3	0.0	0.80	$0.03	0	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Lodging	ROB	Per Valve	5	$71.94	256.3	0.0	0.80	$0.03	5	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Office	ROB	Per Valve	5	$71.94	175.5	0.0	0.80	$0.05	9	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Other	ROB	Per Valve	5	$71.94	175.5	0.0	0.80	$0.05	97	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Retail	ROB	Per Valve	5	$71.94	175.5	0.0	0.80	$0.05	33	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Schools	ROB	Per Valve	5	$71.94	140.4	0.0	0.80	$0.07	24	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_University	ROB	Per Valve	5	$71.94	140.4	0.0	0.80	$0.07	27	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Food Service	ROB	Per Valve	5	$71.94	0.0	11.4	0.80	Inf	-	$0.89	420
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Grocery	ROB	Per Valve	5	$71.94	0.0	11.4	0.80	Inf	-	$0.89	13
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Hospital	ROB	Per Valve	5	$71.94	0.0	11.4	0.80	Inf	-	$0.89	160
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Lodging	ROB	Per Valve	5	$71.94	0.0	11.4	0.80	Inf	-	$0.89	-
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Office	ROB	Per Valve	5	$71.94	0.0	7.8	0.80	Inf	-	$1.41	0
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Other	ROB	Per Valve	5	$71.94	0.0	7.8	0.80	Inf	-	$1.41	121
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Retail	ROB	Per Valve	5	$71.94	0.0	7.8	0.80	Inf	-	$1.41	14
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Schools	ROB	Per Valve	5	$71.94	0.0	6.3	0.80	Inf	-	$1.82	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_University	ROB	Per Valve	5	$71.94	0.0	6.3	0.80	Inf	-	$1.82	1,187
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Food Service	RET	Fixture	18	$170.94	118.8	-1.2	0.72	$0.11	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Grocery	RET	Fixture	18	$170.94	179.9	-1.7	0.95	$0.07	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Hospital	RET	Fixture	18	$170.94	106.9	-1.3	0.83	$0.12	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Lodging	RET	Fixture	18	$170.94	70.3	-0.8	0.32	$0.18	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Office	RET	Fixture	18	$170.94	82.2	-0.8	0.76	$0.15	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Other	RET	Fixture	18	$170.94	66.9	-0.6	0.81	$0.19	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Retail	RET	Fixture	18	$170.94	125.8	-1.2	0.88	$0.10	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Schools	RET	Fixture	18	$170.94	54.2	-0.6	0.87	$0.24	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_University	RET	Fixture	18	$170.94	61.9	-0.6	0.87	$0.21	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Warehouse	RET	Fixture	18	$170.94	73.9	-0.8	0.86	$0.17	-	Inf	-
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Food Service	ROB	kbtuh	15	$9.13	0.0	3.5	0.83	Inf	-	$0.23	805,131
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Grocery	ROB	kbtuh	15	$9.13	0.0	1.0	0.54	Inf	-	$0.80	20,072
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Hospital	ROB	kbtuh	15	$9.13	0.0	2.1	0.23	Inf	-	$0.37	38,973
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Lodging	ROB	kbtuh	15	$9.13	0.0	1.1	0.30	Inf	-	$0.74	39,626
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Office	ROB	kbtuh	15	$9.13	0.0	0.8	0.47	Inf	-	$0.95	114,286
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Other	ROB	kbtuh	15	$9.13	0.0	0.7	0.59	Inf	-	$1.08	236,855

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Retail	ROB	kbtuh	15	$9.13	0.0	0.9	0.55	Inf	-	$0.91	27,664
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Schools	ROB	kbtuh	15	$9.13	0.0	0.6	0.72	Inf	-	$1.44	54,402
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_University	ROB	kbtuh	15	$9.13	0.0	0.6	0.73	Inf	-	$1.24	29,950
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Warehouse	ROB	kbtuh	15	$9.13	0.0	0.7	0.88	Inf	-	$1.10	23,492
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Food Service	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.09	$0.49	71	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Grocery	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.55	$0.49	10,288	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Hospital	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.16	$0.49	9	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Lodging	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.07	$0.49	1	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Office	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.69	$0.49	466	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Other	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.10	$0.49	12	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Retail	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.41	$0.49	4,169	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Schools	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.01	$0.49	1	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_University	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.75	$0.49	22	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Warehouse	ROB	Linear foot	12	$1,318.15	245.0	0.0	1.00	$0.49	66	Inf	-
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Food Service	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	15	$1.42	1,118
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Grocery	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	334	$1.42	25,563
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Hospital	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	0	$1.42	8
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Lodging	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	1	$1.42	52
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Office	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	1	$1.42	48
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Other	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	0	$1.42	6
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Retail	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	193	$1.42	14,751
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Schools	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	5	$1.42	407
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_University	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	1	$1.42	80
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Warehouse	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	3	$1.42	245

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Ozone Laundry	no ozone, HW from gas-fired boiler	Appliances	C_Lodging	RET	lbs capacity	10	$127.64	2.9	30.7	0.68	-$5.63	-	$0.42	-
Com | Ozone Laundry	no ozone, HW from gas-fired boiler	Appliances	C_Other	RET	lbs capacity	10	$127.64	2.9	30.7	0.68	-$5.63	0	$0.42	329
Com | Packaged Terminal AC (PTAC) Equipment	Condensing Units 0.7 tons, 10.6 SEER, 9.1 EER	Space Cooling	C_Food Service	ROB	Ton	15	$210.35	106.5	0.0	0.85	$0.16	1	Inf	-
Com | Packaged Terminal AC (PTAC) Equipment	Condensing Units 0.7 tons, 10.6 SEER, 9.1 EER	Space Cooling	C_Hospital	ROB	Ton	15	$210.35	97.4	0.0	0.85	$0.17	3	Inf	-
Com | Packaged Terminal AC (PTAC) Equipment	Condensing Units 0.7 tons, 10.6 SEER, 9.1 EER	Space Cooling	C_Lodging	ROB	Ton	15	$210.35	56.0	0.0	0.85	$0.30	2	Inf	-
Com | Packaged Terminal AC (PTAC) Equipment	Condensing Units 0.7 tons, 10.6 SEER, 9.1 EER	Space Cooling	C_Office	ROB	Ton	15	$210.35	66.3	0.0	0.85	$0.26	81	Inf	-
Com | Packaged Terminal AC (PTAC) Equipment	Condensing Units 0.7 tons, 10.6 SEER, 9.1 EER	Space Cooling	C_Other	ROB	Ton	15	$210.35	76.8	0.0	0.85	$0.22	6	Inf	-
Com | Packaged Terminal AC (PTAC) Equipment	Condensing Units 0.7 tons, 10.6 SEER, 9.1 EER	Space Cooling	C_Retail	ROB	Ton	15	$210.35	77.7	0.0	0.85	$0.22	11	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Food Service	RET	Watt Controlled	8	$0.49	1.6	0.0	0.41	$0.03	387	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Grocery	RET	Watt Controlled	8	$0.49	1.6	0.0	0.41	$0.03	124	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Hospital	RET	Watt Controlled	8	$0.49	1.6	0.0	0.18	$0.03	78	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Lodging	RET	Watt Controlled	8	$0.49	1.6	0.0	0.31	$0.03	94	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Office	RET	Watt Controlled	8	$0.49	1.6	0.0	0.26	$0.03	5,442	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Other	RET	Watt Controlled	8	$0.49	1.6	0.0	0.03	$0.03	52	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Retail	RET	Watt Controlled	8	$0.49	1.6	0.0	0.01	$0.03	87	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Schools	RET	Watt Controlled	8	$0.49	1.6	0.0	0.47	$0.03	441	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_University	RET	Watt Controlled	8	$0.49	1.6	0.0	0.68	$0.03	581	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Warehouse	RET	Watt Controlled	8	$0.49	1.6	0.0	0.09	$0.03	445	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Food Service	ROB	Fixture	20	$47.96	387.6	0.0	0.79	$0.00	155	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Grocery	ROB	Fixture	20	$47.96	387.6	0.0	0.48	$0.00	42	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Hospital	ROB	Fixture	20	$47.96	387.6	0.0	0.72	$0.00	108	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Lodging	ROB	Fixture	20	$47.96	387.6	0.0	0.57	$0.00	34	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Office	ROB	Fixture	20	$47.96	387.6	0.0	0.66	$0.00	2,509	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Other	ROB	Fixture	20	$47.96	387.6	0.0	0.76	$0.00	214	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Retail	ROB	Fixture	20	$47.96	387.6	0.0	0.75	$0.00	534	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Schools	ROB	Fixture	20	$47.96	387.6	0.0	0.70	$0.00	89	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_University	ROB	Fixture	20	$47.96	387.6	0.0	0.70	$0.00	118	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Warehouse	ROB	Fixture	20	$47.96	387.6	0.0	0.80	$0.00	476	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Food Service	RET	kWh saved	7	$0.03	0.2	0.0	0.36	$0.01	31,575	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Grocery	RET	kWh saved	7	$0.03	0.2	0.0	0.58	$0.01	10,190	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Hospital	RET	kWh saved	7	$0.03	0.2	0.0	0.06	$0.01	3,737	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Lodging	RET	kWh saved	7	$0.03	0.2	0.0	0.12	$0.01	4,523	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Office	RET	kWh saved	7	$0.03	0.2	0.0	0.03	$0.01	2,738	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Other	RET	kWh saved	7	$0.03	0.2	0.0	0.08	$0.01	7,604	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Retail	RET	kWh saved	7	$0.03	0.2	0.0	0.25	$0.01	34,382	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Schools	RET	kWh saved	7	$0.03	0.2	0.0	0.08	$0.01	3,641	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_University	RET	kWh saved	7	$0.03	0.2	0.0	0.08	$0.01	1,644	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Warehouse	RET	kWh saved	7	$0.03	0.2	0.0	0.18	$0.01	1,434	Inf	-
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Food Service	ROB	lamp	15	$0.00	53.0	-0.6	0.78	$0.00	2,957	Inf	(20,060)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Grocery	ROB	lamp	15	$0.00	80.3	-0.7	0.96	$0.00	552	Inf	(3,347)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Hospital	ROB	lamp	15	$0.00	47.7	-0.6	0.49	$0.00	492	Inf	(2,746)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Lodging	ROB	lamp	15	$0.00	31.4	-0.3	0.28	$0.00	319	Inf	(2,285)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Office	ROB	lamp	15	$0.00	36.6	-0.4	0.09	$0.00	931	Inf	(5,899)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Other	ROB	lamp	15	$0.00	29.9	-0.3	0.79	$0.00	2,085	Inf	(13,073)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Retail	ROB	lamp	15	$0.00	56.1	-0.5	0.08	$0.00	694	Inf	(4,258)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Schools	ROB	lamp	15	$0.00	24.2	-0.3	0.65	$0.00	66	Inf	(449)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_University	ROB	lamp	15	$0.00	27.6	-0.3	0.49	$0.00	75	Inf	(339)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Warehouse	ROB	lamp	15	$0.00	32.9	-0.3	0.18	$0.00	131	Inf	(894)
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_Grocery	ROB	Ton	20	$154.50	21.1	0.0	0.85	$0.51	0	Inf	-
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_Hospital	ROB	Ton	20	$154.50	33.3	0.0	0.85	$0.32	80	Inf	-
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_Lodging	ROB	Ton	20	$154.50	19.2	0.0	0.85	$0.56	9	Inf	-
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_Office	ROB	Ton	20	$154.50	22.7	0.0	0.85	$0.48	253	Inf	-
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_Other	ROB	Ton	20	$154.50	26.3	0.0	0.85	$0.41	124	Inf	-
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_Retail	ROB	Ton	20	$154.50	26.6	0.0	0.85	$0.41	144	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_Schools	ROB	Ton	20	$154.50	16.9	0.0	0.85	$0.64	35	Inf	-
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_University	ROB	Ton	20	$154.50	16.9	0.0	0.85	$0.64	20	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Food Service	ROB	Ton	15	$154.32	44.8	0.0	0.85	$0.14	240	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Grocery	ROB	Ton	15	$154.32	25.9	0.0	0.85	$0.25	43	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Hospital	ROB	Ton	15	$154.32	41.0	0.0	0.85	$0.15	42	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Lodging	ROB	Ton	15	$154.32	23.6	0.0	0.85	$0.27	18	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Office	ROB	Ton	15	$154.32	27.9	0.0	0.41	$0.23	944	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Other	ROB	Ton	15	$154.32	32.3	0.0	0.85	$0.20	324	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Retail	ROB	Ton	15	$154.32	32.7	0.0	0.85	$0.20	253	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Schools	ROB	Ton	15	$154.32	20.8	0.0	0.85	$0.31	39	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_University	ROB	Ton	15	$154.32	20.8	0.0	0.85	$0.31	52	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Warehouse	ROB	Ton	15	$154.32	13.9	0.0	0.85	$0.47	84	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_Grocery	ROB	Server	4	$71.94	565.0	0.0	0.67	$0.02	21	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_Hospital	ROB	Server	4	$71.94	565.0	0.0	1.00	$0.02	53	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_Lodging	ROB	Server	4	$71.94	565.0	0.0	0.91	$0.02	69	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_Office	ROB	Server	4	$71.94	565.0	0.0	0.71	$0.02	2,067	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_Other	ROB	Server	4	$71.94	565.0	0.0	0.65	$0.02	563	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_Retail	ROB	Server	4	$71.94	565.0	0.0	0.76	$0.02	136	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_Schools	ROB	Server	4	$71.94	565.0	0.0	0.90	$0.02	86	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_University	ROB	Server	4	$71.94	565.0	0.0	1.00	$0.02	22	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_Grocery	ROB	Server	4	$4,736.74	3463.0	0.0	0.67	$0.30	0	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_Hospital	ROB	Server	4	$4,736.74	3463.0	0.0	1.00	$0.30	0	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_Lodging	ROB	Server	4	$4,736.74	3463.0	0.0	0.91	$0.30	0	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_Office	ROB	Server	4	$4,736.74	3463.0	0.0	0.71	$0.30	2	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_Other	ROB	Server	4	$4,736.74	3463.0	0.0	0.65	$0.30	1	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_Retail	ROB	Server	4	$4,736.74	3463.0	0.0	0.76	$0.30	0	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_Schools	ROB	Server	4	$4,736.74	3463.0	0.0	0.90	$0.30	0	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_University	ROB	Server	4	$4,736.74	3463.0	0.0	1.00	$0.30	0	Inf	-
Com | Smart Thermostats (Small Commercial) - kWh	Standard Thermostat	Space Heating and Cooling	C_Food Service	RET	Per kWh	20	$0.13	0.0	0.0	1.00	$0.43	6,817	$12.56	160,637
Com | Smart Thermostats (Small Commercial) - kWh	Standard Thermostat	Space Heating and Cooling	C_Office	RET	Per kWh	20	$0.12	0.0	0.0	1.00	$0.61	40,572	$64.80	266,935
Com | Smart Thermostats (Small Commercial) - kWh	Standard Thermostat	Space Heating and Cooling	C_Other	RET	Per kWh	20	$0.12	0.0	0.0	1.00	$0.63	23,772	$62.42	163,828
Com | Smart Thermostats (Small Commercial) - kWh	Standard Thermostat	Space Heating and Cooling	C_Retail	RET	Per kWh	20	$0.12	0.0	0.0	1.00	$3.25	4,188	$72.51	130,553
Com | Smart Thermostats (Small Commercial) - therm	Standard Thermostat	Space Heating and Cooling	C_Food Service	RET	Per Therm	20	$3.13	0.1	0.0	1.00	Inf	-	$28.85	175,578
Com | Smart Thermostats (Small Commercial) - therm	Standard Thermostat	Space Heating and Cooling	C_Office	RET	Per Therm	20	$3.51	0.9	0.0	1.00	Inf	-	$41.63	167,978

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Smart Thermostats (Small Commercial) - therm	Standard Thermostat	Space Heating and Cooling	C_Other	RET	Per Therm	20	$3.24	0.3	0.0	1.00	Inf	-	$60.81	137,266
Com | Smart Thermostats (Small Commercial) - therm	Standard Thermostat	Space Heating and Cooling	C_Retail	RET	Per Therm	20	$3.17	0.3	0.0	1.00	Inf	-	$47.97	101,941
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Food Service	NEW	kBtu/h capacity	11	$4.89	766.0	-62.6	0.25	$0.07	68	Inf	(5,149)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Food Service	ROB	kBtu/h capacity	11	$4.89	766.0	-62.6	0.25	$0.07	166	Inf	(12,657)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Grocery	NEW	kBtu/h capacity	11	$4.89	135.2	-11.8	0.25	$0.08	12	Inf	(959)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Grocery	ROB	kBtu/h capacity	11	$4.89	135.2	-11.8	0.25	$0.08	26	Inf	(2,134)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Hospital	NEW	kBtu/h capacity	11	$4.89	453.6	-37.2	0.25	$0.07	704	Inf	(53,724)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Hospital	ROB	kBtu/h capacity	11	$4.89	453.6	-37.2	0.25	$0.07	1,179	Inf	(89,938)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Lodging	NEW	kBtu/h capacity	11	$4.89	160.2	-13.8	0.25	$0.07	97	Inf	(7,752)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Lodging	ROB	kBtu/h capacity	11	$4.89	160.2	-13.8	0.25	$0.07	226	Inf	(18,140)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Office	NEW	kBtu/h capacity	11	$4.89	96.8	-8.7	0.25	$0.08	295	Inf	(24,770)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Office	ROB	kBtu/h capacity	11	$4.89	96.8	-8.7	0.25	$0.08	384	Inf	(32,167)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Other	NEW	kBtu/h capacity	11	$4.89	88.4	-7.9	0.25	$0.08	109	Inf	(9,117)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Other	ROB	kBtu/h capacity	11	$4.89	88.4	-7.9	0.25	$0.08	181	Inf	(15,084)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Retail	NEW	kBtu/h capacity	11	$4.89	122.9	-10.7	0.25	$0.08	26	Inf	(2,137)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Retail	ROB	kBtu/h capacity	11	$4.89	122.9	-10.7	0.25	$0.08	63	Inf	(5,082)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Schools	NEW	kBtu/h capacity	11	$4.89	28.8	-3.2	0.25	$0.11	5	Inf	(567)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Schools	ROB	kBtu/h capacity	11	$4.89	28.8	-3.2	0.25	$0.11	18	Inf	(1,894)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_University	NEW	kBtu/h capacity	11	$4.89	51.6	-5.0	0.25	$0.09	8	Inf	(721)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_University	ROB	kBtu/h capacity	11	$4.89	51.6	-5.0	0.25	$0.09	16	Inf	(1,490)

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Warehouse	NEW	kBtu/h capacity	11	$4.89	84.2	-7.6	0.25	$0.08	13	Inf	(1,127)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Warehouse	ROB	kBtu/h capacity	11	$4.89	84.2	-7.6	0.25	$0.08	31	Inf	(2,618)
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Food Service	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.64	9,665	$8.59	529,113
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Grocery	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.72	2,427	$34.37	33,077
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Hospital	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.69	17,200	$16.41	349,076
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Lodging	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.69	5,604	$14.88	177,518
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Office	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.73	79,029	$33.51	1,116,206
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Other	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.73	48,560	$20.70	1,113,558
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Retail	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.72	43,760	$29.30	704,417
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Schools	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.71	11,018	$17.49	299,986
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_University	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.57	4,699	$4.85	330,298
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Warehouse	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.73	1,370	$39.45	16,411
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Food Service	RET	Therms saved	5	$0.46	0.6	0.1	0.26	Inf	-	$1.63	313,512
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Grocery	RET	Therms saved	5	$0.88	2.6	0.1	0.26	Inf	-	$3.00	14,821
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Hospital	RET	Therms saved	5	$0.59	1.2	0.1	0.26	Inf	-	$2.05	200,416

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Lodging	RET	Therms saved	5	$0.56	1.1	0.1	0.26	Inf	-	$1.95	58,716
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Office	RET	Therms saved	5	$0.86	2.5	0.1	0.26	Inf	-	$2.80	380,779
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Other	RET	Therms saved	5	$0.65	1.5	0.1	0.26	Inf	-	$2.24	505,789
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Retail	RET	Therms saved	5	$0.80	2.2	0.1	0.26	Inf	-	$2.69	298,176
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Schools	RET	Therms saved	5	$0.60	1.3	0.1	0.26	Inf	-	$2.07	144,257
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_University	RET	Therms saved	5	$0.40	0.4	0.1	0.26	Inf	-	$1.43	187,113
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Warehouse	RET	Therms saved	5	$0.96	2.9	0.1	0.26	Inf	-	$3.23	7,535
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Food Service	RET	sqft of strip curtain	4	$16.34	54.8	0.0	0.61	$0.06	1,105	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Grocery	RET	sqft of strip curtain	4	$16.34	176.7	0.0	0.37	$0.01	2,704	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Hospital	RET	sqft of strip curtain	4	$16.34	54.8	0.0	0.68	$0.06	240	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Lodging	RET	sqft of strip curtain	4	$16.34	23.1	0.0	0.63	$0.15	21	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Office	RET	sqft of strip curtain	4	$16.34	23.1	0.0	0.51	$0.15	61	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Other	RET	sqft of strip curtain	4	$16.34	23.1	0.0	0.66	$0.15	127	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Retail	RET	sqft of strip curtain	4	$16.34	23.1	0.0	0.23	$0.15	55	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Schools	RET	sqft of strip curtain	4	$16.34	54.8	0.0	0.74	$0.06	118	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_University	RET	sqft of strip curtain	4	$16.34	54.8	0.0	0.74	$0.06	155	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Warehouse	RET	sqft of strip curtain	4	$16.34	688.3	0.0	0.29	$0.00	9,117	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Food Service	RET	Fixture	18	$242.88	108.2	-1.1	0.72	$0.17	-	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Grocery	RET	Fixture	18	$242.88	163.9	-1.5	0.95	$0.11	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Hospital	RET	Fixture	18	$242.88	97.4	-1.2	0.83	$0.19	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Lodging	RET	Fixture	18	$242.88	64.0	-0.7	0.32	$0.28	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Office	RET	Fixture	18	$242.88	74.8	-0.7	0.76	$0.24	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Other	RET	Fixture	18	$242.88	61.0	-0.6	0.81	$0.29	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Retail	RET	Fixture	18	$242.88	114.6	-1.1	0.88	$0.16	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Schools	RET	Fixture	18	$242.88	49.4	-0.5	0.87	$0.36	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_University	RET	Fixture	18	$242.88	56.4	-0.5	0.87	$0.32	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Warehouse	RET	Fixture	18	$242.88	67.3	-0.7	0.86	$0.27	-	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Food Service	RET	Fixture	18	$123.88	185.9	-1.9	0.72	$0.07	3,452	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Grocery	RET	Fixture	18	$123.88	281.6	-2.6	0.95	$0.05	10,951	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Hospital	RET	Fixture	18	$123.88	167.4	-2.0	0.83	$0.08	6,476	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Lodging	RET	Fixture	18	$123.88	110.0	-1.2	0.32	$0.11	1,653	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Office	RET	Fixture	18	$123.88	128.6	-1.3	0.76	$0.09	243,029	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Other	RET	Fixture	18	$123.88	104.7	-1.0	0.81	$0.12	17,185	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Retail	RET	Fixture	18	$123.88	196.8	-1.9	0.88	$0.06	92,442	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Schools	RET	Fixture	18	$123.88	84.8	-0.9	0.87	$0.14	5,959	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_University	RET	Fixture	18	$123.88	96.9	-0.9	0.87	$0.13	8,966	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Warehouse	RET	Fixture	18	$123.88	115.6	-1.2	0.86	$0.11	15,653	Inf	-
Com |Occupancy-Based PTAC Controls	Standard PTAC Control	Space Cooling	C_Lodging	RET	Ton	15	$415.65	302.0	0.0	1.00	$0.11	11	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Food Service	RET	HP	15	$3,333.83	2013.2	0.0	0.95	$0.13	824	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Grocery	RET	HP	15	$3,333.83	2526.2	0.0	1.00	$0.11	55	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Hospital	RET	HP	15	$3,333.83	2972.2	0.0	0.95	$0.09	14,796	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Lodging	RET	HP	15	$3,333.83	2972.6	0.0	0.50	$0.09	790	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Office	RET	HP	15	$3,333.83	995.3	0.0	0.28	$0.27	22,706	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Other	RET	HP	15	$3,333.83	1774.8	0.0	0.78	$0.15	3,660	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Retail	RET	HP	15	$3,333.83	1487.2	0.0	1.00	$0.18	74	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Schools	RET	HP	15	$3,333.83	952.9	0.0	0.62	$0.28	1,214	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_University	RET	HP	15	$3,333.83	1823.7	0.0	0.95	$0.15	384	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Warehouse	RET	HP	15	$3,333.83	1393.7	0.0	0.95	$0.19	3,265	Inf	-
Ind | Ag Pump Controls | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Other	RET	kWh consumed	15	$0.06	0.1	0.0	0.02	$0.04	189	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Chemicals	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	25	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Food Products	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	30	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Hi Tech	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	13	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Metal Fabrication & Foundries	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	18	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Nonmetallic Manufacturing	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	29	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Pulp & Paper	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	11	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Transportation & Equipment	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	37	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Wood Products	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	15	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Chemicals	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	2,978	Inf	-
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Food Products	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	3,484	Inf	-
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Hi Tech	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	1,582	Inf	-
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Metal Fabrication & Foundries	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	2,149	Inf	-
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Nonmetallic Manufacturing	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	3,466	Inf	-
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Pulp & Paper	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	1,306	Inf	-
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Transportation & Equipment	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	4,355	Inf	-
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Wood Products	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	1,728	Inf	-
Ind | Boiler Tune Up | NEW	As found Boiler	Process Heat	I_Chemicals	NEW	therms consumed	5	$0.02	0.0	0.1	1.00	Inf	-	$0.08	3,625
Ind | Boiler Tune Up | NEW	As found Boiler	Process Heat	I_Food Products	NEW	therms consumed	5	$0.02	0.0	0.1	1.00	Inf	-	$0.08	3,829
Ind | Boiler Tune Up | NEW	As found Boiler	Process Heat	I_Nonmetallic Manufacturing	NEW	therms consumed	5	$0.02	0.0	0.1	1.00	Inf	-	$0.08	6,512
Ind | Boiler Tune Up | NEW	As found Boiler	Process Heat	I_Pulp & Paper	NEW	therms consumed	5	$0.02	0.0	0.1	1.00	Inf	-	$0.08	603
Ind | Boiler Tune Up | NEW	As found Boiler	Process Heat	I_Wood Products	NEW	therms consumed	5	$0.02	0.0	0.1	1.00	Inf	-	$0.08	1,980
Ind | Boiler Tune Up | RET	As found Boiler	Process Heat	I_Chemicals	RET	therms consumed	5	$0.02	0.0	0.1	1.00	Inf	-	$0.08	63,922
Ind | Boiler Tune Up | RET	As found Boiler	Process Heat	I_Food Products	RET	therms consumed	5	$0.02	0.0	0.1	1.00	Inf	-	$0.08	67,506
Ind | Boiler Tune Up | RET	As found Boiler	Process Heat	I_Nonmetallic Manufacturing	RET	therms consumed	5	$0.02	0.0	0.1	1.00	Inf	-	$0.08	114,814
Ind | Boiler Tune Up | RET	As found Boiler	Process Heat	I_Pulp & Paper	RET	therms consumed	5	$0.02	0.0	0.1	1.00	Inf	-	$0.08	10,641
Ind | Boiler Tune Up | RET	As found Boiler	Process Heat	I_Wood Products	RET	therms consumed	5	$0.02	0.0	0.1	1.00	Inf	-	$0.08	34,907

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	28	Inf	-
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	21	Inf	-
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	9	Inf	-
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	18	Inf	-
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	21	Inf	-
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	NEW	kWh consumed	15	$0.00	0.1	0.0	1.00	-$0.01	25	Inf	-
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	26	Inf	-
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	10	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	3,655	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	2,672	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	1,213	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	2,307	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	2,658	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	RET	kWh consumed	15	$0.00	0.1	0.0	1.00	-$0.01	3,204	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	3,340	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	1,325	Inf	-
Ind | Clean Room Upgrades | NEW	Any non participating site	Space Cooling	I_Hi Tech	NEW	kWh consumed	15	$0.05	0.1	0.0	0.00	$0.07	-	Inf	-
Ind | Clean Room Upgrades | NEW	Any non participating site	Space Cooling	I_Publishing, Broadcasting & Telecommunications	NEW	kWh consumed	15	$0.05	0.1	0.0	0.00	$0.07	-	Inf	-
Ind | Clean Room Upgrades | RET	Any non participating site	Space Cooling	I_Hi Tech	RET	kWh consumed	15	$0.05	0.1	0.0	0.00	$0.07	-	Inf	-
Ind | Clean Room Upgrades | RET	Any non participating site	Space Cooling	I_Publishing, Broadcasting & Telecommunications	RET	kWh consumed	15	$0.05	0.1	0.0	0.00	$0.07	-	Inf	-
Ind | Condenser Boiler | NEW	Conventional Boiler	Process Heat	I_Chemicals	NEW	therms consumed	15	$0.40	0.0	0.1	1.00	Inf	-	$0.36	6,616
Ind | Condenser Boiler | NEW	Conventional Boiler	Process Heat	I_Food Products	NEW	therms consumed	15	$0.40	0.0	0.1	1.00	Inf	-	$0.36	6,987
Ind | Condenser Boiler | NEW	Conventional Boiler	Process Heat	I_Nonmetallic Manufacturing	NEW	therms consumed	15	$0.40	0.0	0.1	1.00	Inf	-	$0.36	11,883
Ind | Condenser Boiler | NEW	Conventional Boiler	Process Heat	I_Pulp & Paper	NEW	therms consumed	15	$0.40	0.0	0.1	1.00	Inf	-	$0.36	1,101
Ind | Condenser Boiler | NEW	Conventional Boiler	Process Heat	I_Wood Products	NEW	therms consumed	15	$0.40	0.0	0.1	1.00	Inf	-	$0.36	3,613
Ind | Condenser Boiler | RET	Conventional Boiler	Process Heat	I_Chemicals	RET	therms consumed	15	$0.40	0.0	0.1	1.00	Inf	-	$0.36	116,652
Ind | Condenser Boiler | RET	Conventional Boiler	Process Heat	I_Food Products	RET	therms consumed	15	$0.40	0.0	0.1	1.00	Inf	-	$0.36	123,192
Ind | Condenser Boiler | RET	Conventional Boiler	Process Heat	I_Nonmetallic Manufacturing	RET	therms consumed	15	$0.40	0.0	0.1	1.00	Inf	-	$0.36	209,525
Ind | Condenser Boiler | RET	Conventional Boiler	Process Heat	I_Pulp & Paper	RET	therms consumed	15	$0.40	0.0	0.1	1.00	Inf	-	$0.36	19,419
Ind | Condenser Boiler | RET	Conventional Boiler	Process Heat	I_Wood Products	RET	therms consumed	15	$0.40	0.0	0.1	1.00	Inf	-	$0.36	63,702

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | De Strat Fans Electric | NEW	No Destrat System	Space Heating and Cooling	I_Food Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	15	Inf	-
Ind | De Strat Fans Electric | NEW	No Destrat System	Space Heating and Cooling	I_Hi Tech	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	7	Inf	-
Ind | De Strat Fans Electric | NEW	No Destrat System	Space Heating and Cooling	I_Nonmetallic Manufacturing	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	14	Inf	-
Ind | De Strat Fans Electric | NEW	No Destrat System	Space Heating and Cooling	I_Other	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	9	Inf	-
Ind | De Strat Fans Electric | NEW	No Destrat System	Space Heating and Cooling	I_Publishing, Broadcasting & Telecommunications	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	8	Inf	-
Ind | De Strat Fans Electric | RET	No Destrat System	Space Heating and Cooling	I_Food Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,872	Inf	-
Ind | De Strat Fans Electric | RET	No Destrat System	Space Heating and Cooling	I_Hi Tech	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	850	Inf	-
Ind | De Strat Fans Electric | RET	No Destrat System	Space Heating and Cooling	I_Nonmetallic Manufacturing	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,862	Inf	-
Ind | De Strat Fans Electric | RET	No Destrat System	Space Heating and Cooling	I_Other	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,202	Inf	-
Ind | De Strat Fans Electric | RET	No Destrat System	Space Heating and Cooling	I_Publishing, Broadcasting & Telecommunications	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,035	Inf	-
Ind | De Strat Fans Gas | NEW	No Destrat System	Space Heating and Cooling	I_Food Products	NEW	therms consumed	15	$0.08	0.0	0.1	1.00	Inf	-	$0.11	4,681
Ind | De Strat Fans Gas | NEW	No Destrat System	Space Heating and Cooling	I_Hi Tech	NEW	therms consumed	15	$0.08	0.0	0.1	1.00	Inf	-	$0.11	1,038
Ind | De Strat Fans Gas | NEW	No Destrat System	Space Heating and Cooling	I_Nonmetallic Manufacturing	NEW	therms consumed	15	$0.08	0.0	0.1	1.00	Inf	-	$0.11	7,961
Ind | De Strat Fans Gas | NEW	No Destrat System	Space Heating and Cooling	I_Other	NEW	therms consumed	15	$0.08	0.0	0.1	1.00	Inf	-	$0.11	6,870
Ind | De Strat Fans Gas | NEW	No Destrat System	Space Heating and Cooling	I_Publishing, Broadcasting & Telecommunications	NEW	therms consumed	15	$0.08	0.0	0.1	1.00	Inf	-	$0.11	769

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | De Strat Fans Gas | RET	No Destrat System	Space Heating and Cooling	I_Food Products	RET	therms consumed	15	$0.08	0.0	0.1	1.00	Inf	-	$0.11	82,789
Ind | De Strat Fans Gas | RET	No Destrat System	Space Heating and Cooling	I_Hi Tech	RET	therms consumed	15	$0.08	0.0	0.1	1.00	Inf	-	$0.11	18,353
Ind | De Strat Fans Gas | RET	No Destrat System	Space Heating and Cooling	I_Nonmetallic Manufacturing	RET	therms consumed	15	$0.08	0.0	0.1	1.00	Inf	-	$0.11	140,808
Ind | De Strat Fans Gas | RET	No Destrat System	Space Heating and Cooling	I_Other	RET	therms consumed	15	$0.08	0.0	0.1	1.00	Inf	-	$0.11	121,518
Ind | De Strat Fans Gas | RET	No Destrat System	Space Heating and Cooling	I_Publishing, Broadcasting & Telecommunications	RET	therms consumed	15	$0.08	0.0	0.1	1.00	Inf	-	$0.11	13,598
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	2	Inf	-
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	3	Inf	-
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	1	Inf	-
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	2	Inf	-
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	3	Inf	-
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	1	Inf	-
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	3	Inf	-
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	1	Inf	-
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	279	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	326	Inf	-
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	148	Inf	-
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	201	Inf	-
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	325	Inf	-
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	122	Inf	-
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	408	Inf	-
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	162	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	16	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	19	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	9	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	12	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	19	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	7	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	23	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	9	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	2,065	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	2,416	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	1,097	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	1,490	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	2,403	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	905	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	3,020	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	1,198	Inf	-
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Chemicals	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	1,006
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Food Products	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	1,062
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Hi Tech	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	235
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Metal Fabrication & Foundries	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	2,364
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Nonmetallic Manufacturing	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	1,806
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Pulp & Paper	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	167

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Transportation & Equipment	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	1,659
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Wood Products	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	549
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Chemicals	RET	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	-
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Food Products	RET	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	-
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Hi Tech	RET	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	4,151
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Metal Fabrication & Foundries	RET	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	41,683
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Nonmetallic Manufacturing	RET	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	31,850
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Pulp & Paper	RET	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	2,952
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Transportation & Equipment	RET	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	29,258
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Wood Products	RET	therms consumed	11	$0.01	0.0	0.0	1.00	Inf	-	$0.06	9,683
Ind | Heat recovery	No recovery	Process Heat	I_Chemicals	RET	therms consumed	10	$0.06	0.0	0.0	1.00	Inf	-	$0.16	49,707
Ind | Heat recovery	No recovery	Process Heat	I_Food Products	RET	therms consumed	10	$0.06	0.0	0.0	1.00	Inf	-	$0.16	52,494
Ind | Heat recovery	No recovery	Process Heat	I_Nonmetallic Manufacturing	RET	therms consumed	10	$0.06	0.0	0.0	1.00	Inf	-	$0.16	89,282
Ind | Heat recovery	No recovery	Process Heat	I_Other	RET	therms consumed	10	$0.06	0.0	0.0	1.00	Inf	-	$0.16	77,051
Ind | Heat recovery	No recovery	Process Heat	I_Pulp & Paper	RET	therms consumed	10	$0.06	0.0	0.0	1.00	Inf	-	$0.16	8,275
Ind | Heat recovery	No recovery	Process Heat	I_Transportation & Equipment	RET	therms consumed	10	$0.06	0.0	0.0	1.00	Inf	-	$0.16	82,018
Ind | Heat recovery	No recovery	Process Heat	I_Wood Products	RET	therms consumed	10	$0.06	0.0	0.0	1.00	Inf	-	$0.16	27,144
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	8	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	9	Inf	-
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	4	Inf	-
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	6	Inf	-
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	9	Inf	-
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	4	Inf	-
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	12	Inf	-
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	5	Inf	-
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,043	Inf	-
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,220	Inf	-
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	554	Inf	-
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	753	Inf	-
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,214	Inf	-
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	457	Inf	-
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,525	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	605	Inf	-
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Chemicals	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	9,173
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Food Products	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	9,687
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Hi Tech	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	2,147
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Metal Fabrication & Foundries	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	21,563
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Nonmetallic Manufacturing	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	16,476
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Pulp & Paper	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	1,527
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Transportation & Equipment	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	15,136
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Wood Products	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	5,009
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Chemicals	RET	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	161,739
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Food Products	RET	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	170,807
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Hi Tech	RET	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	37,864
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Metal Fabrication & Foundries	RET	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	380,202
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Nonmetallic Manufacturing	RET	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	290,509
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Pulp & Paper	RET	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	26,924
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Transportation & Equipment	RET	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	266,873
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Wood Products	RET	therms consumed	18	$0.54	0.0	0.1	1.00	Inf	-	$0.31	88,323

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | LED Street Lighting	HID Street Lighting	Lighting	I_Public Street & Highway Lighting	NEW	kWh consumed	20	$0.32	0.6	0.0	0.92	$0.03	-	Inf	-
Ind | LED Street Lighting	HID Street Lighting	Lighting	I_Public Street & Highway Lighting	ROB	kWh consumed	20	$0.32	0.6	0.0	0.92	$0.03	29,803	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Chemicals	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	21	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Food Products	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	24	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Hi Tech	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	11	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Metal Fabrication & Foundries	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	15	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Nonmetallic Manufacturing	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	24	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Pulp & Paper	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	9	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Transportation & Equipment	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	30	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Wood Products	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	12	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Chemicals	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	2,686	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Food Products	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	3,142	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Hi Tech	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	1,427	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Metal Fabrication & Foundries	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	1,938	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Nonmetallic Manufacturing	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	3,125	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Pulp & Paper	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	1,177	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Transportation & Equipment	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	3,927	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Wood Products	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	1,558	Inf	-
Ind | Process Boiler Load Controls | NEW	Conventional boiler with minmal controls	Process Heat	I_Chemicals	NEW	therms consumed	15	$0.10	0.0	0.1	1.00	Inf	-	$0.11	5,347
Ind | Process Boiler Load Controls | NEW	Conventional boiler with minmal controls	Process Heat	I_Food Products	NEW	therms consumed	15	$0.10	0.0	0.1	1.00	Inf	-	$0.11	5,647
Ind | Process Boiler Load Controls | NEW	Conventional boiler with minmal controls	Process Heat	I_Nonmetallic Manufacturing	NEW	therms consumed	15	$0.10	0.0	0.1	1.00	Inf	-	$0.11	9,605
Ind | Process Boiler Load Controls | NEW	Conventional boiler with minmal controls	Process Heat	I_Pulp & Paper	NEW	therms consumed	15	$0.10	0.0	0.1	1.00	Inf	-	$0.11	890
Ind | Process Boiler Load Controls | NEW	Conventional boiler with minmal controls	Process Heat	I_Wood Products	NEW	therms consumed	15	$0.10	0.0	0.1	1.00	Inf	-	$0.11	2,920
Ind | Process Boiler Load Controls | RET	Conventional boiler with minmal controls	Process Heat	I_Chemicals	RET	therms consumed	15	$0.10	0.0	0.1	1.00	Inf	-	$0.11	94,285
Ind | Process Boiler Load Controls | RET	Conventional boiler with minmal controls	Process Heat	I_Food Products	RET	therms consumed	15	$0.10	0.0	0.1	1.00	Inf	-	$0.11	99,571
Ind | Process Boiler Load Controls | RET	Conventional boiler with minmal controls	Process Heat	I_Nonmetallic Manufacturing	RET	therms consumed	15	$0.10	0.0	0.1	1.00	Inf	-	$0.11	169,351
Ind | Process Boiler Load Controls | RET	Conventional boiler with minmal controls	Process Heat	I_Pulp & Paper	RET	therms consumed	15	$0.10	0.0	0.1	1.00	Inf	-	$0.11	15,695
Ind | Process Boiler Load Controls | RET	Conventional boiler with minmal controls	Process Heat	I_Wood Products	RET	therms consumed	15	$0.10	0.0	0.1	1.00	Inf	-	$0.11	51,488
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Chemicals	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	4,568	Inf	-
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Food Products	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	5,344	Inf	-
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Hi Tech	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	2,427	Inf	-
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Metal Fabrication & Foundries	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	3,296	Inf	-
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Nonmetallic Manufacturing	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	5,316	Inf	-
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Pulp & Paper	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	2,003	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Transportation & Equipment	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	6,680	Inf	-
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Wood Products	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	2,651	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	26	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	30	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	14	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	18	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	30	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	11	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	37	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	15	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	3,024	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	3,538	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	1,607	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	2,182	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	3,519	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	1,326	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	4,422	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	1,755	Inf	-
Ind | Reduce Steam Pressure | NEW	Higher Steam Pressure	Process Heat	I_Chemicals	NEW	therms consumed	6	$0.01	0.0	0.0	1.00	Inf	-	$0.14	1,245
Ind | Reduce Steam Pressure | NEW	Higher Steam Pressure	Process Heat	I_Food Products	NEW	therms consumed	6	$0.01	0.0	0.0	1.00	Inf	-	$0.14	1,315
Ind | Reduce Steam Pressure | NEW	Higher Steam Pressure	Process Heat	I_Nonmetallic Manufacturing	NEW	therms consumed	6	$0.01	0.0	0.0	1.00	Inf	-	$0.14	2,237
Ind | Reduce Steam Pressure | NEW	Higher Steam Pressure	Process Heat	I_Pulp & Paper	NEW	therms consumed	6	$0.01	0.0	0.0	1.00	Inf	-	$0.14	207
Ind | Reduce Steam Pressure | NEW	Higher Steam Pressure	Process Heat	I_Wood Products	NEW	therms consumed	6	$0.01	0.0	0.0	1.00	Inf	-	$0.14	680
Ind | Reduce Steam Pressure | RET	Higher Steam Pressure	Process Heat	I_Chemicals	RET	therms consumed	6	$0.01	0.0	0.0	1.00	Inf	-	$0.14	21,956
Ind | Reduce Steam Pressure | RET	Higher Steam Pressure	Process Heat	I_Food Products	RET	therms consumed	6	$0.01	0.0	0.0	1.00	Inf	-	$0.14	23,187
Ind | Reduce Steam Pressure | RET	Higher Steam Pressure	Process Heat	I_Nonmetallic Manufacturing	RET	therms consumed	6	$0.01	0.0	0.0	1.00	Inf	-	$0.14	39,437
Ind | Reduce Steam Pressure | RET	Higher Steam Pressure	Process Heat	I_Pulp & Paper	RET	therms consumed	6	$0.01	0.0	0.0	1.00	Inf	-	$0.14	3,655
Ind | Reduce Steam Pressure | RET	Higher Steam Pressure	Process Heat	I_Wood Products	RET	therms consumed	6	$0.01	0.0	0.0	1.00	Inf	-	$0.14	11,990
Ind | Refrigeration Equipment VFD | NEW	As found Refrigeration System	Non-Res Refrigeration	I_Food Products	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.04	28	Inf	-
Ind | Refrigeration Equipment VFD | RET	As found Refrigeration System	Non-Res Refrigeration	I_Food Products	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.04	3,567	Inf	-
Ind | Refrigeration System Upgrades | NEW	As found Refrigeration System	Non-Res Refrigeration	I_Food Products	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.02	46	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | Refrigeration System Upgrades | RET	As found Refrigeration System	Non-Res Refrigeration	I_Food Products	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.02	5,984	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	12	Inf	-
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	14	Inf	-
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	7	Inf	-
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	9	Inf	-
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	14	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	5	Inf	-
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	18	Inf	-
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	7	Inf	-
Res | Advanced Power Strips, Elec	Standard Power Strip - Home Office Only	Electronics and Office Equipment	R_Manufactured Homes	RET	Advanced Power Strips per house	5	$63.95	70.0	0.0	0.62	$0.16	3,018	Inf	-
Res | Advanced Power Strips, Elec	Standard Power Strip - Home Office Only	Electronics and Office Equipment	R_Multi Family	RET	Advanced Power Strips per house	5	$63.95	70.0	0.0	0.84	$0.16	21,085	Inf	-
Res | Advanced Power Strips, Elec	Standard Power Strip - Home Office Only	Electronics and Office Equipment	R_Single Family	RET	Advanced Power Strips per house	5	$63.95	70.0	0.0	0.62	$0.16	29,172	Inf	-
Res | Air Cleaner	Standard Room Air Cleaner - max 450 sq ft	Electronics and Office Equipment	R_Manufactured Homes	ROB	air cleaner	4	$203.03	203.2	0.0	0.20	$0.22	103	Inf	-
Res | Air Cleaner	Standard Room Air Cleaner - max 450 sq ft	Electronics and Office Equipment	R_Multi Family	ROB	air cleaner	4	$203.03	203.2	0.0	0.20	$0.22	631	Inf	-
Res | Air Cleaner	Standard Room Air Cleaner - max 450 sq ft	Electronics and Office Equipment	R_Single Family	ROB	air cleaner	4	$203.03	203.2	0.0	0.20	$0.22	2,087	Inf	-
Res | Air Sealing - Gas and Electric	Base Infiltration (0.60 ACH)	Space Heating and Cooling	R_Manufactured Homes	RET	home	10	$2,397.98	401.0	4.9	0.63	$0.61	15,246	$53.79	135,130
Res | Air Sealing - Gas and Electric	Base Infiltration (0.60 ACH)	Space Heating and Cooling	R_Multi Family	RET	home	10	$2,397.98	271.3	5.5	0.64	$0.89	41,462	$48.59	603,620
Res | Air Sealing - Gas and Electric	Base Infiltration (0.6 ACH)	Space Heating and Cooling	R_Single Family	RET	home	10	$2,397.98	135.8	31.1	0.65	$1.77	51,427	$8.63	8,494,157
Res | Air Source Heat Pump	Air Source Heat Pump <= 14 SEER, 8.2 HSPF	Space Heating and Cooling	R_Manufactured Homes	ROB	Heat Pump	12	$337.04	693.2	0.0	0.74	$0.03	1,024	Inf	-
Res | Air Source Heat Pump	Air Source Heat Pump <= 14 SEER, 8.2 HSPF	Space Heating and Cooling	R_Multi Family	ROB	Heat Pump	12	$383.28	788.3	0.0	0.90	$0.02	4,522	Inf	-
Res | Air Source Heat Pump	Air Source Heat Pump <= 14 SEER, 8.2 HSPF	Space Heating and Cooling	R_Single Family	ROB	Heat Pump	12	$423.43	870.9	0.0	0.57	$0.02	18,202	Inf	-
Res | Attic Insulation/Ceiling Insulation - Gas and Electric	R-15 Attic Insulation	Space Heating and Cooling	R_Manufactured Homes	RET	sq. ft. attic area	25	$1.33	1.2	0.0	0.15	$0.05	12,678	$11.55	47,310

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | Attic Insulation/Ceiling Insulation - Gas and Electric	R-15 Attic Insulation	Space Heating and Cooling	R_Single Family	RET	sq. ft. attic area	25	$1.33	0.3	0.0	0.15	$0.24	29,888	$2.93	2,164,569
Res | Central AC Quality Installation Verification	No CAC QIV	Space Cooling	R_Manufactured Homes	NEW	QIV	7	$399.66	149.5	0.0	1.00	$0.37	40	Inf	-
Res | Central AC Quality Installation Verification	No CAC QIV	Space Cooling	R_Multi Family	NEW	QIV	7	$399.66	149.5	0.0	1.00	$0.37	105	Inf	-
Res | Central AC Quality Installation Verification	No CAC QIV	Space Cooling	R_Single Family	NEW	QIV	7	$399.66	149.5	0.0	1.00	$0.37	1,273	Inf	-
Res | Central Air Conditioner Replacement	Central AC SEER 13	Space Cooling	R_Manufactured Homes	ROB	AC	7	$399.66	108.0	0.0	1.00	$0.52	261	Inf	-
Res | Central Air Conditioner Replacement	Central AC SEER 13	Space Cooling	R_Multi Family	ROB	AC	7	$399.66	108.0	0.0	1.00	$0.52	149	Inf	-
Res | Central Air Conditioner Replacement	Central AC SEER 13	Space Cooling	R_Single Family	ROB	AC	7	$399.66	108.0	0.0	1.00	$0.52	2,653	Inf	-
Res | Central Air Conditioner Tune up	No tune-up Maintanance	Space Cooling	R_Manufactured Homes	RET	Tune Up	10	$79.93	164.8	0.0	1.00	$0.05	413	Inf	-
Res | Central Air Conditioner Tune up	No tune-up Maintanance	Space Cooling	R_Multi Family	RET	Tune Up	10	$79.93	164.8	0.0	1.00	$0.05	236	Inf	-
Res | Central Air Conditioner Tune up	No tune-up Maintanance	Space Cooling	R_Single Family	RET	Tune Up	10	$79.93	164.8	0.0	1.00	$0.05	4,201	Inf	-
Res | CFL Bulbs (Reflector)	Mixed Market Incandescent Bulb/Halogen Bulb	Lighting	R_Manufactured Homes	ROB	Lamps	4.557094	$2.10	0.0	0.0	1.00	$0.02	-	Inf	-
Res | CFL Bulbs (Reflector)	Mixed Market Incandescent Bulb/Halogen Bulb	Lighting	R_Multi Family	ROB	Lamps	4.557094	$2.10	0.0	0.0	0.78	$0.02	-	Inf	-
Res | CFL Bulbs (Reflector)	Mixed Market Incandescent Bulb/Halogen Bulb	Lighting	R_Single Family	ROB	Lamps	4.557094	$2.10	0.0	0.0	0.72	$0.02	-	Inf	-
Res | Clothes Dryer - Fuel Switch - MF	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Multi Family	NEW	Clothes Dryer	12	$334.86	789.5	-10.4	0.25	$0.04	394	Inf	(4,835)
Res | Clothes Dryer - Fuel Switch - SF	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Single Family	ROB	Clothes Dryer	12	$334.86	789.5	-10.4	0.68	$0.04	5,501	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | Clothes Washer | Electric DHW	RTF Market Standard 2016 Clothes Washer - MEF 2.64 and WF 3.9 (Electric DHW & Dryer)	Appliances	R_Manufactured Homes	ROB	Washers	14.2	$142.09	7.7	0.0	0.40	$0.98	145	Inf	-
Res | Clothes Washer | Electric DHW	RTF Market Standard 2016 Clothes Washer - MEF 2.64 and WF 3.9 (Electric DHW & Dryer)	Appliances	R_Multi Family	ROB	Washers	14.2	$142.09	7.7	0.0	0.40	$0.98	392	Inf	-
Res | Clothes Washer | Electric DHW	RTF Market Standard 2016 Clothes Washer - MEF 2.64 and WF 3.9 (Electric DHW & Dryer)	Appliances	R_Single Family	ROB	Washers	14.2	$142.09	7.7	0.0	0.40	$0.98	609	Inf	-
Res | Clothes Washer | Gas DHW	RTF Market Standard 2016 Clothes Washer - MEF 2.64 and WF 3.9 (Electric DHW & Dryer)	Appliances	R_Manufactured Homes	ROB	Washers	14.2	$157.33	0.0	1.6	0.40	Inf	-	$7.56	1,335
Res | Clothes Washer | Gas DHW	RTF Market Standard 2016 Clothes Washer - MEF 2.64 and WF 3.9 (Electric DHW & Dryer)	Appliances	R_Multi Family	ROB	Washers	14.2	$157.33	0.0	1.6	0.40	Inf	-	$7.56	16,801
Res | Clothes Washer | Gas DHW	RTF Market Standard 2016 Clothes Washer - MEF 2.64 and WF 3.9 (Electric DHW & Dryer)	Appliances	R_Single Family	ROB	Washers	14.2	$157.33	0.0	1.6	0.40	Inf	-	$7.56	122,978
Res | Dishwasher | Electric HW	Federal Standard Dishwasher - 307 kWh/yr and 5.0 gal/cycle	Appliances	R_Manufactured Homes	ROB	Dishwashers	15.4	$79.93	37.0	0.0	0.16	$0.15	144	Inf	-
Res | Dishwasher | Electric HW	Federal Standard Dishwasher - 307 kWh/yr and 5.0 gal/cycle	Appliances	R_Multi Family	ROB	Dishwashers	15.4	$79.93	37.0	0.0	0.16	$0.15	663	Inf	-
Res | Dishwasher | Electric HW	Federal Standard Dishwasher - 307 kWh/yr and 5.0 gal/cycle	Appliances	R_Single Family	ROB	Dishwashers	15.4	$79.93	37.0	0.0	0.16	$0.15	734	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | Dishwasher | Gas HW	RTF Market Standard 2014 Dishwasher - 277 kWh/yr and 3.82 gal/cycle	Appliances	R_Manufactured Homes	ROB	Dishwashers	15.4	$79.93	16.3	0.9	0.16	$0.29	5	$5.05	104
Res | Dishwasher | Gas HW	RTF Market Standard 2014 Dishwasher - 277 kWh/yr and 3.82 gal/cycle	Appliances	R_Multi Family	ROB	Dishwashers	15.4	$79.93	16.3	0.9	0.16	$0.29	108	$5.05	2,217
Res | Dishwasher | Gas HW	RTF Market Standard 2014 Dishwasher - 277 kWh/yr and 3.82 gal/cycle	Appliances	R_Single Family	ROB	Dishwashers	15.4	$79.93	16.3	0.9	0.16	$0.29	563	$5.05	11,565
Res | Duct Insulation - Gas and Electric	No Duct Insulation	Space Heating and Cooling	R_Manufactured Homes	RET	home	20	$3,367.91	466.4	7.3	0.18	$0.48	5,053	$28.10	56,729
Res | Duct Insulation - Gas and Electric	No Duct Insulation	Space Heating and Cooling	R_Single Family	RET	home	20	$5,155.44	71.9	45.8	0.18	$4.78	7,533	$8.26	3,460,653
Res | Duct Sealing - Gas and Electric	No Duct Sealing	Space Heating and Cooling	R_Manufactured Homes	RET	home	18	$739.63	648.3	8.4	0.25	$0.06	9,757	-$1.15	91,007
Res | Duct Sealing - Gas and Electric	No Duct Sealing	Space Heating and Cooling	R_Multi Family	RET	home	20	$393.28	78.0	5.6	0.25	$0.23	4,647	$3.76	240,295
Res | Duct Sealing - Gas and Electric	No Duct Sealing	Space Heating and Cooling	R_Single Family	RET	home	20	$1,118.07	83.3	48.2	0.25	$0.73	12,117	$1.54	5,063,372
Res | Ductless Mini-Split Heat Pumps	Electric Resistance Heating	Space Heating	R_Manufactured Homes	ROB	Heater	18	$7,034.06	2029.0	0.0	0.15	$0.23	11,925	Inf	-
Res | Ductless Mini-Split Heat Pumps	Electric Resistance Heating	Space Heating	R_Multi Family	ROB	Heater	18	$7,034.06	2029.0	0.0	0.66	$0.23	121,944	Inf	-
Res | Ductless Mini-Split Heat Pumps - SF	Electric Resistance Heating	Space Heating	R_Single Family	ROB	Heater	18	$7,034.06	2029.0	0.0	0.26	$0.22	75,392	Inf	-
Res | ECM Motor MH	Standard Motor	Space Heating	R_Manufactured Homes	ROB	Furnace Motor	18	$742.30	223.2	0.0	0.90	$0.21	7,688	Inf	-
Res | ECM Motor SF MF	Standard Motor	Space Heating	R_Multi Family	ROB	Furnace Motor	18	$742.30	53.6	0.0	0.91	$0.48	631	Inf	-
Res | ECM Motor SF MF	Standard Motor	Space Heating	R_Single Family	ROB	Furnace Motor	18	$742.30	53.6	0.0	0.92	$0.48	18,275	Inf	-
Res | Electric Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Manufactured Homes	ROB	Clothes Dryer	12	$334.86	329.1	0.0	0.85	$0.09	6,583	Inf	-
Res | Electric Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Multi Family	ROB	Clothes Dryer	12	$334.86	329.1	0.0	0.85	$0.09	21,710	Inf	-
Res | Electric Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Single Family	ROB	Clothes Dryer	12	$334.86	329.1	0.0	0.85	$0.09	42,971	Inf	-
Res | Electric Resistance Heating - Fuel Switch - MF	Electric Resistance heating	Space Heating	R_Multi Family	NEW	Heater	20	$1,240.28	9839.3	-410.0	0.25	$0.04	39,634	Inf	(1,538,661)

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | Electric Resistance Heating - Fuel Switch - SF	Electric Resistance heating	Space Heating	R_Single Family	ROB	Heater	20	$1,240.28	9839.3	-410.0	0.13	$0.03	84,999	Inf	-
Res | Electric Storage Water Heater	Electric Water Heater, 55 gal.	Hot Water	R_Manufactured Homes	ROB	water heater	13	$527.55	159.7	0.0	1.00	$0.28	7,919	Inf	-
Res | Electric Storage Water Heater	Electric Water Heater, 55 gal.	Hot Water	R_Multi Family	ROB	water heater	13	$527.55	159.7	0.0	1.00	$0.28	32,570	Inf	-
Res | Electric Storage Water Heater	Electric Water Heater, 55 gal.	Hot Water	R_Single Family	ROB	water heater	13	$527.55	159.7	0.0	1.00	$0.28	29,356	Inf	-
Res | Energy Efficient Building - Electric & Gas ST	Code compliant building	Whole Building/House	R_Multi Family	NEW	Base kWh consumed	20	$0.38	0.3	0.0	1.00	$0.01	135,621	-$0.04	2,311,828
Res | Energy Efficient Building - Gas Only ST	Code compliant building	Whole Building/House	R_Multi Family	NEW	Base therms consumed	20	$8.22	6.6	0.3	1.00	Inf	-	$1.80	2,987,189
Res | ENERGY STAR CFL Bulbs (General Service Lamps)	Incandescent - EISA Standard	Lighting	R_Manufactured Homes	ROB	Lamps	7	$2.29	0.0	0.0	0.53	$0.07	-	Inf	-
Res | ENERGY STAR CFL Bulbs (General Service Lamps)	Incandescent - EISA Standard	Lighting	R_Multi Family	ROB	Lamps	7	$2.29	0.0	0.0	0.47	$0.07	-	Inf	-
Res | ENERGY STAR CFL Bulbs (General Service Lamps)	Incandescent - EISA Standard	Lighting	R_Single Family	ROB	Lamps	7	$2.29	0.0	0.0	0.89	$0.07	-	Inf	-
Res | ENERGY STAR CFL Bulbs (Specialty, Non-Reflector)	Incandescent - Specialty	Lighting	R_Manufactured Homes	ROB	Lamps	7	$3.58	0.0	0.0	0.97	$0.08	-	Inf	-
Res | ENERGY STAR CFL Bulbs (Specialty, Non-Reflector)	Incandescent - Specialty	Lighting	R_Multi Family	ROB	Lamps	7	$3.58	0.0	0.0	0.93	$0.08	-	Inf	-
Res | ENERGY STAR CFL Bulbs (Specialty, Non-Reflector)	Incandescent - Specialty	Lighting	R_Single Family	ROB	Lamps	7	$3.58	0.0	0.0	0.93	$0.08	-	Inf	-
Res | Energy Star Home, Electric & Gas ST	2012 IECC Code	Whole Building/House	R_Single Family	NEW	Base kWh consumed	20	$1.08	0.1	0.0	1.00	$0.66	128,741	$11.89	2,712,977
Res | Energy Star Home, Gas Only ST	2012 IECC Code	Whole Building/House	R_Single Family	NEW	Base therms consumed	20	$19.84	1.9	0.1	1.00	Inf	-	$14.61	3,376,379
Res | Energy Star Television, Elec	Standard Television	Electronics and Office Equipment	R_Manufactured Homes	ROB	Per Television	6	$159.87	20.1	0.0	0.29	$1.25	669	Inf	-
Res | Energy Star Television, Elec	Standard Television	Electronics and Office Equipment	R_Multi Family	ROB	Per Television	6	$159.87	20.1	0.0	0.29	$1.25	2,383	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | Energy Star Television, Elec	Standard Television	Electronics and Office Equipment	R_Single Family	ROB	Per Television	6	$159.87	20.1	0.0	0.29	$1.25	6,967	Inf	-
Res | Faucet Aerators - Bathroom, Electric WH	2.2 GPM - Bathroom	Hot Water	R_Manufactured Homes	RET	Bathroom Faucets	10	$21.23	76.1	0.0	0.43	$0.02	3,821	Inf	-
Res | Faucet Aerators - Bathroom, Electric WH	2.2 GPM - Bathroom	Hot Water	R_Multi Family	RET	Bathroom Faucets	10	$21.23	76.1	0.0	0.43	$0.02	9,662	Inf	-
Res | Faucet Aerators - Bathroom, Electric WH	2.2 GPM - Bathroom	Hot Water	R_Single Family	RET	Bathroom Faucets	10	$21.23	76.1	0.0	0.43	$0.02	14,838	Inf	-
Res | Faucet Aerators - Bathroom, Gas WH	2.2 GPM - Bathroom	Hot Water	R_Manufactured Homes	RET	Bathroom Faucets	10	$21.23	0.0	3.2	0.43	Inf	-	$0.67	9,281
Res | Faucet Aerators - Bathroom, Gas WH	2.2 GPM - Bathroom	Hot Water	R_Multi Family	RET	Bathroom Faucets	10	$21.23	0.0	3.2	0.43	Inf	-	$0.67	109,136
Res | Faucet Aerators - Bathroom, Gas WH	2.2 GPM - Bathroom	Hot Water	R_Single Family	RET	Bathroom Faucets	10	$21.23	0.0	3.2	0.43	Inf	-	$0.67	789,756
Res | Faucet Aerators - Kitchen, Electric WH	2.2 GPM - Kitchen	Hot Water	R_Manufactured Homes	RET	Kitchen Faucets	10	$21.23	34.5	0.0	0.43	$0.05	771	Inf	-
Res | Faucet Aerators - Kitchen, Electric WH	2.2 GPM - Kitchen	Hot Water	R_Multi Family	RET	Kitchen Faucets	10	$21.23	34.5	0.0	0.43	$0.05	2,508	Inf	-
Res | Faucet Aerators - Kitchen, Electric WH	2.2 GPM - Kitchen	Hot Water	R_Single Family	RET	Kitchen Faucets	10	$21.23	34.5	0.0	0.43	$0.05	2,995	Inf	-
Res | Faucet Aerators - Kitchen, Gas WH	2.2 GPM - Kitchen	Hot Water	R_Manufactured Homes	RET	Kitchen Faucets	10	$21.23	0.0	1.5	0.43	Inf	-	$1.47	1,870
Res | Faucet Aerators - Kitchen, Gas WH	2.2 GPM - Kitchen	Hot Water	R_Multi Family	RET	Kitchen Faucets	10	$21.23	0.0	1.5	0.43	Inf	-	$1.47	28,277
Res | Faucet Aerators - Kitchen, Gas WH	2.2 GPM - Kitchen	Hot Water	R_Single Family	RET	Kitchen Faucets	10	$21.23	0.0	1.5	0.43	Inf	-	$1.47	159,150
Res | Floor Insulation - Gas and Electric	Higher R-value based on PSE feedback	Space Heating	R_Manufactured Homes	RET	sq. ft	20	$3.35	0.6	0.0	0.24	$0.36	10,266	$30.68	72,618
Res | Floor Insulation - Gas and Electric	Higher R-value based on PSE feedback	Space Heating	R_Single Family	RET	sq. ft	20	$3.35	0.1	0.0	0.23	$1.49	22,694	$8.22	3,141,866
Res | Gas Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Manufactured Homes	ROB	Dryers	12	$334.86	0.0	2.6	0.83	Inf	-	$12.90	2,115
Res | Gas Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Multi Family	ROB	Dryers	12	$334.86	0.0	2.6	0.83	Inf	-	$12.90	825
Res | Gas Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Single Family	ROB	Dryers	12	$334.86	0.0	2.6	0.83	Inf	-	$12.90	25,067
Res | Gas Fireplace	Standard Fireplace	Space Heating	R_Manufactured Homes	ROB	Heat Pump	19	$931.21	0.0	72.0	0.30	Inf	-	$0.99	48,250

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | Gas Fireplace	Standard Fireplace	Space Heating	R_Multi Family	ROB	Heat Pump	19	$931.21	0.0	72.0	0.30	Inf	-	$0.99	286,204
Res | Gas Fireplace	Standard Fireplace	Space Heating	R_Single Family	ROB	Heat Pump	19	$931.21	0.0	72.0	0.30	Inf	-	$0.99	2,486,994
Res | Gas Furnace Tune-up, RET	No gas furnace tune up	Space Heating	R_Manufactured Homes	RET	Furnace	2	$190.24	0.0	34.2	0.27	Inf	-	$2.55	50,061
Res | Gas Furnace Tune-up, RET	No gas furnace tune up	Space Heating	R_Multi Family	RET	Furnace	2	$190.24	0.0	34.2	0.27	Inf	-	$2.55	73,804
Res | Gas Furnace Tune-up, RET	No gas furnace tune up	Space Heating	R_Single Family	RET	Furnace	2	$190.24	0.0	34.2	0.27	Inf	-	$2.55	1,921,415
Res | Gas Storage Water Heater	Gas Storage Water Heater	Hot Water	R_Manufactured Homes	ROB	water heater	12	$393.27	0.0	31.0	0.68	Inf	-	$1.27	64,101
Res | Gas Storage Water Heater	Gas Storage Water Heater	Hot Water	R_Multi Family	ROB	water heater	12	$393.27	0.0	31.0	0.73	Inf	-	$1.27	102,597
Res | Gas Storage Water Heater	Gas Storage Water Heater	Hot Water	R_Single Family	ROB	water heater	12	$393.27	0.0	31.0	0.63	Inf	-	$1.27	3,564,515
Res | Gas Tankless Water Heater	Gas Storage Water Heater	Hot Water	R_Manufactured Homes	ROB	water heater	15	$1,987.12	0.0	86.5	0.68	Inf	-	$1.99	39,251
Res | Gas Tankless Water Heater	Gas Storage Water Heater	Hot Water	R_Multi Family	ROB	water heater	15	$1,987.12	0.0	86.5	0.73	Inf	-	$1.99	62,823
Res | Gas Tankless Water Heater	Gas Storage Water Heater	Hot Water	R_Single Family	ROB	water heater	15	$1,987.12	0.0	86.5	0.63	Inf	-	$1.99	2,182,656
Res | Ground Source Heat Pump	Air Source Heat Pump <= 14 SEER, 8.2 HSPF	Space Heating and Cooling	R_Manufactured Homes	ROB	Ground Source Heat Pump	20	$11,916.44	3548.6	0.0	0.20	$0.22	8	Inf	-
Res | Ground Source Heat Pump	Air Source Heat Pump <= 14 SEER, 8.2 HSPF	Space Heating and Cooling	R_Single Family	ROB	Ground Source Heat Pump	20	$14,970.83	4458.2	0.0	0.48	$0.21	451	Inf	-
Res | Heat Pump - Fuel Switch - MF	Air Source Heat Pump <= 14 SEER, 8.2 HSPF	Space Heating	R_Multi Family	NEW	Heat Pump	20	$1,240.28	7738.2	-884.4	0.25	$0.14	2,156	Inf	(229,561)
Res | Heat Pump - Fuel Switch - SF	Air Source Heat Pump <= 14 SEER, 8.2 HSPF	Space Heating	R_Single Family	ROB	Heat Pump	20	$1,240.28	8548.9	-884.4	0.09	$0.12	52	Inf	-
Res | Heat Pump Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Manufactured Homes	ROB	Dryers	12	$756.16	428.5	0.0	0.64	$0.16	1,776	Inf	-
Res | Heat Pump Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Multi Family	ROB	Dryers	12	$756.16	428.5	0.0	0.64	$0.16	5,855	Inf	-
Res | Heat Pump Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Single Family	ROB	Dryers	12	$756.16	428.5	0.0	0.64	$0.16	11,593	Inf	-
Res | Heat Pump Water Heater	RTF Market Standard Heat Pump Water Heater - EF 1.99	Hot Water	R_Manufactured Homes	ROB	electric water heater	10	$1,715.21	2490.3	0.0	0.85	$0.06	978	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | Heat Pump Water Heater	RTF Market Standard Heat Pump Water Heater - EF 1.99	Hot Water	R_Multi Family	ROB	electric water heater	10	$1,715.21	2490.3	0.0	0.50	$0.06	3,998	Inf	-
Res | Heat Pump Water Heater	RTF Market Standard Heat Pump Water Heater - EF 1.99	Hot Water	R_Single Family	ROB	electric water heater	10	$1,715.21	2490.3	0.0	0.85	$0.06	49,970	Inf	-
Res | High Efficiency Boiler	Standard Boiler	Space Heating	R_Single Family	ROB	Boilers	26.6	$3,075.80	0.0	157.1	0.91	Inf	-	$1.13	2,914,431
Res | High Efficiency Freezer	RTF Market Standard Freezer	Appliances	R_Manufactured Homes	ROB	Refrigerators	20	$77.29	32.0	0.0	0.70	$0.16	328	Inf	-
Res | High Efficiency Freezer	RTF Market Standard Freezer	Appliances	R_Multi Family	ROB	Refrigerators	20	$77.29	32.0	0.0	0.70	$0.16	185	Inf	-
Res | High Efficiency Freezer	RTF Market Standard Freezer	Appliances	R_Single Family	ROB	Refrigerators	20	$77.29	32.0	0.0	0.70	$0.16	3,269	Inf	-
Res | High Efficiency Furnace Replacement	Standard Gas Furnace, AFUE 80%	Space Heating	R_Manufactured Homes	ROB	Furnace	20	$2,232.12	0.0	165.8	0.81	Inf	-	$1.01	478,395
Res | High Efficiency Furnace Replacement	Standard Gas Furnace, AFUE 80%	Space Heating	R_Multi Family	ROB	Furnace	20	$2,232.12	0.0	165.8	0.81	Inf	-	$1.01	705,300
Res | High Efficiency Furnace Replacement	Standard Gas Furnace, AFUE 80%	Space Heating	R_Single Family	ROB	Furnace	20	$2,232.12	0.0	165.8	0.81	Inf	-	$1.01	18,361,680
Res | High Efficiency Refrigerator	RTF Market Baseline Refrigerator	Appliances	R_Manufactured Homes	ROB	Refrigerators	17	$157.18	39.0	0.0	0.70	$0.29	1,544	Inf	-
Res | High Efficiency Refrigerator	RTF Market Baseline Refrigerator	Appliances	R_Multi Family	ROB	Refrigerators	17	$157.18	39.0	0.0	0.70	$0.29	5,039	Inf	-
Res | High Efficiency Refrigerator	RTF Market Baseline Refrigerator	Appliances	R_Single Family	ROB	Refrigerators	17	$157.18	39.0	0.0	0.70	$0.29	15,947	Inf	-
Res | High Efficiency Windows - Gas and Electric	U-value = 0.30 (WA Code)	Space Heating and Cooling	R_Manufactured Homes	ROB	home	15	$1,498.73	541.2	7.6	0.72	$0.20	17,864	$15.69	181,234
Res | High Efficiency Windows - Gas and Electric	U-value = 0.30 (WA Code)	Space Heating and Cooling	R_Multi Family	ROB	home	15	$999.16	364.2	8.5	0.72	$0.17	47,603	$9.18	797,464
Res | High Efficiency Windows - Gas and Electric	U-value = 0.30 (WA Code)	Space Heating and Cooling	R_Single Family	ROB	home	15	$1,998.31	180.1	48.0	0.72	$0.79	57,470	$3.49	11,055,875
Res | Home Energy Reports, Electric & Gas ST, NEW	No Home Energy Report	Whole Building/House	R_Manufactured Homes	NEW	base kWh consumed	1	$0.00	0.0	0.0	1.00	$0.05	545	-$0.52	8,159
Res | Home Energy Reports, Electric & Gas ST, NEW	No Home Energy Report	Whole Building/House	R_Multi Family	NEW	base kWh consumed	1	$0.00	0.0	0.0	1.00	$0.09	5,716	$1.92	155,061

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | Home Energy Reports, Electric & Gas ST, NEW	No Home Energy Report	Whole Building/House	R_Single Family	NEW	base kWh consumed	1	$0.00	0.0	0.0	1.00	$0.03	16,378	-$0.13	473,115
Res | Home Energy Reports, Electric & Gas ST, RET	No Home Energy Report	Whole Building/House	R_Manufactured Homes	RET	base kWh consumed	1	$0.00	0.0	0.0	1.00	$0.05	5,125	-$0.06	92,273
Res | Home Energy Reports, Electric & Gas ST, RET	No Home Energy Report	Whole Building/House	R_Multi Family	RET	base kWh consumed	1	$0.00	0.0	0.0	1.00	$0.09	11,815	$1.94	335,540
Res | Home Energy Reports, Electric & Gas ST, RET	No Home Energy Report	Whole Building/House	R_Single Family	RET	base kWh consumed	1	$0.00	0.0	0.0	1.00	$0.03	49,601	-$0.08	1,485,234
Res | Home Energy Reports, Electric Only ST, NEW	No Home Energy Report	Whole Building/House	R_Manufactured Homes	NEW	kWh consumed	1	$0.00	0.0	0.0	1.00	$0.04	887	Inf	-
Res | Home Energy Reports, Electric Only ST, NEW	No Home Energy Report	Whole Building/House	R_Multi Family	NEW	kWh consumed	1	$0.00	0.0	0.0	1.00	$0.07	9,293	Inf	-
Res | Home Energy Reports, Electric Only ST, NEW	No Home Energy Report	Whole Building/House	R_Single Family	NEW	kWh consumed	1	$0.00	0.0	0.0	1.00	$0.04	26,624	Inf	-
Res | Home Energy Reports, Electric Only ST, RET	No Home Energy Report	Whole Building/House	R_Manufactured Homes	RET	kWh consumed	1	$0.00	0.0	0.0	1.00	$0.04	8,332	Inf	-
Res | Home Energy Reports, Electric Only ST, RET	No Home Energy Report	Whole Building/House	R_Multi Family	RET	kWh consumed	1	$0.00	0.0	0.0	1.00	$0.07	19,206	Inf	-
Res | Home Energy Reports, Electric Only ST, RET	No Home Energy Report	Whole Building/House	R_Single Family	RET	kWh consumed	1	$0.00	0.0	0.0	1.00	$0.04	80,634	Inf	-
Res | Home Energy Reports, Gas Only ST, NEW	No Home Energy Report	Whole Building/House	R_Manufactured Homes	NEW	therms consumed	1	$0.02	0.0	0.0	1.00	Inf	-	$2.16	10,174
Res | Home Energy Reports, Gas Only ST, NEW	No Home Energy Report	Whole Building/House	R_Multi Family	NEW	therms consumed	1	$0.03	0.0	0.0	1.00	Inf	-	$2.36	200,360
Res | Home Energy Reports, Gas Only ST, NEW	No Home Energy Report	Whole Building/House	R_Single Family	NEW	therms consumed	1	$0.01	0.0	0.0	1.00	Inf	-	$1.30	588,806
Res | Home Energy Reports, Gas Only ST, RET	No Home Energy Report	Whole Building/House	R_Manufactured Homes	RET	therms consumed	1	$0.02	0.0	0.0	1.00	Inf	-	$2.16	123,941

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | Home Energy Reports, Gas Only ST, RET	No Home Energy Report	Whole Building/House	R_Multi Family	RET	therms consumed	1	$0.03	0.0	0.0	1.00	Inf	-	$2.36	450,965
Res | Home Energy Reports, Gas Only ST, RET	No Home Energy Report	Whole Building/House	R_Single Family	RET	therms consumed	1	$0.01	0.0	0.0	1.00	Inf	-	$1.30	1,996,154
Res | Indoor Fixture (hard wired, pin-based)	Incandescent Bulb 27 Watt	Lighting	R_Manufactured Homes	ROB	Lamps	20	$23.98	23.6	0.0	1.00	$0.06	5,354	Inf	-
Res | Indoor Fixture (hard wired, pin-based)	Incandescent Bulb 27 Watt	Lighting	R_Multi Family	ROB	Lamps	20	$23.98	23.6	0.0	0.99	$0.06	18,090	Inf	-
Res | Indoor Fixture (hard wired, pin-based)	Incandescent Bulb 27 Watt	Lighting	R_Single Family	ROB	Lamps	20	$23.98	23.6	0.0	0.99	$0.06	47,324	Inf	-
Res | Indoor Fluorescents T8	T12 Fluorescents	Lighting	R_Manufactured Homes	RET	Lamps	15	$54.02	10.8	-0.2	0.76	$0.42	1,813	Inf	(12,921)
Res | Indoor Fluorescents T8	T12 Fluorescents	Lighting	R_Multi Family	RET	Lamps	15	$54.02	10.8	-0.2	0.60	$0.42	2,521	Inf	(17,960)
Res | Indoor Fluorescents T8	T12 Fluorescents	Lighting	R_Single Family	RET	Lamps	15	$54.02	10.8	-0.2	0.72	$0.42	25,985	Inf	(185,156)
Res | Integrated Space and Water Heating	Gas furnace, Gas water heater (55 gal.)	Space Heating	R_Manufactured Homes	NEW	heating system	20	$6,234.74	0.0	323.8	0.10	Inf	-	$1.44	356
Res | Integrated Space and Water Heating	Gas furnace, Gas water heater (55 gal.)	Space Heating	R_Manufactured Homes	ROB	heating system	20	$6,234.74	0.0	323.8	0.10	Inf	-	$1.44	2,171
Res | Integrated Space and Water Heating	Gas furnace, Gas water heater (55 gal.)	Space Heating	R_Multi Family	NEW	heating system	20	$6,234.74	0.0	323.8	0.10	Inf	-	$1.44	17,646
Res | Integrated Space and Water Heating	Gas furnace, Gas water heater (55 gal.)	Space Heating	R_Multi Family	ROB	heating system	20	$6,234.74	0.0	323.8	0.10	Inf	-	$1.44	23,646
Res | Integrated Space and Water Heating	Gas furnace, Gas water heater (55 gal.)	Space Heating	R_Single Family	NEW	heating system	20	$6,234.74	0.0	323.8	0.10	Inf	-	$1.44	775,301
Res | Integrated Space and Water Heating	Gas furnace, Gas water heater (55 gal.)	Space Heating	R_Single Family	ROB	heating system	20	$6,234.74	0.0	323.8	0.10	Inf	-	$1.44	1,522,382
Res | LED (General Service Lamps)	Incandescent - EISA Standard	Lighting	R_Manufactured Homes	ROB	Lamps	12	$0.00	1.4	0.0	0.53	$0.02	14,493	Inf	-
Res | LED (General Service Lamps)	Incandescent - EISA Standard	Lighting	R_Multi Family	ROB	Lamps	12	$0.00	1.4	0.0	0.47	$0.02	43,963	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | LED (General Service Lamps)	Incandescent - EISA Standard	Lighting	R_Single Family	ROB	Lamps	12	$0.00	1.4	0.0	0.89	$0.02	217,856	Inf	-
Res | LED (Reflector)	Mixed Market Incandescent Bulb/Halogen Bulb	Lighting	R_Manufactured Homes	ROB	Lamps	12	$0.00	3.7	0.0	1.00	$0.02	401	Inf	-
Res | LED (Reflector)	Mixed Market Incandescent Bulb/Halogen Bulb	Lighting	R_Multi Family	ROB	Lamps	12	$0.00	3.7	0.0	0.78	$0.02	4,731	Inf	-
Res | LED (Reflector)	Mixed Market Incandescent Bulb/Halogen Bulb	Lighting	R_Single Family	ROB	Lamps	12	$0.00	3.7	0.0	0.72	$0.02	94,819	Inf	-
Res | LED (Specialty, Non-Reflector)	Incandescent - Specialty	Lighting	R_Manufactured Homes	ROB	Lamps	12	$0.00	1.7	0.0	0.97	$0.00	4,704	Inf	-
Res | LED (Specialty, Non-Reflector)	Incandescent - Specialty	Lighting	R_Multi Family	ROB	Lamps	12	$0.00	1.7	0.0	0.93	$0.00	15,962	Inf	-
Res | LED (Specialty, Non-Reflector)	Incandescent - Specialty	Lighting	R_Single Family	ROB	Lamps	12	$0.00	1.7	0.0	0.93	$0.00	87,053	Inf	-
Res | LED Exit Signs (Multi-Family only)	Incandescent Exit Signs	Lighting	R_Multi Family	ROB	LED exit signs	20	$127.89	264.9	0.0	0.51	$0.02	4,419	Inf	-
Res | Low-Flow Showerheads, Electric WH	2.24 GPM (RBSA Baseline: Manufactured)	Hot Water	R_Manufactured Homes	RET	Showerheads	10	$29.13	223.1	0.0	0.92	-$0.01	9,994	Inf	-
Res | Low-Flow Showerheads, Electric WH	2.24 GPM (RBSA Baseline: Manufactured)	Hot Water	R_Multi Family	RET	Showerheads	10	$29.13	223.1	0.0	0.81	-$0.01	30,218	Inf	-
Res | Low-Flow Showerheads, Electric WH	2.24 GPM (RBSA Baseline: Manufactured)	Hot Water	R_Single Family	RET	Showerheads	10	$29.13	223.1	0.0	0.81	-$0.01	41,024	Inf	-
Res | Low-Flow Showerheads, Gas WH	2.24 GPM (RBSA Baseline: Manufactured)	Hot Water	R_Manufactured Homes	RET	Showerheads	10	$29.13	0.0	9.4	0.92	Inf	-	$0.11	24,275
Res | Low-Flow Showerheads, Gas WH	2.24 GPM (RBSA Baseline: Manufactured)	Hot Water	R_Multi Family	RET	Showerheads	10	$29.13	0.0	9.4	0.81	Inf	-	$0.11	341,284
Res | Low-Flow Showerheads, Gas WH	2.24 GPM (RBSA Baseline: Manufactured)	Hot Water	R_Single Family	RET	Showerheads	10	$29.13	0.0	9.4	0.81	Inf	-	$0.11	2,183,255
Res | Outdoor Fixture (hard wired, pin-based)	Halogen Bulb 55 Watt	Lighting	R_Manufactured Homes	ROB	Lamps	20	$31.97	79.4	0.0	1.00	$0.02	201	Inf	-
Res | Outdoor Fixture (hard wired, pin-based)	Halogen Bulb 55 Watt	Lighting	R_Multi Family	ROB	Lamps	20	$31.97	79.4	0.0	1.00	$0.02	14,730	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | Outdoor Fixture (hard wired, pin-based)	Halogen Bulb 55 Watt	Lighting	R_Single Family	ROB	Lamps	20	$31.97	79.4	0.0	0.98	$0.02	36,820	Inf	-
Res | Programmable Thermostat - NEW	Manual thermostat	Space Heating and Cooling	R_Manufactured Homes	NEW	Thermostats	11	$79.93	344.9	3.8	0.42	$0.02	1,013	$2.18	5,115
Res | Programmable Thermostat - NEW	Manual thermostat	Space Heating and Cooling	R_Multi Family	NEW	Thermostats	11	$79.93	356.8	6.3	0.42	$0.00	18,863	$1.15	119,493
Res | Programmable Thermostat - NEW	Manual thermostat	Space Heating and Cooling	R_Single Family	NEW	Thermostats	11	$79.93	93.3	17.9	0.36	$0.03	6,412	$0.43	298,106
Res | Programmable Thermostat - RET	Manual thermostat	Space Heating and Cooling	R_Manufactured Homes	RET	Thermostats	11	$159.87	344.9	3.8	0.42	$0.04	9,515	$4.43	48,069
Res | Programmable Thermostat - RET	Manual thermostat	Space Heating and Cooling	R_Multi Family	RET	Thermostats	11	$159.87	356.8	6.3	0.42	$0.02	38,986	$2.50	246,970
Res | Programmable Thermostat - RET	Manual thermostat	Space Heating and Cooling	R_Single Family	RET	Thermostats	11	$159.87	93.3	17.9	0.36	$0.11	19,419	$0.90	902,845
Res | Refrigerator Recycling	Existing Non-Efficient Refrigerator	Appliances	R_Manufactured Homes	RET	Refrigerators	1	$0.00	584.0	0.0	0.01	-$0.01	128	Inf	-
Res | Refrigerator Recycling	Existing Non-Efficient Refrigerator	Appliances	R_Multi Family	RET	Refrigerators	1	$0.00	584.0	0.0	0.01	-$0.01	348	Inf	-
Res | Refrigerator Recycling	Existing Non-Efficient Refrigerator	Appliances	R_Single Family	RET	Refrigerators	1	$0.00	584.0	0.0	0.01	-$0.01	2,037	Inf	-
Res | Room AC Replacement	Federal Standard 2014 Room AC - CEER 10.9 (8,000-13,999 Btuh)	Space Cooling	R_Manufactured Homes	ROB	RAC	5	$39.97	2.0	0.0	1.00	$3.64	10	Inf	-
Res | Room AC Replacement	Federal Standard 2014 Room AC - CEER 10.9 (8,000-13,999 Btuh)	Space Cooling	R_Multi Family	ROB	RAC	5	$39.97	2.0	0.0	1.00	$3.64	84	Inf	-
Res | Room AC Replacement	Federal Standard 2014 Room AC - CEER 10.9 (8,000-13,999 Btuh)	Space Cooling	R_Single Family	ROB	RAC	5	$39.97	2.0	0.0	0.68	$3.64	61	Inf	-
Res | Smart Thermostat - NEW, Manual Baseline	Manual Thermostat	Space Heating and Cooling	R_Manufactured Homes	NEW	Thermostats	11	$319.73	599.8	4.2	0.42	$0.05	0	$7.09	2
Res | Smart Thermostat - NEW, Manual Baseline	Manual Thermostat	Space Heating and Cooling	R_Multi Family	NEW	Thermostats	11	$319.73	797.2	7.0	0.42	$0.03	13	$1.83	84
Res | Smart Thermostat - NEW, Manual Baseline	Manual Thermostat	Space Heating and Cooling	R_Single Family	NEW	Thermostats	11	$319.73	308.5	19.9	0.36	$0.08	15	$1.00	687

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | Smart Thermostat - NEW, Programmable Baseline	Programmable Thermostat	Space Heating and Cooling	R_Manufactured Homes	NEW	Thermostats	11	$239.80	254.9	0.4	1.00	$0.09	1,021	$51.24	1,213
Res | Smart Thermostat - NEW, Programmable Baseline	Programmable Thermostat	Space Heating and Cooling	R_Multi Family	NEW	Thermostats	11	$239.80	440.4	0.7	1.00	$0.05	31,745	$7.96	36,404
Res | Smart Thermostat - NEW, Programmable Baseline	Programmable Thermostat	Space Heating and Cooling	R_Single Family	NEW	Thermostats	11	$239.80	215.2	2.0	1.00	$0.11	26,855	$6.19	179,005
Res | Smart Thermostat - RET, Manual Baseline	Manual Thermostat	Space Heating and Cooling	R_Manufactured Homes	RET	Thermostats	11	$399.66	599.8	4.2	0.42	$0.06	1,128	$9.12	5,698
Res | Smart Thermostat - RET, Manual Baseline	Manual Thermostat	Space Heating and Cooling	R_Multi Family	RET	Thermostats	11	$399.66	797.2	7.0	0.42	$0.04	13,506	$3.04	85,561
Res | Smart Thermostat - RET, Manual Baseline	Manual Thermostat	Space Heating and Cooling	R_Single Family	RET	Thermostats	11	$399.66	308.5	19.9	0.36	$0.11	6,800	$1.43	316,142
Res | Smart Thermostat - RET, Programmable Baseline	Programmable Thermostat	Space Heating and Cooling	R_Manufactured Homes	RET	Thermostats	11	$399.66	254.9	0.4	1.00	$0.15	9,590	$91.75	11,400
Res | Smart Thermostat - RET, Programmable Baseline	Programmable Thermostat	Space Heating and Cooling	R_Multi Family	RET	Thermostats	11	$399.66	440.4	0.7	1.00	$0.09	65,610	$32.26	75,240
Res | Smart Thermostat - RET, Programmable Baseline	Programmable Thermostat	Space Heating and Cooling	R_Single Family	RET	Thermostats	11	$399.66	215.2	2.0	1.00	$0.18	81,334	$14.75	542,134
Res | Solar Water Heater	RTF Market Standard Heat Pump Water Heater - EF 1.99	Hot Water	R_Manufactured Homes	ROB	water heater	20	$12,579.85	2306.9	0.0	0.30	$0.37	35	Inf	-
Res | Solar Water Heater	RTF Market Standard Heat Pump Water Heater - EF 1.99	Hot Water	R_Multi Family	ROB	water heater	20	$12,579.85	2306.9	0.0	0.30	$0.37	143	Inf	-
Res | Solar Water Heater	RTF Market Standard Heat Pump Water Heater - EF 1.99	Hot Water	R_Single Family	ROB	water heater	20	$12,579.85	2306.9	0.0	0.10	$0.37	1,784	Inf	-
Res | Stand-Alone Freezer - Removal	Existing Non-Efficient Freezer	Appliances	R_Manufactured Homes	RET	Freezers	1	$0.00	313.0	0.0	1.00	-$0.01	1,413	Inf	-

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | Stand-Alone Freezer - Removal	Existing Non-Efficient Freezer	Appliances	R_Multi Family	RET	Freezers	1	$0.00	313.0	0.0	1.00	-$0.01	2,316	Inf	-
Res | Stand-Alone Freezer - Removal	Existing Non-Efficient Freezer	Appliances	R_Single Family	RET	Freezers	1	$0.00	313.0	0.0	1.00	-$0.01	19,251	Inf	-
Res | Tankless Water Heater - Fuel Switch - MF	Electric Water Heater, 55 gal.	Hot Water	R_Multi Family	NEW	water heater	15	$2,784.85	4598.8	-127.3	0.13	$0.06	24,327	Inf	(627,289)
Res | Tankless Water Heater - Fuel Switch - SF	Electric Water Heater, 55 gal.	Hot Water	R_Single Family	ROB	water heater	15	$2,784.85	4598.8	-127.3	0.19	$0.06	73,586	Inf	-
Res | Wall Insulation - Gas and Electric	R-21 (WA Code - Single Family and Manufactured Homes Only)	Space Heating and Cooling	R_Manufactured Homes	RET	sq. ft	20	$2.36	3.8	0.0	0.15	$0.02	40,186	$5.22	155,394
Res | Wall Insulation - Gas and Electric	R-21 (WA Code - Single Family and Manufactured Homes Only)	Space Heating and Cooling	R_Single Family	RET	sq. ft	20	$2.36	0.9	0.1	0.04	$0.12	36,647	$1.58	2,762,961
Res | Water Heater Tank Blanket/Insulation, Electric WH	No Tank Insulation	Hot Water	R_Manufactured Homes	RET	Water Heaters	7.5	$36.77	147.1	0.0	0.10	$0.02	764	Inf	-
Res | Water Heater Tank Blanket/Insulation, Electric WH	No Tank Insulation	Hot Water	R_Multi Family	RET	Water Heaters	7.5	$36.77	147.1	0.0	0.05	$0.02	1,221	Inf	-
Res | Water Heater Tank Blanket/Insulation, Electric WH	No Tank Insulation	Hot Water	R_Single Family	RET	Water Heaters	7.5	$36.77	147.1	0.0	0.10	$0.02	2,944	Inf	-
Res | Water Heater Tank Blanket/Insulation, Gas WH	No Tank Insulation	Hot Water	R_Manufactured Homes	RET	Water Heaters	7.5	$36.77	0.0	7.1	0.10	Inf	-	$0.52	2,101
Res | Water Heater Tank Blanket/Insulation, Gas WH	No Tank Insulation	Hot Water	R_Multi Family	RET	Water Heaters	7.5	$36.77	0.0	7.1	0.05	Inf	-	$0.52	15,615
Res | Water Heater Tank Blanket/Insulation, Gas WH	No Tank Insulation	Hot Water	R_Single Family	RET	Water Heaters	7.5	$36.77	0.0	7.1	0.10	Inf	-	$0.52	177,447

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | Water Heater Temperature Setback, Electric WH, NEW	No temperature setback	Hot Water	R_Manufactured Homes	NEW	Water Heaters	4	$0.00	39.5	0.0	0.45	$0.00	99	Inf	-
Res | Water Heater Temperature Setback, Electric WH, NEW	No temperature setback	Hot Water	R_Multi Family	NEW	Water Heaters	4	$0.00	39.5	0.0	0.79	$0.00	2,542	Inf	-
Res | Water Heater Temperature Setback, Electric WH, NEW	No temperature setback	Hot Water	R_Single Family	NEW	Water Heaters	4	$0.00	39.5	0.0	0.45	$0.00	1,185	Inf	-
Res | Water Heater Temperature Setback, Electric WH, RET	No temperature setback	Hot Water	R_Manufactured Homes	RET	Water Heaters	4	$0.00	39.5	0.0	0.45	$0.00	920	Inf	-
Res | Water Heater Temperature Setback, Electric WH, RET	No temperature setback	Hot Water	R_Multi Family	RET	Water Heaters	4	$0.00	39.5	0.0	0.79	$0.00	5,191	Inf	-
Res | Water Heater Temperature Setback, Electric WH, RET	No temperature setback	Hot Water	R_Single Family	RET	Water Heaters	4	$0.00	39.5	0.0	0.45	$0.00	3,548	Inf	-
Res | Water Heater Temperature Setback, Gas WH, NEW	No temperature setback	Hot Water	R_Manufactured Homes	NEW	Water Heaters	4	$0.00	0.0	1.7	0.45	Inf	-	$0.00	241
Res | Water Heater Temperature Setback, Gas WH, NEW	No temperature setback	Hot Water	R_Multi Family	NEW	Water Heaters	4	$0.00	0.0	1.7	0.79	Inf	-	$0.00	28,797
Res | Water Heater Temperature Setback, Gas WH, NEW	No temperature setback	Hot Water	R_Single Family	NEW	Water Heaters	4	$0.00	0.0	1.7	0.45	Inf	-	$0.00	63,289
Res | Water Heater Temperature Setback, Gas WH, RET	No temperature setback	Hot Water	R_Manufactured Homes	RET	Water Heaters	4	$0.00	0.0	1.7	0.45	Inf	-	$0.00	2,242
Res | Water Heater Temperature Setback, Gas WH, RET	No temperature setback	Hot Water	R_Multi Family	RET	Water Heaters	4	$0.00	0.0	1.7	0.79	Inf	-	$0.00	58,816
Res | Water Heater Temperature Setback, Gas WH, RET	No temperature setback	Hot Water	R_Single Family	RET	Water Heaters	4	$0.00	0.0	1.7	0.45	Inf	-	$0.00	189,420

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Res | Window Film - Gas and Electric	Single or Double pane window, no solar film, screen or low-e coating	Space Heating and Cooling	R_Manufactured Homes	RET	home	20	$1,079.09	33.8	0.5	0.95	$2.20	1,937	$164.51	20,155
Res | Window Film - Gas and Electric	Single or Double pane window, no solar film, screen or low-e coating	Space Heating and Cooling	R_Multi Family	RET	home	20	$719.39	22.8	0.5	0.98	$2.15	5,290	$98.48	90,897
Res | Window Film - Gas and Electric	Single or Double pane window, no solar film, screen or low-e coating	Space Heating and Cooling	R_Single Family	RET	home	20	$1,438.79	11.3	3.1	0.93	$8.82	6,076	$34.92	1,198,824

Measure Name	Baseline Assumption	End Use Category	Customer Segment	Replace-ment Type	Unit Basis	Life-time (years)	Increm-ental Cost ($/Unit)	Electric Energy Savings (kWh/year/unit)	Gas Energy Savings (Therms/ year/unit)	Measure Applica-bility (dimensio-nless)	Electric TRC Net LCOE ($/kWh, real 2018 dollars)	2037 Cumulative Achievable Technical Electric Savings Potential (MWh)	Gas TRC Net LCOE ($/Therm, real 2018 dollars)	2037 Cumulative Achievable Technical Gas Savings Potential (Therms)
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Food Service	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	566	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Grocery	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	392	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Hospital	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	973	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Lodging	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	678	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Office	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	7,991	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Other	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	11,948	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Retail	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	6,569	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Schools	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	2,086	Inf	-

Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_University	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	2,237	Inf	-
Com | Advanced Power Strips	No Advanced Power Strip	Electronics and Office Equipment	C_Warehouse	ROB	Power Strip	5	$41.56	48.9	0.0	0.80	$0.15	6,939	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_Grocery	ROB	Ton	20	$275.54	42.9	0.0	0.85	$0.45	1	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_Hospital	ROB	Ton	20	$275.54	67.8	0.0	0.85	$0.28	195	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_Lodging	ROB	Ton	20	$275.54	39.0	0.0	0.85	$0.49	23	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_Office	ROB	Ton	20	$275.54	46.1	0.0	0.85	$0.42	2,688	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_Other	ROB	Ton	20	$275.54	53.4	0.0	0.85	$0.36	572	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_Schools	ROB	Ton	20	$275.54	34.4	0.0	0.85	$0.56	106	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_University	ROB	Ton	20	$275.54	34.4	0.0	0.85	$0.56	59	Inf	-
Com | Air Cooled Chillers	Air cooled chiller 10.1 EER, 13.7 SEER	Space Cooling	C_Warehouse	ROB	Ton	20	$275.54	22.9	0.0	0.85	$0.84	5	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Food Service	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.44	$0.03	170	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Grocery	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.67	$0.03	5,982	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Hospital	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.01	$0.03	0	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Lodging	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.01	$0.03	0	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Office	RET	Linear foot of display case	8	$74.98	265.0	0.0	1.00	$0.03	17	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Other	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.01	$0.03	0	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Retail	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.55	$0.03	2,845	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Schools	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.75	$0.03	107	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_University	RET	Linear foot of display case	8	$74.98	265.0	0.0	0.75	$0.03	29	Inf	-
Com | Anti-Sweat Heater Controls	Anti-sweat heater for vertical display case doors	Non-Res Refrigeration	C_Warehouse	RET	Linear foot of display case	8	$74.98	265.0	0.0	1.00	$0.03	85	Inf	-

Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Food Service	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	0.84	$65,535.00	-	$0.32	3,735
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Grocery	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	1.00	$65,535.00	-	$0.32	2,731
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Hospital	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	0.89	$65,535.00	-	$0.32	25,701
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Lodging	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	0.89	$65,535.00	-	$0.32	102,969
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Office	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	0.89	$65,535.00	-	$0.32	40,409
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Other	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	0.89	$65,535.00	-	$0.32	140,861
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Retail	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	1.00	$65,535.00	-	$0.32	1,225
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Schools	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	0.76	$65,535.00	-	$0.32	50,888
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_University	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	0.76	$65,535.00	-	$0.32	17,781
Com | Boiler - SHW	Existing hot water heating system or existing equipment below ASHRAE 2010 standards	Hot Water	C_Warehouse	ROB	kBtu/h capacity	20	$4.60	0.0	1.1	1.00	$65,535.00	-	$0.32	9,964

Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Food Service	RET	kWh saved	15	$0.62	0.0	0.0	0.32	$1.28	3,291	$5.59	650,472
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Grocery	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.57	816	$22.33	40,126
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Hospital	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.45	5,945	$10.67	435,535
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Lodging	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.45	1,937	$9.65	221,485
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Office	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.20	36,238	$21.39	1,385,791
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Other	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.58	16,344	$13.36	1,353,041
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Retail	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.17	19,870	$18.69	865,984
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Schools	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.15	5,027	$11.12	370,607
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_University	RET	kWh saved	15	$0.62	0.0	0.0	0.32	$0.99	1,608	$3.15	408,054
Com | Building Automation Systems - kWh	No EMS	Whole Building/House	C_Warehouse	RET	kWh saved	15	$0.61	0.0	0.0	0.32	$1.20	625	$25.14	20,274
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Food Service	RET	therm saved	15	$0.68	0.4	0.1	0.31	$65,535.00	-	$0.54	692,224
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Grocery	RET	therm saved	15	$1.33	1.4	0.1	0.31	$65,535.00	-	$1.07	32,292
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Hospital	RET	therm saved	15	$0.88	0.7	0.1	0.31	$65,535.00	-	$0.70	449,106
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Lodging	RET	therm saved	15	$0.84	0.6	0.1	0.31	$65,535.00	-	$0.67	131,574
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Office	RET	therm saved	15	$1.59	1.8	0.1	0.31	$65,535.00	-	$1.27	849,060
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Other	RET	therm saved	15	$0.98	0.9	0.1	0.31	$65,535.00	-	$0.78	1,103,773
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Retail	RET	therm saved	15	$1.45	1.6	0.1	0.31	$65,535.00	-	$1.16	658,363

Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Schools	RET	therm saved	15	$1.04	1.0	0.1	0.31	$65,535.00	-	$0.83	320,081
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_University	RET	therm saved	15	$0.58	0.2	0.1	0.31	$65,535.00	-	$0.47	415,172
Com | Building Automation Systems - therm	No EMS	Whole Building/House	C_Warehouse	RET	therm saved	15	$1.79	2.2	0.1	0.31	$65,535.00	-	$1.43	16,719
Com | Centrifugal Chillers	Centrifugal Chiller Code Avg Eff: 0.60 FLV, 0.54 IPLV	Space Cooling	C_Hospital	ROB	Ton	20	$274.30	33.5	0.0	0.85	$0.57	48	Inf	-
Com | Centrifugal Chillers	Centrifugal Chiller Code Avg Eff: 0.60 FLV, 0.54 IPLV	Space Cooling	C_Lodging	ROB	Ton	20	$274.30	19.2	0.0	0.85	$1.00	6	Inf	-
Com | Centrifugal Chillers	Centrifugal Chiller Code Avg Eff: 0.60 FLV, 0.54 IPLV	Space Cooling	C_Office	ROB	Ton	20	$274.30	22.8	0.0	0.85	$0.84	624	Inf	-
Com | Centrifugal Chillers	Centrifugal Chiller Code Avg Eff: 0.60 FLV, 0.54 IPLV	Space Cooling	C_Other	ROB	Ton	20	$274.30	26.4	0.0	0.85	$0.73	245	Inf	-
Com | Centrifugal Chillers	Centrifugal Chiller Code Avg Eff: 0.60 FLV, 0.54 IPLV	Space Cooling	C_Schools	ROB	Ton	20	$274.30	17.0	0.0	0.85	$1.13	15	Inf	-
Com | Centrifugal Chillers	Centrifugal Chiller Code Avg Eff: 0.60 FLV, 0.54 IPLV	Space Cooling	C_University	ROB	Ton	20	$274.30	17.0	0.0	0.85	$1.13	8	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Food Service	ROB	Fixture	20	$47.96	398.4	0.0	0.79	$0.00	396	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Grocery	ROB	Fixture	20	$47.96	398.4	0.0	0.48	$0.00	108	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Hospital	ROB	Fixture	20	$47.96	398.4	0.0	0.72	$0.00	277	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Lodging	ROB	Fixture	20	$47.96	398.4	0.0	0.57	$0.00	88	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Office	ROB	Fixture	20	$47.96	398.4	0.0	0.66	$0.00	6,417	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Other	ROB	Fixture	20	$47.96	398.4	0.0	0.76	$0.00	548	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Retail	ROB	Fixture	20	$47.96	398.4	0.0	0.75	$0.00	1,366	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Schools	ROB	Fixture	20	$47.96	398.4	0.0	0.70	$0.00	228	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_University	ROB	Fixture	20	$47.96	398.4	0.0	0.70	$0.00	301	Inf	-
Com | Ceramic Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Warehouse	ROB	Fixture	20	$47.96	398.4	0.0	0.80	$0.00	1,219	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Food Service	ROB	Fixture	18	$0.00	0.0	0.0	0.54	$0.01	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Grocery	ROB	Fixture	18	$0.00	0.0	0.0	0.47	$0.01	-	Inf	-

Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Hospital	ROB	Fixture	18	$0.00	0.0	0.0	0.08	$0.01	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Lodging	ROB	Fixture	18	$0.00	0.0	0.0	0.13	$0.02	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Office	ROB	Fixture	18	$0.00	0.0	0.0	0.18	$0.01	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Other	ROB	Fixture	18	$0.00	0.0	0.0	0.32	$0.02	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Retail	ROB	Fixture	18	$0.00	0.0	0.0	0.10	$0.01	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Schools	ROB	Fixture	18	$0.00	0.0	0.0	0.10	$0.02	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_University	ROB	Fixture	18	$0.00	0.0	0.0	0.16	$0.02	-	Inf	-
Com | CFL Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Warehouse	ROB	Fixture	18	$0.00	0.0	0.0	0.12	$0.01	-	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Food Service	NEW	Ton	20	$1,032.70	65.3	0.0	0.95	$1.10	120	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Food Service	ROB	Ton	20	$1,032.70	65.3	0.0	0.95	$1.10	222	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Grocery	NEW	Ton	20	$1,032.70	37.8	0.0	0.95	$1.91	23	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Grocery	ROB	Ton	20	$1,032.70	37.8	0.0	0.95	$1.91	38	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Hospital	NEW	Ton	20	$1,032.70	59.7	0.0	0.95	$1.20	131	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Hospital	ROB	Ton	20	$1,032.70	59.7	0.0	0.95	$1.20	165	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Lodging	NEW	Ton	20	$1,032.70	34.3	0.0	0.95	$2.10	11	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Lodging	ROB	Ton	20	$1,032.70	34.3	0.0	0.95	$2.10	19	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Office	NEW	Ton	20	$1,032.70	40.6	0.0	0.95	$1.78	5,237	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Office	ROB	Ton	20	$1,032.70	40.6	0.0	0.95	$1.78	5,124	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Other	NEW	Ton	20	$1,032.70	47.1	0.0	0.95	$1.53	291	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Other	ROB	Ton	20	$1,032.70	47.1	0.0	0.95	$1.53	362	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Retail	NEW	Ton	20	$1,032.70	47.7	0.0	0.95	$1.51	116	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Retail	ROB	Ton	20	$1,032.70	47.7	0.0	0.95	$1.51	209	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Schools	NEW	Ton	20	$1,032.70	30.3	0.0	0.95	$2.38	18	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Schools	ROB	Ton	20	$1,032.70	30.3	0.0	0.95	$2.38	45	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_University	NEW	Ton	20	$1,032.70	30.3	0.0	0.95	$2.38	16	Inf	-

Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_University	ROB	Ton	20	$1,032.70	30.3	0.0	0.95	$2.38	25	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Warehouse	NEW	Ton	20	$1,032.70	20.2	0.0	0.95	$3.57	42	Inf	-
Com | Chiller-Water Side Economizer	No existing economizer	Space Cooling	C_Warehouse	ROB	Ton	20	$1,032.70	20.2	0.0	0.95	$3.57	74	Inf	-
Com | Clothes Washer_Edry,EDHW	Current Practice	Appliances	C_Other	ROB	washer	7.1	$604.03	270.3	0.0	0.60	$0.16	1,542	Inf	-
Com | Clothes Washer_Edry,GDHW	Current Practice	Appliances	C_Other	ROB	washer	7.1	$604.03	0.0	0.4	0.60	$65,535.00	-	$122.10	28
Com | Clothes Washer_Gdry,EDHW	Current Practice	Appliances	C_Other	ROB	washer	7.1	$604.03	23.4	0.0	0.60	$1.96	34	Inf	(0)
Com | Clothes Washer_Gdry,GDHW	Current Practice	Appliances	C_Other	ROB	washer	7.1	$604.03	-513.8	16.1	0.60	$65,535.00	(14)	$6.02	285
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Food Service	ROB	Ice maker	10	$893.65	27.2	0.0	0.29	$3.47	11	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Grocery	ROB	Ice maker	10	$2,374.00	0.0	0.0	0.46	$65,535.00	-	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Hospital	ROB	Ice maker	10	$893.65	28.8	0.0	0.25	$3.28	6	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Lodging	ROB	Ice maker	10	$498.78	32.0	0.0	0.25	$1.64	6	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Office	ROB	Ice maker	10	$473.20	13.9	0.0	0.09	$3.60	20	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Other	ROB	Ice maker	10	$473.20	12.8	0.0	0.02	$3.92	4	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Retail	ROB	Ice maker	10	$473.20	12.1	0.0	0.02	$4.13	3	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Schools	ROB	Ice maker	10	$473.20	12.8	0.0	0.07	$3.92	0	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_University	ROB	Ice maker	10	$893.65	28.8	0.0	0.25	$3.28	7	Inf	-
Com | Commercial Ice Makers	CEE Tier 2 ice machine (cube/nugget type)	Non-Res Refrigeration	C_Warehouse	ROB	Ice maker	10	$473.20	12.8	0.0	0.03	$3.92	2	Inf	-
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Food Service	RET	kWh saved	5	$0.44	0.1	0.0	0.39	$0.61	16,281	$8.06	904,555
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Grocery	RET	kWh saved	5	$0.38	0.1	0.0	0.39	$0.60	4,089	$27.67	56,548
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Hospital	RET	kWh saved	5	$0.40	0.1	0.0	0.39	$0.60	28,974	$14.00	596,769
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Lodging	RET	kWh saved	5	$0.40	0.1	0.0	0.39	$0.61	9,440	$12.85	303,479
Com | Comprehensive Retrocommissioning,	No Retrocommissioning	Whole Building/House	C_Office	RET	kWh saved	5	$0.38	0.1	0.0	0.39	$0.61	133,131	$27.10	1,908,232

kWh														
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Other	RET	kWh saved	5	$0.39	0.1	0.0	0.39	$0.62	81,803	$17.33	1,903,705
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Retail	RET	kWh saved	5	$0.38	0.1	0.0	0.39	$0.60	73,718	$23.86	1,204,250
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Schools	RET	kWh saved	5	$0.40	0.1	0.0	0.39	$0.62	18,560	$14.89	512,847
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_University	RET	kWh saved	5	$0.49	0.1	0.0	0.39	$0.63	7,916	$5.21	564,667
Com | Comprehensive Retrocommissioning, kWh	No Retrocommissioning	Whole Building/House	C_Warehouse	RET	kWh saved	5	$0.38	0.1	0.0	0.39	$0.61	2,308	$31.62	28,055
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Food Service	RET	therms saved	8	$8.41	1.3	0.1	0.38	$65,535.00	-	$9.92	962,616
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Grocery	RET	therms saved	8	$9.85	5.3	0.1	0.38	$65,535.00	-	$11.46	45,508
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Hospital	RET	therms saved	8	$8.84	2.5	0.1	0.38	$65,535.00	-	$10.39	615,364
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Lodging	RET	therms saved	8	$8.75	2.3	0.1	0.38	$65,535.00	-	$10.28	180,283
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Office	RET	therms saved	8	$9.78	5.1	0.1	0.38	$65,535.00	-	$11.24	1,169,155
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Other	RET	therms saved	8	$9.07	3.2	0.1	0.38	$65,535.00	-	$10.61	1,552,990
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Retail	RET	therms saved	8	$9.55	4.5	0.1	0.38	$65,535.00	-	$11.11	915,529
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Schools	RET	therms saved	8	$8.89	2.7	0.1	0.38	$65,535.00	-	$10.41	442,929
Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_University	RET	therms saved	8	$8.20	0.7	0.1	0.38	$65,535.00	-	$9.70	574,517

Com | Comprehensive Retrocommissioning, therm	No Retrocommissioning	Whole Building/House	C_Warehouse	RET	therms saved	8	$10.11	6.1	0.1	0.38	$65,535.00	-	$11.72	23,135
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Food Service	NEW	Ton	20	$326.12	165.8	0.0	0.95	$0.14	180	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Food Service	ROB	Ton	20	$326.12	165.8	0.0	0.95	$0.14	334	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Grocery	NEW	Ton	20	$326.12	96.1	0.0	0.95	$0.24	154	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Grocery	ROB	Ton	20	$326.12	96.1	0.0	0.95	$0.24	258	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Hospital	NEW	Ton	20	$326.12	151.7	0.0	0.95	$0.15	1,166	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Hospital	ROB	Ton	20	$326.12	151.7	0.0	0.95	$0.15	1,471	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Lodging	NEW	Ton	20	$326.12	87.2	0.0	0.95	$0.26	334	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Lodging	ROB	Ton	20	$326.12	87.2	0.0	0.95	$0.26	588	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Office	NEW	Ton	20	$326.12	103.2	0.0	0.95	$0.22	9,786	Inf	-

Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Office	ROB	Ton	20	$326.12	103.2	0.0	0.95	$0.22	9,576	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Other	NEW	Ton	20	$326.12	119.6	0.0	0.95	$0.19	3,166	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Other	ROB	Ton	20	$326.12	119.6	0.0	0.95	$0.19	3,947	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Retail	NEW	Ton	20	$326.12	121.2	0.0	0.95	$0.19	1,974	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Retail	ROB	Ton	20	$326.12	121.2	0.0	0.95	$0.19	3,538	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Schools	NEW	Ton	20	$326.12	77.0	0.0	0.95	$0.30	243	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Schools	ROB	Ton	20	$326.12	77.0	0.0	0.95	$0.30	612	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_University	NEW	Ton	20	$326.12	77.0	0.0	0.95	$0.30	517	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_University	ROB	Ton	20	$326.12	77.0	0.0	0.95	$0.30	806	Inf	-
Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Warehouse	NEW	Ton	20	$326.12	51.5	0.0	0.95	$0.44	725	Inf	-

Com | Direct Evaporative Pre-Cooling	Air-cooled condensers on DX units w/o evaporative pre-cooler for 1 ton of cooling capacity	Space Cooling	C_Warehouse	ROB	Ton	20	$326.12	51.5	0.0	0.95	$0.44	1,269	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Grocery	ROB	Ton	15	$700.12	54.9	0.0	0.85	$1.02	0	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Hospital	ROB	Ton	15	$700.12	86.8	0.0	0.85	$0.64	5	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Lodging	ROB	Ton	15	$700.12	114.0	0.0	0.85	$0.48	1	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Office	ROB	Ton	15	$700.12	59.1	0.0	0.85	$0.94	399	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Other	ROB	Ton	15	$700.12	155.7	0.0	0.85	$0.35	14	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Retail	ROB	Ton	15	$700.12	62.7	0.0	0.85	$0.89	0	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Schools	ROB	Ton	15	$700.12	76.3	0.0	0.85	$0.72	1	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_University	ROB	Ton	15	$700.12	76.3	0.0	0.85	$0.72	1	Inf	-
Com | Ductless Mini-Split Heat Pumps	Code Level Ductless Mini-Split Heat Pumps	Space Heating and Cooling	C_Warehouse	ROB	Ton	15	$700.12	62.6	0.0	0.85	$0.87	3	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Food Service	RET	Motor	15	$409.67	961.7	0.0	0.96	$0.03	2,131	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Grocery	RET	Motor	15	$409.67	961.7	0.0	0.66	$0.03	2,676	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Hospital	RET	Motor	15	$409.67	961.7	0.0	0.80	$0.03	397	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Lodging	RET	Motor	15	$409.67	961.7	0.0	0.57	$0.03	195	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Office	RET	Motor	15	$409.67	961.7	0.0	1.00	$0.03	790	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Other	RET	Motor	15	$409.67	961.7	0.0	1.00	$0.03	1,124	Inf	-

Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Retail	RET	Motor	15	$409.67	961.7	0.0	0.41	$0.03	312	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Schools	RET	Motor	15	$409.67	961.7	0.0	1.00	$0.03	297	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_University	RET	Motor	15	$409.67	961.7	0.0	0.75	$0.03	439	Inf	-
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Shaded pole motor for walk-in and reach-in refrigeration (low and medium temperature)	Non-Res Refrigeration	C_Warehouse	RET	Motor	15	$409.67	961.7	0.0	0.86	$0.03	2,986	Inf	-
Com | Efficient Dryer_Electric	Compact, 120V; Electric Dryer	Appliances	C_Other	ROB	dryer	7.1	$242.99	310.2	0.0	0.85	$0.06	5,801	Inf	-
Com | Efficient Dryer_Gas	Compact, 120V; Gas Dryer	Appliances	C_Other	ROB	dryer	7.1	$242.99	46.5	8.3	0.83	$0.27	214	$2.17	24,905
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Food Service	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	1,073	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Grocery	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	780	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Hospital	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	561	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Lodging	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	9	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Other	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	4,058	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Retail	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	121	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Schools	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	546	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_University	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	3,152	Inf	-
Com | Electric Combination Ovens	Standard Electric Combination Oven	Non-Res Cooking	C_Warehouse	ROB	Oven	12	$1,620.28	15086.2	0.0	0.50	$0.00	819	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Food Service	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	132	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Grocery	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	68	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Hospital	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	135	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Lodging	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	42	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Office	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	919	Inf	-

Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Other	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	563	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Retail	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	25	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_Schools	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	102	Inf	-
Com | Electric Convection Ovens	Standard Electric Convection Oven	Non-Res Cooking	C_University	ROB	Oven	12	$1,438.81	1501.0	0.0	0.50	$0.08	591	Inf	-
Com | Electric Exhaust Hood	Exhaust Hood	Non-Res Cooking	C_Food Service	RET	HP	15	$3,183.21	3348.9	0.0	0.90	$0.07	6,052	Inf	-
Com | Electric Exhaust Hood	Exhaust Hood	Non-Res Cooking	C_Grocery	RET	HP	15	$3,183.21	4196.6	0.0	0.90	$0.05	1,831	Inf	-
Com | Electric Exhaust Hood	Exhaust Hood	Non-Res Cooking	C_Hospital	RET	HP	15	$3,183.21	4196.6	0.0	0.90	$0.05	7,998	Inf	-
Com | Electric Exhaust Hood	Exhaust Hood	Non-Res Cooking	C_Lodging	RET	HP	15	$3,183.21	5530.6	0.0	0.90	$0.04	1,025	Inf	-
Com | Electric Exhaust Hood	Exhaust Hood	Non-Res Cooking	C_Other	RET	HP	15	$3,183.21	4196.6	0.0	0.90	$0.05	26,138	Inf	-
Com | Electric Exhaust Hood	Exhaust Hood	Non-Res Cooking	C_Schools	RET	HP	15	$3,183.21	3028.9	0.0	0.90	$0.07	2,134	Inf	-
Com | Electric Exhaust Hood	Exhaust Hood	Non-Res Cooking	C_University	RET	HP	15	$3,183.21	3028.9	0.0	0.90	$0.07	2,811	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_Food Service	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	269	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_Grocery	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	161	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_Hospital	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	30	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_Lodging	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	4	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_Other	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	85	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_Retail	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	50	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_Schools	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	18	Inf	-
Com | Electric Fryer	Standard Electric Fryer/Fryer Large Vat	Non-Res Cooking	C_University	ROB	Fryer	12	$1,228.75	2249.1	0.0	0.79	$0.04	9	Inf	-
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Food Service	NEW	kBtuh capacity	16.5	$0.00	478.6	-17.6	0.25	$0.01	368	Inf	(12,592)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Food Service	ROB	kBtuh capacity	16.5	$0.00	478.6	-17.6	0.25	$0.01	759	Inf	(25,946)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Grocery	NEW	kBtuh capacity	16.5	$0.00	175.0	-6.4	0.25	$0.01	43	Inf	(1,469)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Grocery	ROB	kBtuh capacity	16.5	$0.00	175.0	-6.4	0.25	$0.01	80	Inf	(2,741)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Hospital	NEW	kBtuh capacity	16.5	$0.00	276.7	-10.2	0.25	$0.02	87	Inf	(2,990)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Hospital	ROB	kBtuh capacity	16.5	$0.00	276.7	-10.2	0.25	$0.02	123	Inf	(4,196)

Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Lodging	NEW	kBtuh capacity	16.5	$0.00	522.9	-19.2	0.25	$0.02	54	Inf	(1,842)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Lodging	ROB	kBtuh capacity	16.5	$0.00	522.9	-19.2	0.25	$0.02	106	Inf	(3,614)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Office	NEW	kBtuh capacity	16.5	$0.00	188.2	-6.9	0.25	$0.02	3,962	Inf	(135,408)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Office	ROB	kBtuh capacity	16.5	$0.00	188.2	-6.9	0.25	$0.02	4,312	Inf	(147,396)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Other	NEW	kBtuh capacity	16.5	$0.00	712.8	-26.2	0.25	$0.00	3,443	Inf	(117,672)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Other	ROB	kBtuh capacity	16.5	$0.00	712.8	-26.2	0.25	$0.00	4,774	Inf	(163,189)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Retail	NEW	kBtuh capacity	16.5	$0.00	183.5	-6.7	0.25	$0.00	312	Inf	(10,655)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Retail	ROB	kBtuh capacity	16.5	$0.00	183.5	-6.7	0.25	$0.00	622	Inf	(21,243)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Schools	NEW	kBtuh capacity	16.5	$0.00	323.6	-11.9	0.25	$0.02	47	Inf	(1,603)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Schools	ROB	kBtuh capacity	16.5	$0.00	323.6	-11.9	0.25	$0.02	131	Inf	(4,491)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_University	NEW	kBtuh capacity	16.5	$0.00	323.6	-11.9	0.25	$0.02	72	Inf	(2,462)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_University	ROB	kBtuh capacity	16.5	$0.00	323.6	-11.9	0.25	$0.02	125	Inf	(4,265)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Warehouse	NEW	kBtuh capacity	16.5	$0.00	281.9	-10.3	0.25	$0.00	173	Inf	(5,912)
Com | Electric Furnace - Fuel Switch	Electric furnace	Space Heating	C_Warehouse	ROB	kBtuh capacity	16.5	$0.00	281.9	-10.3	0.25	$0.00	337	Inf	(11,514)
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_Food Service	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	383	Inf	-
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_Grocery	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	71	Inf	-
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_Hospital	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	88	Inf	-
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_Lodging	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	25	Inf	-
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_Other	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	349	Inf	-
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_Retail	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	23	Inf	-
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_Schools	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	54	Inf	-
Com | Electric Griddles	Standard Electric Griddle	Non-Res Cooking	C_University	ROB	Griddle	12	$1,237.43	1917.8	0.0	0.80	$0.05	6	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Food Service	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	2,456	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Grocery	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	545	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Hospital	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	2,187	Inf	-

Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Lodging	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	315	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Office	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	38	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Other	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	2,194	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Retail	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	422	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_Schools	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	781	Inf	-
Com | Electric Pressureless Steamer	Standard Electric Steamer	Non-Res Cooking	C_University	ROB	Steam Cooker	12	$670.99	19102.8	0.0	0.47	-$0.01	475	Inf	-
Com | ENERGY STAR Commercial Dishwashers - Elec HW	Standard Commercial Dishwasher	Non-Res Cooking	C_Food Service	ROB	Dishwasher	15	$3,579.81	8201.3	0.0	0.33	$0.02	810	Inf	-
Com | ENERGY STAR Commercial Dishwashers - Gas HW	Standard Commercial Dishwasher	Non-Res Cooking	C_Food Service	ROB	Dishwasher	15	$4,099.58	438.6	362.9	0.33	-$0.10	2	$0.78	1,045
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Food Service	RET	Motor	16	$418.88	263.4	0.0	0.88	$0.11	538	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Grocery	RET	Motor	16	$418.88	263.4	0.0	0.72	$0.11	795	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Hospital	RET	Motor	16	$418.88	263.4	0.0	0.69	$0.11	94	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Lodging	RET	Motor	16	$418.88	263.4	0.0	0.81	$0.11	76	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Office	RET	Motor	16	$418.88	263.4	0.0	0.88	$0.11	190	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Other	RET	Motor	16	$418.88	263.4	0.0	0.02	$0.11	5	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Retail	RET	Motor	16	$418.88	263.4	0.0	0.46	$0.11	96	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Schools	RET	Motor	16	$418.88	263.4	0.0	0.58	$0.11	47	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_University	RET	Motor	16	$418.88	263.4	0.0	0.58	$0.11	93	Inf	-
Com | Evaporator Fan Controls	Evaporator fan controls	Non-Res Refrigeration	C_Warehouse	RET	Motor	16	$418.88	263.4	0.0	0.27	$0.11	260	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Food Service	ROB	Fixture	20	$0.00	813.8	0.0	0.79	-$0.01	1,914	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Grocery	ROB	Fixture	20	$0.00	813.8	0.0	0.48	-$0.01	523	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Hospital	ROB	Fixture	20	$0.00	813.8	0.0	0.72	-$0.01	1,339	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Lodging	ROB	Fixture	20	$0.00	813.8	0.0	0.57	-$0.01	424	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Office	ROB	Fixture	20	$0.00	813.8	0.0	0.66	-$0.01	30,974	Inf	-

Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Other	ROB	Fixture	20	$0.00	813.8	0.0	0.76	-$0.01	2,646	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Retail	ROB	Fixture	20	$0.00	813.8	0.0	0.75	-$0.01	6,591	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Schools	ROB	Fixture	20	$0.00	813.8	0.0	0.70	-$0.01	1,101	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_University	ROB	Fixture	20	$0.00	813.8	0.0	0.70	-$0.01	1,451	Inf	-
Com | Exterior LED Area and Wall Lights	Exterior MH/HPS fixture	Lighting	C_Warehouse	ROB	Fixture	20	$0.00	813.8	0.0	0.80	-$0.01	5,882	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Food Service	ROB	Fixture	15	$79.93	665.3	0.0	0.67	$0.00	5,732	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Grocery	ROB	Fixture	15	$79.93	665.3	0.0	0.33	$0.00	159	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Hospital	ROB	Fixture	15	$79.93	665.3	0.0	0.95	$0.00	960	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Lodging	ROB	Fixture	15	$79.93	665.3	0.0	0.51	$0.00	475	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Office	ROB	Fixture	15	$79.93	665.3	0.0	0.31	$0.00	6,710	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Other	ROB	Fixture	15	$79.93	665.3	0.0	0.52	$0.00	962	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Retail	ROB	Fixture	15	$79.93	665.3	0.0	0.09	$0.00	140	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Schools	ROB	Fixture	15	$79.93	665.3	0.0	0.30	$0.00	230	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_University	ROB	Fixture	15	$79.93	665.3	0.0	0.55	$0.00	559	Inf	-
Com | Exterior Pin-based CFLs	Exterior Incandescent fixture	Lighting	C_Warehouse	ROB	Fixture	15	$79.93	665.3	0.0	0.32	$0.00	562	Inf	-
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Food Service	RET	Watt Controlled	8	$0.55	1.3	0.0	1.00	$0.06	3,080	Inf	(20,896)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Grocery	RET	Watt Controlled	8	$0.55	2.0	0.0	0.99	$0.04	3,290	Inf	(19,953)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Hospital	RET	Watt Controlled	8	$0.55	1.2	0.0	0.99	$0.06	4,625	Inf	(25,821)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Lodging	RET	Watt Controlled	8	$0.55	0.8	0.0	0.98	$0.09	1,874	Inf	(13,422)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Office	RET	Watt Controlled	8	$0.55	0.9	0.0	0.86	$0.08	72,873	Inf	(461,689)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Other	RET	Watt Controlled	8	$0.55	0.7	0.0	0.73	$0.09	4,417	Inf	(27,699)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Retail	RET	Watt Controlled	8	$0.55	1.4	0.0	0.96	$0.05	25,566	Inf	(156,968)

Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Schools	RET	Watt Controlled	8	$0.55	0.6	0.0	0.84	$0.12	1,732	Inf	(11,803)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_University	RET	Watt Controlled	8	$0.55	0.7	0.0	0.97	$0.10	2,606	Inf	(11,717)
Com | Fixture Mounted Occupancy Sensor	No occupancy sensor	Lighting	C_Warehouse	RET	Watt Controlled	8	$0.55	0.8	0.0	0.77	$0.09	8,733	Inf	(59,562)
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Food Service	RET	Hp	15	$434.83	692.5	0.0	1.00	$0.04	643	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Grocery	RET	Hp	15	$434.83	692.5	0.0	0.63	$0.04	4,471	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Hospital	RET	Hp	15	$434.83	692.5	0.0	1.00	$0.04	53	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Lodging	RET	Hp	15	$434.83	692.5	0.0	1.00	$0.04	95	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Office	RET	Hp	15	$434.83	692.5	0.0	1.00	$0.04	6,462	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Other	RET	Hp	15	$434.83	692.5	0.0	0.02	$0.04	45	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Retail	RET	Hp	15	$434.83	692.5	0.0	0.28	$0.04	642	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Schools	RET	Hp	15	$434.83	692.5	0.0	1.00	$0.04	53	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_University	RET	Hp	15	$434.83	692.5	0.0	1.00	$0.04	70	Inf	-
Com | Floating-Head Pressure Controls	No controls	Non-Res Refrigeration	C_Warehouse	RET	Hp	15	$434.83	692.5	0.0	0.36	$0.04	1,848	Inf	-
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_Hospital	ROB	kBtuh capacity	20	$6.78	0.0	0.7	0.85	$65,535.00	-	$0.73	65,595
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_Lodging	ROB	kBtuh capacity	20	$6.78	0.0	1.3	0.85	$65,535.00	-	$0.39	26,834
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_Office	ROB	kBtuh capacity	20	$6.78	0.0	0.5	0.85	$65,535.00	-	$1.08	400,304
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_Other	ROB	kBtuh capacity	20	$6.78	0.0	1.8	0.85	$65,535.00	-	$0.28	887,086
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_Retail	ROB	kBtuh capacity	20	$6.78	0.0	0.5	0.85	$65,535.00	-	$1.10	34,315
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_Schools	ROB	kBtuh capacity	20	$6.78	0.0	0.8	0.85	$65,535.00	-	$0.63	436,095
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_University	ROB	kBtuh capacity	20	$6.78	0.0	0.8	0.85	$65,535.00	-	$0.63	324,306
Com | Gas Boiler - Mid Efficiency	70-80% Efficiency	Space Heating	C_Warehouse	ROB	kBtuh capacity	20	$6.78	0.0	0.7	0.85	$65,535.00	-	$0.72	13,900
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Food Service	ROB	Broiler	12	$3,029.97	0.0	992.5	0.79	$65,535.00	-	$0.31	407,108
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Grocery	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	$65,535.00	-	$0.31	27,538

Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Hospital	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	$65,535.00	-	$0.31	13,829
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Lodging	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	$65,535.00	-	$0.31	7,018
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Office	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	$65,535.00	-	$0.31	1,861
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Other	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	$65,535.00	-	$0.31	84,437
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Retail	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	$65,535.00	-	$0.31	6,763
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_Schools	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	$65,535.00	-	$0.31	3,940
Com | Gas Charbroiler	Standard Charbroiler	Non-Res Cooking	C_University	ROB	Fryer	12	$3,029.97	0.0	992.5	0.79	$65,535.00	-	$0.31	733
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Food Service	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	$65,535.00	-	$0.59	479,001
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Grocery	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	$65,535.00	-	$0.59	54,387
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Hospital	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	$65,535.00	-	$0.59	232,519
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Lodging	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	$65,535.00	-	$0.59	34,559
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Office	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	$65,535.00	-	$0.59	6,320
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Other	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	$65,535.00	-	$0.59	529,738
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Retail	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	$65,535.00	-	$0.59	21,177
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Schools	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	$65,535.00	-	$0.59	75,433
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_University	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	$65,535.00	-	$0.59	15,707
Com | Gas Combination Ovens	Standard Gas Combination Oven	Non-Res Cooking	C_Warehouse	ROB	Oven	12	$7,344.63	0.0	1242.7	0.50	$65,535.00	-	$0.59	9,757
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_Hospital	ROB	kBtuh capacity	20	$24.75	0.0	1.5	0.85	$65,535.00	-	$1.21	20,013
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_Lodging	ROB	kBtuh capacity	20	$24.75	0.0	2.9	0.85	$65,535.00	-	$0.64	1,818
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_Office	ROB	kBtuh capacity	20	$24.75	0.0	1.0	0.85	$65,535.00	-	$1.77	197,741
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_Other	ROB	kBtuh capacity	20	$24.75	0.0	4.0	0.85	$65,535.00	-	$0.47	17,700
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_Retail	ROB	kBtuh capacity	20	$24.75	0.0	1.0	0.85	$65,535.00	-	$1.82	17,364
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_Schools	ROB	kBtuh capacity	20	$24.75	0.0	1.8	0.85	$65,535.00	-	$1.03	101,324
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_University	ROB	kBtuh capacity	20	$24.75	0.0	1.8	0.85	$65,535.00	-	$1.03	75,350
Com | Gas Condensing Boiler	70-80% Efficiency	Space Heating	C_Warehouse	ROB	kBtuh capacity	20	$24.75	0.0	1.6	0.85	$65,535.00	-	$1.18	4,115

Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Food Service	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	$65,535.00	-	$1.02	43,296
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Grocery	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	$65,535.00	-	$1.02	4,992
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Hospital	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	$65,535.00	-	$1.02	9,406
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Lodging	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	$65,535.00	-	$1.02	1,290
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Office	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	$65,535.00	-	$1.02	15,659
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Other	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	$65,535.00	-	$1.02	40,361
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Retail	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	$65,535.00	-	$1.02	2,197
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_Schools	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	$65,535.00	-	$1.02	9,186
Com | Gas Convection Ovens	Standard Gas Convection Oven	Non-Res Cooking	C_University	ROB	Oven	12	$1,882.28	0.0	183.9	0.50	$65,535.00	-	$1.02	1,913
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Food Service	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	$65,535.00	-	$0.13	195,908
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Grocery	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	$65,535.00	-	$0.13	22,589
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Hospital	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	$65,535.00	-	$0.13	42,559
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Lodging	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	$65,535.00	-	$0.13	5,839
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Office	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	$65,535.00	-	$0.13	70,856
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Other	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	$65,535.00	-	$0.13	182,627
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Retail	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	$65,535.00	-	$0.13	9,939
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_Schools	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	$65,535.00	-	$0.13	41,566
Com | Gas Conveyor Ovens	Standard Conveyor Ovens	Non-Res Cooking	C_University	ROB	Oven	12	$1,117.46	0.0	832.2	0.50	$65,535.00	-	$0.13	8,655
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Food Service	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	$65,535.00	-	$0.36	736,503
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Grocery	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	$65,535.00	-	$0.36	49,820
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Hospital	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	$65,535.00	-	$0.36	25,019
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Lodging	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	$65,535.00	-	$0.36	12,697
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Office	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	$65,535.00	-	$0.36	3,367
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Other	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	$65,535.00	-	$0.36	152,756
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Retail	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	$65,535.00	-	$0.36	12,236

Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_Schools	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	$65,535.00	-	$0.36	7,128
Com | Gas Fryer	Standard Gas Fryer/Fryer Large Vat	Non-Res Cooking	C_University	ROB	Fryer	12	$1,613.19	0.0	448.9	0.79	$65,535.00	-	$0.36	1,325
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Food Service	ROB	kBtuh capacity	16.5	$21.77	0.0	2.7	0.85	$65,535.00	-	$0.65	528,340
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Grocery	ROB	kBtuh capacity	16.5	$21.77	0.0	1.0	0.85	$65,535.00	-	$1.79	25,762
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Hospital	ROB	kBtuh capacity	16.5	$21.77	0.0	1.5	0.85	$65,535.00	-	$1.13	14,432
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Lodging	ROB	kBtuh capacity	16.5	$21.77	0.0	2.9	0.85	$65,535.00	-	$0.60	14,490
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Office	ROB	kBtuh capacity	16.5	$21.77	0.0	1.0	0.85	$65,535.00	-	$1.66	429,488
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Other	ROB	kBtuh capacity	16.5	$21.77	0.0	4.0	0.85	$65,535.00	-	$0.44	1,656,005
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Retail	ROB	kBtuh capacity	16.5	$21.77	0.0	1.0	0.85	$65,535.00	-	$1.70	95,803
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Schools	ROB	kBtuh capacity	16.5	$21.77	0.0	1.8	0.85	$65,535.00	-	$0.97	54,720
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_University	ROB	kBtuh capacity	16.5	$21.77	0.0	1.8	0.85	$65,535.00	-	$0.97	40,693
Com | Gas Furnace - High Efficiency	Gas furnace with an AFUE less than 80%	Space Heating	C_Warehouse	ROB	kBtuh capacity	16.5	$21.77	0.0	1.6	0.85	$65,535.00	-	$1.11	105,671
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Food Service	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	$65,535.00	-	$0.32	482,524
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Grocery	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	$65,535.00	-	$0.32	55,638
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Hospital	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	$65,535.00	-	$0.32	104,823
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Lodging	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	$65,535.00	-	$0.32	14,381
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Office	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	$65,535.00	-	$0.32	174,520
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Other	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	$65,535.00	-	$0.32	449,813
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Retail	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	$65,535.00	-	$0.32	24,481
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_Schools	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	$65,535.00	-	$0.32	102,379
Com | Gas Rack Ovens	Standard Gas Rack Oven	Non-Res Cooking	C_University	ROB	Oven	12	$6,599.23	0.0	2049.8	0.50	$65,535.00	-	$0.32	21,318
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Food Service	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	$65,535.00	-	$0.44	84,380
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Grocery	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	$65,535.00	-	$0.44	10,662
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Hospital	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	$65,535.00	-	$0.44	29,429
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Lodging	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	$65,535.00	-	$0.44	8,937

Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Office	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	$65,535.00	-	$0.44	850
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Other	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	$65,535.00	-	$0.44	75,483
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Retail	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	$65,535.00	-	$0.44	2,134
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_Schools	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	$65,535.00	-	$0.44	10,734
Com | Gas Steam Cooker	Standard Gas Steam Cooker	Non-Res Cooking	C_University	ROB	Steam Cooker	12	$4,637.56	0.0	1065.5	0.47	$65,535.00	-	$0.44	7,983
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Food Service	ROB	Ton	15	$299.06	89.5	0.0	0.85	$0.14	53	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Grocery	ROB	Ton	15	$299.06	52.8	0.0	0.85	$0.28	5	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Hospital	ROB	Ton	15	$299.06	83.5	0.0	0.85	$0.17	10	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Lodging	ROB	Ton	15	$299.06	44.2	0.0	0.85	$0.20	2	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Office	ROB	Ton	15	$299.06	56.8	0.0	0.85	$0.25	2,260	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Other	ROB	Ton	15	$299.06	60.7	0.0	0.85	$0.14	195	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Retail	ROB	Ton	15	$299.06	67.0	0.0	0.85	$0.22	2	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Schools	ROB	Ton	15	$299.06	40.5	0.0	0.85	$0.26	6	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_University	ROB	Ton	15	$299.06	40.5	0.0	0.85	$0.26	7	Inf	-
Com | Heat Pump, Air Source	HP Equipment Code Avg SEER 12.8	Space Heating and Cooling	C_Warehouse	ROB	Ton	15	$299.06	26.3	0.0	0.85	$0.35	12	Inf	-
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Food Service	ROB	Fixture	20	$139.40	480.5	-5.0	1.00	$0.02	13	Inf	(89)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Grocery	ROB	Fixture	20	$139.40	727.8	-6.8	0.35	$0.02	41	Inf	(248)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Hospital	ROB	Fixture	20	$139.40	432.6	-5.2	0.35	$0.03	237	Inf	(1,323)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Lodging	ROB	Fixture	20	$139.40	284.4	-3.1	1.00	$0.04	3	Inf	(19)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Office	ROB	Fixture	20	$139.40	332.3	-3.2	1.00	$0.03	2,645	Inf	(16,758)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Other	ROB	Fixture	20	$139.40	270.7	-2.6	0.29	$0.04	435	Inf	(2,727)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Retail	ROB	Fixture	20	$139.40	508.8	-4.8	0.11	$0.02	1,167	Inf	(7,168)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Schools	ROB	Fixture	20	$139.40	219.2	-2.3	0.37	$0.05	133	Inf	(907)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_University	ROB	Fixture	20	$139.40	250.4	-2.4	0.27	$0.04	148	Inf	(664)
Com | High Bay T8/T5 HO - Interior	MH/HPS/MV High Bay fixtures	Lighting	C_Warehouse	ROB	Fixture	20	$139.40	298.7	-3.1	0.18	$0.04	834	Inf	(5,689)

Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Food Service	NEW	kWh Saved	15	$0.34	0.1	0.0	1.00	$0.16	1,548	$2.37	84,605
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Grocery	NEW	kWh Saved	15	$0.27	0.1	0.0	1.00	$0.18	685	$6.95	9,206
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Hospital	NEW	kWh Saved	15	$1.11	0.1	0.0	1.00	$0.83	16,748	$20.81	324,093
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Lodging	NEW	kWh Saved	15	$0.91	0.1	0.0	1.00	$0.67	3,637	$14.39	114,771
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Office	NEW	kWh Saved	15	$1.78	0.1	0.0	1.00	$1.39	116,179	$70.96	1,536,164
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Other	NEW	kWh Saved	15	$1.02	0.1	0.0	1.00	$0.77	47,880	$23.48	1,052,434
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Retail	NEW	kWh Saved	15	$0.70	0.1	0.0	1.00	$0.53	26,475	$21.03	422,232
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Schools	NEW	kWh Saved	15	$1.36	0.1	0.0	1.00	$1.03	5,805	$22.95	177,997
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_University	NEW	kWh Saved	15	$0.96	0.1	0.0	1.00	$0.59	3,620	$5.11	246,518
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Warehouse	NEW	kWh Saved	15	$2.41	0.1	0.0	1.00	$1.91	1,099	$108.15	13,193
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Food Service	NEW	therms saved	15	$4.69	1.4	0.1	1.00	$65,535.00	-	$3.91	52,300
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Grocery	NEW	therms saved	15	$14.47	5.6	0.1	1.00	$65,535.00	-	$11.97	4,343
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Hospital	NEW	therms saved	15	$51.55	2.6	0.1	1.00	$65,535.00	-	$44.41	335,659

Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Lodging	NEW	therms saved	15	$37.46	2.5	0.1	1.00	$65,535.00	-	$32.18	63,311
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Office	NEW	therms saved	15	$455.21	5.2	0.1	1.00	$65,535.00	-	$393.58	943,698
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Other	NEW	therms saved	15	$49.57	3.3	0.1	1.00	$65,535.00	-	$42.57	843,838
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Retail	NEW	therms saved	15	$42.29	4.8	0.1	1.00	$65,535.00	-	$36.07	281,425
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Schools	NEW	therms saved	15	$75.64	2.9	0.1	1.00	$65,535.00	-	$65.18	119,980
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_University	NEW	therms saved	15	$29.73	0.8	0.1	1.00	$65,535.00	-	$25.67	256,629
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Warehouse	NEW	therms saved	15	$107.47	6.3	0.1	1.00	$65,535.00	-	$92.43	9,048
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Food Service	NEW	kWh saved	15	$0.39	0.3	0.0	1.00	$0.01	14,860	$0.51	811,941
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Grocery	NEW	kWh saved	15	$0.31	0.3	0.0	1.00	$0.07	3,921	$0.79	52,713
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Hospital	NEW	kWh saved	15	$1.42	0.3	0.0	1.00	$0.40	25,559	$9.57	494,608
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Lodging	NEW	kWh saved	15	$1.17	0.3	0.0	1.00	$0.31	6,225	$6.46	196,460
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Office	NEW	kWh saved	15	$3.15	0.3	0.0	1.00	$0.98	131,718	$48.92	1,741,622
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Other	NEW	kWh saved	15	$1.26	0.3	0.0	1.00	$0.35	75,942	$10.16	1,669,265

Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Retail	NEW	kWh saved	15	$0.85	0.3	0.0	1.00	$0.23	50,312	$8.17	802,413
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Schools	NEW	kWh saved	15	$1.87	0.3	0.0	1.00	$0.53	7,892	$11.76	242,012
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_University	NEW	kWh saved	15	$1.60	0.3	0.0	1.00	$0.32	5,827	$3.18	396,856
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	ASHRAE 90.1-2010	Whole Building/House	C_Warehouse	NEW	kWh saved	15	$2.67	0.3	0.0	1.00	$0.83	1,351	$45.10	16,223
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Food Service	NEW	therms saved	15	$4.69	3.5	0.3	1.00	$65,535.00	-	$1.47	804,036
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Grocery	NEW	therms saved	15	$14.47	13.9	0.3	1.00	$65,535.00	-	$4.45	41,580
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Hospital	NEW	therms saved	15	$51.55	6.5	0.3	1.00	$65,535.00	-	$17.61	480,919
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Lodging	NEW	therms saved	15	$37.46	6.3	0.3	1.00	$65,535.00	-	$12.70	102,782
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Office	NEW	therms saved	15	$455.21	13.1	0.3	1.00	$65,535.00	-	$156.92	1,057,575
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Other	NEW	therms saved	15	$49.57	8.1	0.3	1.00	$65,535.00	-	$16.80	1,309,688
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Retail	NEW	therms saved	15	$42.29	12.1	0.3	1.00	$65,535.00	-	$14.08	563,208
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Schools	NEW	therms saved	15	$75.64	7.3	0.3	1.00	$65,535.00	-	$25.85	156,721
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_University	NEW	therms saved	15	$29.73	2.0	0.3	1.00	$65,535.00	-	$10.21	357,729

Com | High Efficiency Comprehensive New Construction - 25% Better - therm	ASHRAE 90.1-2010	Whole Building/House	C_Warehouse	NEW	therms saved	15	$107.47	15.8	0.3	1.00	$65,535.00	-	$36.55	12,713
Com | Hot Food Holding Cabinets	Standard Hot Food Holding Cabinet	Non-Res Cooking	C_Food Service	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	501	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_Grocery	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	218	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_Hospital	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	126	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_Lodging	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	58	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_Office	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	4	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_Other	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	405	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_Retail	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	60	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_Schools	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	155	Inf	-
Com | Hot Food Holding Cabinets	Standard Electric Hot Food Holding Cabinet	Non-Res Cooking	C_University	ROB	Holding Cabinet	12	$923.85	923.4	0.0	0.83	$0.08	204	Inf	-
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Food Service	NEW	per CFM	15	$9.59	0.0	0.5	0.10	$65,535.00	-	$1.82	244
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Hospital	NEW	per CFM	15	$9.59	0.0	0.3	0.10	$65,535.00	-	$3.15	566
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Lodging	NEW	per CFM	15	$9.59	0.0	0.5	0.08	$65,535.00	-	$1.67	1,784
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Office	NEW	per CFM	15	$9.59	0.0	0.2	0.06	$65,535.00	-	$4.64	185,151
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Other	NEW	per CFM	15	$9.59	0.0	0.7	0.09	$65,535.00	-	$1.22	40,068
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Retail	NEW	per CFM	15	$9.59	0.0	0.2	0.10	$65,535.00	-	$4.76	1,027
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Schools	NEW	per CFM	15	$9.59	0.0	0.3	0.09	$65,535.00	-	$2.70	8,865

Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_University	NEW	per CFM	15	$9.59	0.0	0.3	0.10	$65,535.00	-	$2.70	10,808
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Standard ventilation systems	Space Heating	C_Warehouse	NEW	per CFM	15	$9.59	0.0	0.3	0.10	$65,535.00	-	$3.10	17,512
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Food Service	RET	per CFM	15	$9.59	0.0	0.5	0.10	$65,535.00	-	$1.82	689
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Hospital	RET	per CFM	15	$9.59	0.0	0.3	0.10	$65,535.00	-	$3.15	1,103
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Lodging	RET	per CFM	15	$9.59	0.0	0.5	0.08	$65,535.00	-	$1.67	4,859
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Office	RET	per CFM	15	$9.59	0.0	0.2	0.06	$65,535.00	-	$4.64	278,643
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Other	RET	per CFM	15	$9.59	0.0	0.7	0.09	$65,535.00	-	$1.22	75,323
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Retail	RET	per CFM	15	$9.59	0.0	0.2	0.10	$65,535.00	-	$4.76	2,806
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Schools	RET	per CFM	15	$9.59	0.0	0.3	0.09	$65,535.00	-	$2.70	34,182
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_University	RET	per CFM	15	$9.59	0.0	0.3	0.10	$65,535.00	-	$2.70	25,771
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Standard ventilation systems	Space Heating	C_Warehouse	RET	per CFM	15	$9.59	0.0	0.3	0.10	$65,535.00	-	$3.10	46,943
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Food Service	ROB	kbtuh	15	$31.67	0.0	7.2	0.83	$65,535.00	-	$0.38	3,276
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Grocery	ROB	kbtuh	15	$31.67	0.0	1.3	0.54	$65,535.00	-	$2.16	1,624

Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Hospital	ROB	kbtuh	15	$31.67	0.0	4.3	0.23	$65,535.00	-	$0.64	1,601
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Lodging	ROB	kbtuh	15	$31.67	0.0	1.5	0.30	$65,535.00	-	$1.82	3,226
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Office	ROB	kbtuh	15	$31.67	0.0	0.9	0.47	$65,535.00	-	$3.01	9,639
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Other	ROB	kbtuh	15	$31.67	0.0	0.8	0.59	$65,535.00	-	$3.30	27,605
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Retail	ROB	kbtuh	15	$31.67	0.0	1.2	0.55	$65,535.00	-	$2.37	3,152
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Schools	ROB	kbtuh	15	$31.67	0.0	0.3	0.72	$65,535.00	-	$10.14	6,922
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_University	ROB	kbtuh	15	$31.67	0.0	0.5	0.73	$65,535.00	-	$5.66	3,432
Com | Instantaneous Water Heater	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Warehouse	ROB	kbtuh	15	$31.67	0.0	0.8	0.88	$65,535.00	-	$3.47	2,797
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Food Service	RET	Exit Sign	16	$127.89	32.2	-0.3	0.34	$0.31	8	Inf	(53)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Grocery	RET	Exit Sign	16	$127.89	36.1	-0.3	0.49	$0.28	1	Inf	(6)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Hospital	RET	Exit Sign	16	$127.89	27.9	-0.3	0.49	$0.36	10	Inf	(58)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Lodging	RET	Exit Sign	16	$127.89	30.5	-0.3	0.29	$0.33	4	Inf	(28)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Office	RET	Exit Sign	16	$127.89	34.5	-0.3	0.16	$0.29	59	Inf	(377)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Other	RET	Exit Sign	16	$127.89	34.9	-0.3	0.30	$0.29	24	Inf	(148)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Retail	RET	Exit Sign	16	$127.89	35.6	-0.3	0.92	$0.28	125	Inf	(770)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Schools	RET	Exit Sign	16	$127.89	32.1	-0.3	0.41	$0.31	4	Inf	(30)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_University	RET	Exit Sign	16	$127.89	35.1	-0.3	0.49	$0.29	8	Inf	(34)
Com | LED Exit Signs	CFL Exit Sign (9 Watts)	Lighting	C_Warehouse	RET	Exit Sign	16	$127.89	32.1	-0.3	0.21	$0.31	44	Inf	(299)
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Food Service	ROB	Fixture	20	$0.00	82.6	-0.9	0.54	$0.01	7,246	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Grocery	ROB	Fixture	20	$0.00	125.1	-1.2	0.47	$0.00	958	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Hospital	ROB	Fixture	20	$0.00	74.3	-0.9	0.08	$0.01	1,160	Inf	-

Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Lodging	ROB	Fixture	20	$0.00	48.9	-0.5	0.13	$0.01	1,718	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Office	ROB	Fixture	20	$0.00	57.1	-0.6	0.18	$0.00	20,062	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Other	ROB	Fixture	20	$0.00	46.5	-0.4	0.32	$0.01	6,555	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Retail	ROB	Fixture	20	$0.00	87.4	-0.8	0.10	$0.00	3,094	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Schools	ROB	Fixture	20	$0.00	37.7	-0.4	0.10	$0.01	131	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_University	ROB	Fixture	20	$0.00	43.0	-0.4	0.16	$0.01	432	Inf	-
Com | LED Fixture - Interior	Incandescent/Halogen fixture	Lighting	C_Warehouse	ROB	Fixture	20	$0.00	51.3	-0.5	0.12	$0.01	881	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Food Service	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	23	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Grocery	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	528	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Hospital	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	0	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Lodging	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	1	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Office	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	1	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Other	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	0	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Retail	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	301	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Schools	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	8	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_University	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	2	Inf	-
Com | LED Refrigeration Case Lighting - Strip	T12/T8 Lighting	Non-Res Refrigeration	C_Warehouse	ROB	Linear foot	7.862677	$29.47	108.9	0.0	0.35	$0.01	5	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Food Service	ROB	Per Valve	5	$71.94	256.3	0.0	0.80	$0.03	74	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Grocery	ROB	Per Valve	5	$71.94	256.3	0.0	0.80	$0.03	25	Inf	-

Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Hospital	ROB	Per Valve	5	$71.94	256.3	0.0	0.80	$0.03	0	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Lodging	ROB	Per Valve	5	$71.94	256.3	0.0	0.80	$0.03	5	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Office	ROB	Per Valve	5	$71.94	175.5	0.0	0.80	$0.05	9	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Other	ROB	Per Valve	5	$71.94	175.5	0.0	0.80	$0.05	97	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Retail	ROB	Per Valve	5	$71.94	175.5	0.0	0.80	$0.05	33	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_Schools	ROB	Per Valve	5	$71.94	140.4	0.0	0.80	$0.07	24	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Standard valve	Hot Water	C_University	ROB	Per Valve	5	$71.94	140.4	0.0	0.80	$0.07	27	Inf	-
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Food Service	ROB	Per Valve	5	$71.94	0.0	11.4	0.80	$65,535.00	-	$0.89	420
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Grocery	ROB	Per Valve	5	$71.94	0.0	11.4	0.80	$65,535.00	-	$0.89	13
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Hospital	ROB	Per Valve	5	$71.94	0.0	11.4	0.80	$65,535.00	-	$0.89	160
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Lodging	ROB	Per Valve	5	$71.94	0.0	11.4	0.80	$65,535.00	-	$0.89	-
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Office	ROB	Per Valve	5	$71.94	0.0	7.8	0.80	$65,535.00	-	$1.41	0
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Other	ROB	Per Valve	5	$71.94	0.0	7.8	0.80	$65,535.00	-	$1.41	121
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Retail	ROB	Per Valve	5	$71.94	0.0	7.8	0.80	$65,535.00	-	$1.41	14
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_Schools	ROB	Per Valve	5	$71.94	0.0	6.3	0.80	$65,535.00	-	$1.82	-
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Standard valve	Hot Water	C_University	ROB	Per Valve	5	$71.94	0.0	6.3	0.80	$65,535.00	-	$1.82	1,187
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Food Service	RET	Fixture	18	$170.94	118.8	-1.2	0.72	$0.11	-	Inf	-

Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Grocery	RET	Fixture	18	$170.94	179.9	-1.7	0.95	$0.07	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Hospital	RET	Fixture	18	$170.94	106.9	-1.3	0.83	$0.12	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Lodging	RET	Fixture	18	$170.94	70.3	-0.8	0.32	$0.18	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Office	RET	Fixture	18	$170.94	82.2	-0.8	0.76	$0.15	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Other	RET	Fixture	18	$170.94	66.9	-0.6	0.81	$0.19	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Retail	RET	Fixture	18	$170.94	125.8	-1.2	0.88	$0.10	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Schools	RET	Fixture	18	$170.94	54.2	-0.6	0.87	$0.24	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_University	RET	Fixture	18	$170.94	61.9	-0.6	0.87	$0.21	-	Inf	-
Com | Low Wattage T8 Fixture with EEB	T8/T12 Fluorescent fixture	Lighting	C_Warehouse	RET	Fixture	18	$170.94	73.9	-0.8	0.86	$0.17	-	Inf	-
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Food Service	ROB	kbtuh	15	$9.13	0.0	3.5	0.83	$65,535.00	-	$0.23	805,131
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Grocery	ROB	kbtuh	15	$9.13	0.0	1.0	0.54	$65,535.00	-	$0.80	20,072
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Hospital	ROB	kbtuh	15	$9.13	0.0	2.1	0.23	$65,535.00	-	$0.37	38,973
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Lodging	ROB	kbtuh	15	$9.13	0.0	1.1	0.30	$65,535.00	-	$0.74	39,626
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Office	ROB	kbtuh	15	$9.13	0.0	0.8	0.47	$65,535.00	-	$0.95	114,286
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Other	ROB	kbtuh	15	$9.13	0.0	0.7	0.59	$65,535.00	-	$1.08	236,855
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Retail	ROB	kbtuh	15	$9.13	0.0	0.9	0.55	$65,535.00	-	$0.91	27,664
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Schools	ROB	kbtuh	15	$9.13	0.0	0.6	0.72	$65,535.00	-	$1.44	54,402
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_University	ROB	kbtuh	15	$9.13	0.0	0.6	0.73	$65,535.00	-	$1.24	29,950
Com | Natural Gas Storage Water Heaters	Existing hot water heating system (Avg Eff 80%)	Hot Water	C_Warehouse	ROB	kbtuh	15	$9.13	0.0	0.7	0.88	$65,535.00	-	$1.10	23,492
Com | New Display Case with Doors (Medium	Open medium temperature display case	Non-Res Refrigeration	C_Food Service	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.09	$0.49	71	Inf	-

Temperature)														
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Grocery	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.55	$0.49	10,288	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Hospital	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.16	$0.49	9	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Lodging	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.07	$0.49	1	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Office	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.69	$0.49	466	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Other	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.10	$0.49	12	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Retail	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.41	$0.49	4,169	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Schools	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.01	$0.49	1	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_University	ROB	Linear foot	12	$1,318.15	245.0	0.0	0.75	$0.49	22	Inf	-
Com | New Display Case with Doors (Medium Temperature)	Open medium temperature display case	Non-Res Refrigeration	C_Warehouse	ROB	Linear foot	12	$1,318.15	245.0	0.0	1.00	$0.49	66	Inf	-
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Food Service	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	15	$1.42	1,118
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Grocery	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	334	$1.42	25,563
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Hospital	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	0	$1.42	8
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Lodging	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	1	$1.42	52

Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Office	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	1	$1.42	48
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Other	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	0	$1.42	6
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Retail	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	193	$1.42	14,751
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Schools	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	5	$1.42	407
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_University	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	1	$1.42	80
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Open low and medium temperature vertical display case	Non-Res Refrigeration	C_Warehouse	RET	Display Case	5	$57.55	44.3	5.2	0.56	$0.08	3	$1.42	245
Com | Ozone Laundry	no ozone, HW from gas-fired boiler	Appliances	C_Lodging	RET	lbs capacity	10	$127.64	2.9	30.7	0.68	-$5.63	-	$0.42	-
Com | Ozone Laundry	no ozone, HW from gas-fired boiler	Appliances	C_Other	RET	lbs capacity	10	$127.64	2.9	30.7	0.68	-$5.63	0	$0.42	329
Com | Packaged Terminal AC (PTAC) Equipment	Condensing Units 0.7 tons, 10.6 SEER, 9.1 EER	Space Cooling	C_Food Service	ROB	Ton	15	$210.35	106.5	0.0	0.85	$0.16	1	Inf	-
Com | Packaged Terminal AC (PTAC) Equipment	Condensing Units 0.7 tons, 10.6 SEER, 9.1 EER	Space Cooling	C_Hospital	ROB	Ton	15	$210.35	97.4	0.0	0.85	$0.17	3	Inf	-
Com | Packaged Terminal AC (PTAC) Equipment	Condensing Units 0.7 tons, 10.6 SEER, 9.1 EER	Space Cooling	C_Lodging	ROB	Ton	15	$210.35	56.0	0.0	0.85	$0.30	2	Inf	-
Com | Packaged Terminal AC (PTAC) Equipment	Condensing Units 0.7 tons, 10.6 SEER, 9.1 EER	Space Cooling	C_Office	ROB	Ton	15	$210.35	66.3	0.0	0.85	$0.26	81	Inf	-
Com | Packaged Terminal AC (PTAC) Equipment	Condensing Units 0.7 tons, 10.6 SEER, 9.1 EER	Space Cooling	C_Other	ROB	Ton	15	$210.35	76.8	0.0	0.85	$0.22	6	Inf	-
Com | Packaged Terminal AC (PTAC) Equipment	Condensing Units 0.7 tons, 10.6 SEER, 9.1 EER	Space Cooling	C_Retail	ROB	Ton	15	$210.35	77.7	0.0	0.85	$0.22	11	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Food Service	RET	Watt Controlled	8	$0.49	1.6	0.0	0.41	$0.03	387	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Grocery	RET	Watt Controlled	8	$0.49	1.6	0.0	0.41	$0.03	124	Inf	-

Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Hospital	RET	Watt Controlled	8	$0.49	1.6	0.0	0.18	$0.03	78	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Lodging	RET	Watt Controlled	8	$0.49	1.6	0.0	0.31	$0.03	94	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Office	RET	Watt Controlled	8	$0.49	1.6	0.0	0.26	$0.03	5,442	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Other	RET	Watt Controlled	8	$0.49	1.6	0.0	0.03	$0.03	52	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Retail	RET	Watt Controlled	8	$0.49	1.6	0.0	0.01	$0.03	87	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Schools	RET	Watt Controlled	8	$0.49	1.6	0.0	0.47	$0.03	441	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_University	RET	Watt Controlled	8	$0.49	1.6	0.0	0.68	$0.03	581	Inf	-
Com | Photocell	No Photocell (Manual Switch)	Lighting	C_Warehouse	RET	Watt Controlled	8	$0.49	1.6	0.0	0.09	$0.03	445	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Food Service	ROB	Fixture	20	$47.96	387.6	0.0	0.79	$0.00	155	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Grocery	ROB	Fixture	20	$47.96	387.6	0.0	0.48	$0.00	42	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Hospital	ROB	Fixture	20	$47.96	387.6	0.0	0.72	$0.00	108	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Lodging	ROB	Fixture	20	$47.96	387.6	0.0	0.57	$0.00	34	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Office	ROB	Fixture	20	$47.96	387.6	0.0	0.66	$0.00	2,509	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Other	ROB	Fixture	20	$47.96	387.6	0.0	0.76	$0.00	214	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Retail	ROB	Fixture	20	$47.96	387.6	0.0	0.75	$0.00	534	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Schools	ROB	Fixture	20	$47.96	387.6	0.0	0.70	$0.00	89	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_University	ROB	Fixture	20	$47.96	387.6	0.0	0.70	$0.00	118	Inf	-
Com | Pulse Start Metal Halide - Exterior	Exterior MH/HPS fixture	Lighting	C_Warehouse	ROB	Fixture	20	$47.96	387.6	0.0	0.80	$0.00	476	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Food Service	RET	kWh saved	7	$0.03	0.2	0.0	0.36	$0.01	31,575	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Grocery	RET	kWh saved	7	$0.03	0.2	0.0	0.58	$0.01	10,190	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Hospital	RET	kWh saved	7	$0.03	0.2	0.0	0.06	$0.01	3,737	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Lodging	RET	kWh saved	7	$0.03	0.2	0.0	0.12	$0.01	4,523	Inf	-

Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Office	RET	kWh saved	7	$0.03	0.2	0.0	0.03	$0.01	2,738	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Other	RET	kWh saved	7	$0.03	0.2	0.0	0.08	$0.01	7,604	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Retail	RET	kWh saved	7	$0.03	0.2	0.0	0.25	$0.01	34,382	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Schools	RET	kWh saved	7	$0.03	0.2	0.0	0.08	$0.01	3,641	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_University	RET	kWh saved	7	$0.03	0.2	0.0	0.08	$0.01	1,644	Inf	-
Com | Refrigeration Recommissioning	Pre-Recommissioning Measures	Non-Res Refrigeration	C_Warehouse	RET	kWh saved	7	$0.03	0.2	0.0	0.18	$0.01	1,434	Inf	-
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Food Service	ROB	lamp	15	$0.00	53.0	-0.6	0.78	$0.00	2,957	Inf	(20,060)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Grocery	ROB	lamp	15	$0.00	80.3	-0.7	0.96	$0.00	552	Inf	(3,347)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Hospital	ROB	lamp	15	$0.00	47.7	-0.6	0.49	$0.00	492	Inf	(2,746)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Lodging	ROB	lamp	15	$0.00	31.4	-0.3	0.28	$0.00	319	Inf	(2,285)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Office	ROB	lamp	15	$0.00	36.6	-0.4	0.09	$0.00	931	Inf	(5,899)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Other	ROB	lamp	15	$0.00	29.9	-0.3	0.79	$0.00	2,085	Inf	(13,073)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Retail	ROB	lamp	15	$0.00	56.1	-0.5	0.08	$0.00	694	Inf	(4,258)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Schools	ROB	lamp	15	$0.00	24.2	-0.3	0.65	$0.00	66	Inf	(449)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_University	ROB	lamp	15	$0.00	27.6	-0.3	0.49	$0.00	75	Inf	(339)
Com | Screw-In LED - Interior	Incandescent/Halogen Lamp	Lighting	C_Warehouse	ROB	lamp	15	$0.00	32.9	-0.3	0.18	$0.00	131	Inf	(894)
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_Grocery	ROB	Ton	20	$154.50	21.1	0.0	0.85	$0.51	0	Inf	-
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_Hospital	ROB	Ton	20	$154.50	33.3	0.0	0.85	$0.32	80	Inf	-
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_Lodging	ROB	Ton	20	$154.50	19.2	0.0	0.85	$0.56	9	Inf	-
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_Office	ROB	Ton	20	$154.50	22.7	0.0	0.85	$0.48	253	Inf	-
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_Other	ROB	Ton	20	$154.50	26.3	0.0	0.85	$0.41	124	Inf	-
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_Retail	ROB	Ton	20	$154.50	26.6	0.0	0.85	$0.41	144	Inf	-
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_Schools	ROB	Ton	20	$154.50	16.9	0.0	0.85	$0.64	35	Inf	-
Com | Scroll/Screw Chillers	Standard Chiller - 0.68 kW/Ton (Full Load)	Space Cooling	C_University	ROB	Ton	20	$154.50	16.9	0.0	0.85	$0.64	20	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Food Service	ROB	Ton	15	$154.32	44.8	0.0	0.85	$0.14	240	Inf	-

Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Grocery	ROB	Ton	15	$154.32	25.9	0.0	0.85	$0.25	43	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Hospital	ROB	Ton	15	$154.32	41.0	0.0	0.85	$0.15	42	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Lodging	ROB	Ton	15	$154.32	23.6	0.0	0.85	$0.27	18	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Office	ROB	Ton	15	$154.32	27.9	0.0	0.41	$0.23	944	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Other	ROB	Ton	15	$154.32	32.3	0.0	0.85	$0.20	324	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Retail	ROB	Ton	15	$154.32	32.7	0.0	0.85	$0.20	253	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Schools	ROB	Ton	15	$154.32	20.8	0.0	0.85	$0.31	39	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_University	ROB	Ton	15	$154.32	20.8	0.0	0.85	$0.31	52	Inf	-
Com | SEER Rated Split or Rooftop AC	DX Unit 12.9 SEER	Space Cooling	C_Warehouse	ROB	Ton	15	$154.32	13.9	0.0	0.85	$0.47	84	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_Grocery	ROB	Server	4	$71.94	565.0	0.0	0.67	$0.02	21	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_Hospital	ROB	Server	4	$71.94	565.0	0.0	1.00	$0.02	53	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_Lodging	ROB	Server	4	$71.94	565.0	0.0	0.91	$0.02	69	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_Office	ROB	Server	4	$71.94	565.0	0.0	0.71	$0.02	2,067	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_Other	ROB	Server	4	$71.94	565.0	0.0	0.65	$0.02	563	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_Retail	ROB	Server	4	$71.94	565.0	0.0	0.76	$0.02	136	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_Schools	ROB	Server	4	$71.94	565.0	0.0	0.90	$0.02	86	Inf	-
Com | Server - High Efficiency	Standard Server	Electronics and Office Equipment	C_University	ROB	Server	4	$71.94	565.0	0.0	1.00	$0.02	22	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_Grocery	ROB	Server	4	$4,736.74	3463.0	0.0	0.67	$0.30	0	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_Hospital	ROB	Server	4	$4,736.74	3463.0	0.0	1.00	$0.30	0	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_Lodging	ROB	Server	4	$4,736.74	3463.0	0.0	0.91	$0.30	0	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_Office	ROB	Server	4	$4,736.74	3463.0	0.0	0.71	$0.30	2	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office	C_Other	ROB	Server	4	$4,736.74	3463.0	0.0	0.65	$0.30	1	Inf	-

		Equipment												
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_Retail	ROB	Server	4	$4,736.74	3463.0	0.0	0.76	$0.30	0	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_Schools	ROB	Server	4	$4,736.74	3463.0	0.0	0.90	$0.30	0	Inf	-
Com | Server Virtualization	Standard Server	Electronics and Office Equipment	C_University	ROB	Server	4	$4,736.74	3463.0	0.0	1.00	$0.30	0	Inf	-
Com | Smart Thermostats (Small Commercial) - kWh	Standard Thermostat	Space Heating and Cooling	C_Food Service	RET	Per kWh	20	$0.13	0.0	0.0	1.00	$0.43	6,817	$12.56	160,637
Com | Smart Thermostats (Small Commercial) - kWh	Standard Thermostat	Space Heating and Cooling	C_Office	RET	Per kWh	20	$0.12	0.0	0.0	1.00	$0.61	40,572	$64.80	266,935
Com | Smart Thermostats (Small Commercial) - kWh	Standard Thermostat	Space Heating and Cooling	C_Other	RET	Per kWh	20	$0.12	0.0	0.0	1.00	$0.63	23,772	$62.42	163,828
Com | Smart Thermostats (Small Commercial) - kWh	Standard Thermostat	Space Heating and Cooling	C_Retail	RET	Per kWh	20	$0.12	0.0	0.0	1.00	$3.25	4,188	$72.51	130,553
Com | Smart Thermostats (Small Commercial) - therm	Standard Thermostat	Space Heating and Cooling	C_Food Service	RET	Per Therm	20	$3.13	0.1	0.0	1.00	$65,535.00	-	$28.85	175,578
Com | Smart Thermostats (Small Commercial) - therm	Standard Thermostat	Space Heating and Cooling	C_Office	RET	Per Therm	20	$3.51	0.9	0.0	1.00	$65,535.00	-	$41.63	167,978
Com | Smart Thermostats (Small Commercial) - therm	Standard Thermostat	Space Heating and Cooling	C_Other	RET	Per Therm	20	$3.24	0.3	0.0	1.00	$65,535.00	-	$60.81	137,266
Com | Smart Thermostats (Small Commercial) - therm	Standard Thermostat	Space Heating and Cooling	C_Retail	RET	Per Therm	20	$3.17	0.3	0.0	1.00	$65,535.00	-	$47.97	101,941
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Food Service	NEW	kBtu/h capacity	11	$4.89	766.0	-62.6	0.25	$0.07	68	Inf	(5,149)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Food Service	ROB	kBtu/h capacity	11	$4.89	766.0	-62.6	0.25	$0.07	166	Inf	(12,657)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Grocery	NEW	kBtu/h capacity	11	$4.89	135.2	-11.8	0.25	$0.08	12	Inf	(959)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Grocery	ROB	kBtu/h capacity	11	$4.89	135.2	-11.8	0.25	$0.08	26	Inf	(2,134)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Hospital	NEW	kBtu/h capacity	11	$4.89	453.6	-37.2	0.25	$0.07	704	Inf	(53,724)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Hospital	ROB	kBtu/h capacity	11	$4.89	453.6	-37.2	0.25	$0.07	1,179	Inf	(89,938)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Lodging	NEW	kBtu/h capacity	11	$4.89	160.2	-13.8	0.25	$0.07	97	Inf	(7,752)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Lodging	ROB	kBtu/h capacity	11	$4.89	160.2	-13.8	0.25	$0.07	226	Inf	(18,140)

Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Office	NEW	kBtu/h capacity	11	$4.89	96.8	-8.7	0.25	$0.08	295	Inf	(24,770)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Office	ROB	kBtu/h capacity	11	$4.89	96.8	-8.7	0.25	$0.08	384	Inf	(32,167)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Other	NEW	kBtu/h capacity	11	$4.89	88.4	-7.9	0.25	$0.08	109	Inf	(9,117)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Other	ROB	kBtu/h capacity	11	$4.89	88.4	-7.9	0.25	$0.08	181	Inf	(15,084)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Retail	NEW	kBtu/h capacity	11	$4.89	122.9	-10.7	0.25	$0.08	26	Inf	(2,137)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Retail	ROB	kBtu/h capacity	11	$4.89	122.9	-10.7	0.25	$0.08	63	Inf	(5,082)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Schools	NEW	kBtu/h capacity	11	$4.89	28.8	-3.2	0.25	$0.11	5	Inf	(567)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Schools	ROB	kBtu/h capacity	11	$4.89	28.8	-3.2	0.25	$0.11	18	Inf	(1,894)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_University	NEW	kBtu/h capacity	11	$4.89	51.6	-5.0	0.25	$0.09	8	Inf	(721)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_University	ROB	kBtu/h capacity	11	$4.89	51.6	-5.0	0.25	$0.09	16	Inf	(1,490)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Warehouse	NEW	kBtu/h capacity	11	$4.89	84.2	-7.6	0.25	$0.08	13	Inf	(1,127)
Com | Storage Water Heater - Fuel Switch	Electric storage water heater	Hot Water	C_Warehouse	ROB	kBtu/h capacity	11	$4.89	84.2	-7.6	0.25	$0.08	31	Inf	(2,618)
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Food Service	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.64	9,665	$8.59	529,113
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Grocery	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.72	2,427	$34.37	33,077
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Hospital	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.69	17,200	$16.41	349,076
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Lodging	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.69	5,604	$14.88	177,518
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Office	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.73	79,029	$33.51	1,116,206
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Other	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.73	48,560	$20.70	1,113,558
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Retail	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.72	43,760	$29.30	704,417
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Schools	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.71	11,018	$17.49	299,986
Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_University	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.57	4,699	$4.85	330,298

Com | Strategic Energy Management - kWh	No SEM	Whole Building/House	C_Warehouse	RET	kWh Saved	5	$0.22	0.1	0.0	0.47	$0.73	1,370	$39.45	16,411
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Food Service	RET	Therms saved	5	$0.46	0.6	0.1	0.26	$65,535.00	-	$1.63	313,512
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Grocery	RET	Therms saved	5	$0.88	2.6	0.1	0.26	$65,535.00	-	$3.00	14,821
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Hospital	RET	Therms saved	5	$0.59	1.2	0.1	0.26	$65,535.00	-	$2.05	200,416
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Lodging	RET	Therms saved	5	$0.56	1.1	0.1	0.26	$65,535.00	-	$1.95	58,716
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Office	RET	Therms saved	5	$0.86	2.5	0.1	0.26	$65,535.00	-	$2.80	380,779
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Other	RET	Therms saved	5	$0.65	1.5	0.1	0.26	$65,535.00	-	$2.24	505,789
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Retail	RET	Therms saved	5	$0.80	2.2	0.1	0.26	$65,535.00	-	$2.69	298,176
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Schools	RET	Therms saved	5	$0.60	1.3	0.1	0.26	$65,535.00	-	$2.07	144,257
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_University	RET	Therms saved	5	$0.40	0.4	0.1	0.26	$65,535.00	-	$1.43	187,113
Com | Strategic Energy Management - therm	No SEM	Whole Building/House	C_Warehouse	RET	Therms saved	5	$0.96	2.9	0.1	0.26	$65,535.00	-	$3.23	7,535
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Food Service	RET	sqft of strip curtain	4	$16.34	54.8	0.0	0.61	$0.06	1,105	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Grocery	RET	sqft of strip curtain	4	$16.34	176.7	0.0	0.37	$0.01	2,704	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Hospital	RET	sqft of strip curtain	4	$16.34	54.8	0.0	0.68	$0.06	240	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Lodging	RET	sqft of strip curtain	4	$16.34	23.1	0.0	0.63	$0.15	21	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Office	RET	sqft of strip curtain	4	$16.34	23.1	0.0	0.51	$0.15	61	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Other	RET	sqft of strip curtain	4	$16.34	23.1	0.0	0.66	$0.15	127	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Retail	RET	sqft of strip curtain	4	$16.34	23.1	0.0	0.23	$0.15	55	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Schools	RET	sqft of strip curtain	4	$16.34	54.8	0.0	0.74	$0.06	118	Inf	-
Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_University	RET	sqft of strip curtain	4	$16.34	54.8	0.0	0.74	$0.06	155	Inf	-

Com | Strip Curtains	No strip curtains	Non-Res Refrigeration	C_Warehouse	RET	sqft of strip curtain	4	$16.34	688.3	0.0	0.29	$0.00	9,117	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Food Service	RET	Fixture	18	$242.88	108.2	-1.1	0.72	$0.17	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Grocery	RET	Fixture	18	$242.88	163.9	-1.5	0.95	$0.11	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Hospital	RET	Fixture	18	$242.88	97.4	-1.2	0.83	$0.19	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Lodging	RET	Fixture	18	$242.88	64.0	-0.7	0.32	$0.28	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Office	RET	Fixture	18	$242.88	74.8	-0.7	0.76	$0.24	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Other	RET	Fixture	18	$242.88	61.0	-0.6	0.81	$0.29	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Retail	RET	Fixture	18	$242.88	114.6	-1.1	0.88	$0.16	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Schools	RET	Fixture	18	$242.88	49.4	-0.5	0.87	$0.36	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_University	RET	Fixture	18	$242.88	56.4	-0.5	0.87	$0.32	-	Inf	-
Com | T5 Fixture w/EB - Interior	T8/T12 Fluorescent fixture	Lighting	C_Warehouse	RET	Fixture	18	$242.88	67.3	-0.7	0.86	$0.27	-	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Food Service	RET	Fixture	18	$123.88	185.9	-1.9	0.72	$0.07	3,452	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Grocery	RET	Fixture	18	$123.88	281.6	-2.6	0.95	$0.05	10,951	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Hospital	RET	Fixture	18	$123.88	167.4	-2.0	0.83	$0.08	6,476	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Lodging	RET	Fixture	18	$123.88	110.0	-1.2	0.32	$0.11	1,653	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Office	RET	Fixture	18	$123.88	128.6	-1.3	0.76	$0.09	243,029	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Other	RET	Fixture	18	$123.88	104.7	-1.0	0.81	$0.12	17,185	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Retail	RET	Fixture	18	$123.88	196.8	-1.9	0.88	$0.06	92,442	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Schools	RET	Fixture	18	$123.88	84.8	-0.9	0.87	$0.14	5,959	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_University	RET	Fixture	18	$123.88	96.9	-0.9	0.87	$0.13	8,966	Inf	-
Com | Troffer LED	T8/T12 Fluorescent fixture	Lighting	C_Warehouse	RET	Fixture	18	$123.88	115.6	-1.2	0.86	$0.11	15,653	Inf	-
Com |Occupancy-Based PTAC Controls	Standard PTAC Control	Space Cooling	C_Lodging	RET	Ton	15	$415.65	302.0	0.0	1.00	$0.11	11	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Food Service	RET	HP	15	$3,333.83	2013.2	0.0	0.95	$0.13	824	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Grocery	RET	HP	15	$3,333.83	2526.2	0.0	1.00	$0.11	55	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Hospital	RET	HP	15	$3,333.83	2972.2	0.0	0.95	$0.09	14,796	Inf	-

Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Lodging	RET	HP	15	$3,333.83	2972.6	0.0	0.50	$0.09	790	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Office	RET	HP	15	$3,333.83	995.3	0.0	0.28	$0.27	22,706	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Other	RET	HP	15	$3,333.83	1774.8	0.0	0.78	$0.15	3,660	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Retail	RET	HP	15	$3,333.83	1487.2	0.0	1.00	$0.18	74	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Schools	RET	HP	15	$3,333.83	952.9	0.0	0.62	$0.28	1,214	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_University	RET	HP	15	$3,333.83	1823.7	0.0	0.95	$0.15	384	Inf	-
Com |VFD on HVAC Fans/Pumps	HVAC Fan/Pump w/o VFD	Space Heating and Cooling	C_Warehouse	RET	HP	15	$3,333.83	1393.7	0.0	0.95	$0.19	3,265	Inf	-
Ind | Ag Pump Controls | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Other	RET	kWh consumed	15	$0.06	0.1	0.0	0.02	$0.04	189	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Chemicals	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	25	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Food Products	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	30	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Hi Tech	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	13	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Metal Fabrication & Foundries	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	18	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Nonmetallic Manufacturing	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	29	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Pulp & Paper	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	11	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Transportation & Equipment	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	37	Inf	-
Ind | Air Compressor Improvements | NEW	As found Air compressor	Compressed Air	I_Wood Products	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	15	Inf	-
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Chemicals	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	2,978	Inf	-
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Food Products	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	3,484	Inf	-
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Hi Tech	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	1,582	Inf	-
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Metal Fabrication & Foundries	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	2,149	Inf	-
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Nonmetallic Manufacturing	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	3,466	Inf	-

Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Pulp & Paper	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	1,306	Inf	-
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Transportation & Equipment	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	4,355	Inf	-
Ind | Air Compressor Improvements | RET	As found Air compressor	Compressed Air	I_Wood Products	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.01	1,728	Inf	-
Ind | Boiler Tune Up | NEW	As found Boiler	Process Heat	I_Chemicals	NEW	therms consumed	5	$0.02	0.0	0.1	1.00	$65,535.00	-	$0.08	3,625
Ind | Boiler Tune Up | NEW	As found Boiler	Process Heat	I_Food Products	NEW	therms consumed	5	$0.02	0.0	0.1	1.00	$65,535.00	-	$0.08	3,829
Ind | Boiler Tune Up | NEW	As found Boiler	Process Heat	I_Nonmetallic Manufacturing	NEW	therms consumed	5	$0.02	0.0	0.1	1.00	$65,535.00	-	$0.08	6,512
Ind | Boiler Tune Up | NEW	As found Boiler	Process Heat	I_Pulp & Paper	NEW	therms consumed	5	$0.02	0.0	0.1	1.00	$65,535.00	-	$0.08	603
Ind | Boiler Tune Up | NEW	As found Boiler	Process Heat	I_Wood Products	NEW	therms consumed	5	$0.02	0.0	0.1	1.00	$65,535.00	-	$0.08	1,980
Ind | Boiler Tune Up | RET	As found Boiler	Process Heat	I_Chemicals	RET	therms consumed	5	$0.02	0.0	0.1	1.00	$65,535.00	-	$0.08	63,922
Ind | Boiler Tune Up | RET	As found Boiler	Process Heat	I_Food Products	RET	therms consumed	5	$0.02	0.0	0.1	1.00	$65,535.00	-	$0.08	67,506
Ind | Boiler Tune Up | RET	As found Boiler	Process Heat	I_Nonmetallic Manufacturing	RET	therms consumed	5	$0.02	0.0	0.1	1.00	$65,535.00	-	$0.08	114,814
Ind | Boiler Tune Up | RET	As found Boiler	Process Heat	I_Pulp & Paper	RET	therms consumed	5	$0.02	0.0	0.1	1.00	$65,535.00	-	$0.08	10,641
Ind | Boiler Tune Up | RET	As found Boiler	Process Heat	I_Wood Products	RET	therms consumed	5	$0.02	0.0	0.1	1.00	$65,535.00	-	$0.08	34,907
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	28	Inf	-
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	21	Inf	-
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	9	Inf	-
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	18	Inf	-
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	21	Inf	-
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	NEW	kWh consumed	15	$0.00	0.1	0.0	1.00	-$0.01	25	Inf	-
Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	26	Inf	-

Ind | Centrifugal Fan | NEW	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	10	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	3,655	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	2,672	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	1,213	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	2,307	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	2,658	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	RET	kWh consumed	15	$0.00	0.1	0.0	1.00	-$0.01	3,204	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	3,340	Inf	-
Ind | Centrifugal Fan | RET	Inefficient fan equipment	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	-$0.01	1,325	Inf	-
Ind | Clean Room Upgrades | NEW	Any non participating site	Space Cooling	I_Hi Tech	NEW	kWh consumed	15	$0.05	0.1	0.0	0.00	$0.07	-	Inf	-
Ind | Clean Room Upgrades | NEW	Any non participating site	Space Cooling	I_Publishing, Broadcasting & Telecommunications	NEW	kWh consumed	15	$0.05	0.1	0.0	0.00	$0.07	-	Inf	-
Ind | Clean Room Upgrades | RET	Any non participating site	Space Cooling	I_Hi Tech	RET	kWh consumed	15	$0.05	0.1	0.0	0.00	$0.07	-	Inf	-
Ind | Clean Room Upgrades | RET	Any non participating site	Space Cooling	I_Publishing, Broadcasting & Telecommunications	RET	kWh consumed	15	$0.05	0.1	0.0	0.00	$0.07	-	Inf	-
Ind | Condenser Boiler | NEW	Conventional Boiler	Process Heat	I_Chemicals	NEW	therms consumed	15	$0.40	0.0	0.1	1.00	$65,535.00	-	$0.36	6,616
Ind | Condenser Boiler | NEW	Conventional Boiler	Process Heat	I_Food Products	NEW	therms consumed	15	$0.40	0.0	0.1	1.00	$65,535.00	-	$0.36	6,987
Ind | Condenser Boiler | NEW	Conventional Boiler	Process Heat	I_Nonmetallic Manufacturing	NEW	therms consumed	15	$0.40	0.0	0.1	1.00	$65,535.00	-	$0.36	11,883
Ind | Condenser Boiler | NEW	Conventional Boiler	Process Heat	I_Pulp & Paper	NEW	therms consumed	15	$0.40	0.0	0.1	1.00	$65,535.00	-	$0.36	1,101

Ind | Condenser Boiler | NEW	Conventional Boiler	Process Heat	I_Wood Products	NEW	therms consumed	15	$0.40	0.0	0.1	1.00	$65,535.00	-	$0.36	3,613
Ind | Condenser Boiler | RET	Conventional Boiler	Process Heat	I_Chemicals	RET	therms consumed	15	$0.40	0.0	0.1	1.00	$65,535.00	-	$0.36	116,652
Ind | Condenser Boiler | RET	Conventional Boiler	Process Heat	I_Food Products	RET	therms consumed	15	$0.40	0.0	0.1	1.00	$65,535.00	-	$0.36	123,192
Ind | Condenser Boiler | RET	Conventional Boiler	Process Heat	I_Nonmetallic Manufacturing	RET	therms consumed	15	$0.40	0.0	0.1	1.00	$65,535.00	-	$0.36	209,525
Ind | Condenser Boiler | RET	Conventional Boiler	Process Heat	I_Pulp & Paper	RET	therms consumed	15	$0.40	0.0	0.1	1.00	$65,535.00	-	$0.36	19,419
Ind | Condenser Boiler | RET	Conventional Boiler	Process Heat	I_Wood Products	RET	therms consumed	15	$0.40	0.0	0.1	1.00	$65,535.00	-	$0.36	63,702
Ind | De Strat Fans Electric | NEW	No Destrat System	Space Heating and Cooling	I_Food Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	15	Inf	-
Ind | De Strat Fans Electric | NEW	No Destrat System	Space Heating and Cooling	I_Hi Tech	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	7	Inf	-
Ind | De Strat Fans Electric | NEW	No Destrat System	Space Heating and Cooling	I_Nonmetallic Manufacturing	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	14	Inf	-
Ind | De Strat Fans Electric | NEW	No Destrat System	Space Heating and Cooling	I_Other	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	9	Inf	-
Ind | De Strat Fans Electric | NEW	No Destrat System	Space Heating and Cooling	I_Publishing, Broadcasting & Telecommunications	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	8	Inf	-
Ind | De Strat Fans Electric | RET	No Destrat System	Space Heating and Cooling	I_Food Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,872	Inf	-
Ind | De Strat Fans Electric | RET	No Destrat System	Space Heating and Cooling	I_Hi Tech	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	850	Inf	-
Ind | De Strat Fans Electric | RET	No Destrat System	Space Heating and Cooling	I_Nonmetallic Manufacturing	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,862	Inf	-
Ind | De Strat Fans Electric | RET	No Destrat System	Space Heating and Cooling	I_Other	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,202	Inf	-
Ind | De Strat Fans Electric | RET	No Destrat System	Space Heating and Cooling	I_Publishing, Broadcasting & Telecommunications	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,035	Inf	-
Ind | De Strat Fans Gas | NEW	No Destrat System	Space Heating and Cooling	I_Food Products	NEW	therms consumed	15	$0.08	0.0	0.1	1.00	$65,535.00	-	$0.11	4,681
Ind | De Strat Fans Gas | NEW	No Destrat System	Space Heating and Cooling	I_Hi Tech	NEW	therms consumed	15	$0.08	0.0	0.1	1.00	$65,535.00	-	$0.11	1,038
Ind | De Strat Fans Gas | NEW	No Destrat System	Space Heating and Cooling	I_Nonmetallic Manufacturing	NEW	therms consumed	15	$0.08	0.0	0.1	1.00	$65,535.00	-	$0.11	7,961
Ind | De Strat Fans Gas | NEW	No Destrat System	Space Heating and Cooling	I_Other	NEW	therms consumed	15	$0.08	0.0	0.1	1.00	$65,535.00	-	$0.11	6,870

Ind | De Strat Fans Gas | NEW	No Destrat System	Space Heating and Cooling	I_Publishing, Broadcasting & Telecommunications	NEW	therms consumed	15	$0.08	0.0	0.1	1.00	$65,535.00	-	$0.11	769
Ind | De Strat Fans Gas | RET	No Destrat System	Space Heating and Cooling	I_Food Products	RET	therms consumed	15	$0.08	0.0	0.1	1.00	$65,535.00	-	$0.11	82,789
Ind | De Strat Fans Gas | RET	No Destrat System	Space Heating and Cooling	I_Hi Tech	RET	therms consumed	15	$0.08	0.0	0.1	1.00	$65,535.00	-	$0.11	18,353
Ind | De Strat Fans Gas | RET	No Destrat System	Space Heating and Cooling	I_Nonmetallic Manufacturing	RET	therms consumed	15	$0.08	0.0	0.1	1.00	$65,535.00	-	$0.11	140,808
Ind | De Strat Fans Gas | RET	No Destrat System	Space Heating and Cooling	I_Other	RET	therms consumed	15	$0.08	0.0	0.1	1.00	$65,535.00	-	$0.11	121,518
Ind | De Strat Fans Gas | RET	No Destrat System	Space Heating and Cooling	I_Publishing, Broadcasting & Telecommunications	RET	therms consumed	15	$0.08	0.0	0.1	1.00	$65,535.00	-	$0.11	13,598
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	2	Inf	-
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	3	Inf	-
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	1	Inf	-
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	2	Inf	-
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	3	Inf	-
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	1	Inf	-
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	3	Inf	-
Ind | Effcient Conveyor Belts | NEW	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	1	Inf	-
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	279	Inf	-
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	326	Inf	-

Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	148	Inf	-
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	201	Inf	-
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	325	Inf	-
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	122	Inf	-
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	408	Inf	-
Ind | Effcient Conveyor Belts | RET	As found Conveyer	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	162	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	16	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	19	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	9	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	12	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	19	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	7	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	23	Inf	-
Ind | Fan System Optimization | NEW	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	NEW	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	9	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	2,065	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	2,416	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	1,097	Inf	-

Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	1,490	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	2,403	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	905	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	3,020	Inf	-
Ind | Fan System Optimization | RET	As found Fan	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	RET	kWh consumed	10	$0.00	0.0	0.0	1.00	$0.01	1,198	Inf	-
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Chemicals	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	1,006
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Food Products	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	1,062
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Hi Tech	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	235
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Metal Fabrication & Foundries	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	2,364
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Nonmetallic Manufacturing	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	1,806
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Pulp & Paper	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	167
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Transportation & Equipment	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	1,659
Ind | Furnace Covers | NEW	No tank covers	Process Heat	I_Wood Products	NEW	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	549
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Chemicals	RET	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	-
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Food Products	RET	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	-
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Hi Tech	RET	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	4,151
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Metal Fabrication & Foundries	RET	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	41,683
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Nonmetallic Manufacturing	RET	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	31,850
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Pulp & Paper	RET	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	2,952
Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Transportation & Equipment	RET	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	29,258

Ind | Furnace Covers | RET	No tank covers	Process Heat	I_Wood Products	RET	therms consumed	11	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.06	9,683
Ind | Heat recovery	No recovery	Process Heat	I_Chemicals	RET	therms consumed	10	$0.06	0.0	0.0	1.00	$65,535.00	-	$0.16	49,707
Ind | Heat recovery	No recovery	Process Heat	I_Food Products	RET	therms consumed	10	$0.06	0.0	0.0	1.00	$65,535.00	-	$0.16	52,494
Ind | Heat recovery	No recovery	Process Heat	I_Nonmetallic Manufacturing	RET	therms consumed	10	$0.06	0.0	0.0	1.00	$65,535.00	-	$0.16	89,282
Ind | Heat recovery	No recovery	Process Heat	I_Other	RET	therms consumed	10	$0.06	0.0	0.0	1.00	$65,535.00	-	$0.16	77,051
Ind | Heat recovery	No recovery	Process Heat	I_Pulp & Paper	RET	therms consumed	10	$0.06	0.0	0.0	1.00	$65,535.00	-	$0.16	8,275
Ind | Heat recovery	No recovery	Process Heat	I_Transportation & Equipment	RET	therms consumed	10	$0.06	0.0	0.0	1.00	$65,535.00	-	$0.16	82,018
Ind | Heat recovery	No recovery	Process Heat	I_Wood Products	RET	therms consumed	10	$0.06	0.0	0.0	1.00	$65,535.00	-	$0.16	27,144
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	8	Inf	-
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	9	Inf	-
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	4	Inf	-
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	6	Inf	-
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	9	Inf	-
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	4	Inf	-
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	12	Inf	-
Ind | High Effciency Fans | NEW	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	5	Inf	-
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,043	Inf	-
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,220	Inf	-
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	554	Inf	-

Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	753	Inf	-
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,214	Inf	-
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	457	Inf	-
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	1,525	Inf	-
Ind | High Effciency Fans | RET	As found Fan Motors	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.01	605	Inf	-
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Chemicals	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	9,173
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Food Products	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	9,687
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Hi Tech	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	2,147
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Metal Fabrication & Foundries	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	21,563
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Nonmetallic Manufacturing	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	16,476
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Pulp & Paper	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	1,527
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Transportation & Equipment	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	15,136
Ind | High Efficiency Oven | NEW	Convetional ovens	Process Heat	I_Wood Products	NEW	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	5,009
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Chemicals	RET	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	161,739
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Food Products	RET	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	170,807
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Hi Tech	RET	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	37,864
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Metal Fabrication & Foundries	RET	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	380,202
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Nonmetallic Manufacturing	RET	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	290,509
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Pulp & Paper	RET	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	26,924
Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Transportation & Equipment	RET	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	266,873

Ind | High Efficiency Oven | RET	Convetional ovens	Process Heat	I_Wood Products	RET	therms consumed	18	$0.54	0.0	0.1	1.00	$65,535.00	-	$0.31	88,323
Ind | LED Street Lighting	HID Street Lighting	Lighting	I_Public Street & Highway Lighting	NEW	kWh consumed	20	$0.32	0.6	0.0	0.92	$0.03	-	Inf	-
Ind | LED Street Lighting	HID Street Lighting	Lighting	I_Public Street & Highway Lighting	ROB	kWh consumed	20	$0.32	0.6	0.0	0.92	$0.03	29,803	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Chemicals	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	21	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Food Products	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	24	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Hi Tech	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	11	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Metal Fabrication & Foundries	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	15	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Nonmetallic Manufacturing	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	24	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Pulp & Paper	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	9	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Transportation & Equipment	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	30	Inf	-
Ind | Lighting Improvements | NEW	As found Lighting	Lighting	I_Wood Products	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	12	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Chemicals	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	2,686	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Food Products	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	3,142	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Hi Tech	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	1,427	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Metal Fabrication & Foundries	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	1,938	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Nonmetallic Manufacturing	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	3,125	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Pulp & Paper	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	1,177	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Transportation & Equipment	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	3,927	Inf	-
Ind | Lighting Improvements | RET	As found Lighting	Lighting	I_Wood Products	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.03	1,558	Inf	-

Ind | Process Boiler Load Controls | NEW	Conventional boiler with minmal controls	Process Heat	I_Chemicals	NEW	therms consumed	15	$0.10	0.0	0.1	1.00	$65,535.00	-	$0.11	5,347
Ind | Process Boiler Load Controls | NEW	Conventional boiler with minmal controls	Process Heat	I_Food Products	NEW	therms consumed	15	$0.10	0.0	0.1	1.00	$65,535.00	-	$0.11	5,647
Ind | Process Boiler Load Controls | NEW	Conventional boiler with minmal controls	Process Heat	I_Nonmetallic Manufacturing	NEW	therms consumed	15	$0.10	0.0	0.1	1.00	$65,535.00	-	$0.11	9,605
Ind | Process Boiler Load Controls | NEW	Conventional boiler with minmal controls	Process Heat	I_Pulp & Paper	NEW	therms consumed	15	$0.10	0.0	0.1	1.00	$65,535.00	-	$0.11	890
Ind | Process Boiler Load Controls | NEW	Conventional boiler with minmal controls	Process Heat	I_Wood Products	NEW	therms consumed	15	$0.10	0.0	0.1	1.00	$65,535.00	-	$0.11	2,920
Ind | Process Boiler Load Controls | RET	Conventional boiler with minmal controls	Process Heat	I_Chemicals	RET	therms consumed	15	$0.10	0.0	0.1	1.00	$65,535.00	-	$0.11	94,285
Ind | Process Boiler Load Controls | RET	Conventional boiler with minmal controls	Process Heat	I_Food Products	RET	therms consumed	15	$0.10	0.0	0.1	1.00	$65,535.00	-	$0.11	99,571
Ind | Process Boiler Load Controls | RET	Conventional boiler with minmal controls	Process Heat	I_Nonmetallic Manufacturing	RET	therms consumed	15	$0.10	0.0	0.1	1.00	$65,535.00	-	$0.11	169,351
Ind | Process Boiler Load Controls | RET	Conventional boiler with minmal controls	Process Heat	I_Pulp & Paper	RET	therms consumed	15	$0.10	0.0	0.1	1.00	$65,535.00	-	$0.11	15,695
Ind | Process Boiler Load Controls | RET	Conventional boiler with minmal controls	Process Heat	I_Wood Products	RET	therms consumed	15	$0.10	0.0	0.1	1.00	$65,535.00	-	$0.11	51,488
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Chemicals	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	4,568	Inf	-
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Food Products	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	5,344	Inf	-
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Hi Tech	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	2,427	Inf	-
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Metal Fabrication & Foundries	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	3,296	Inf	-
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Nonmetallic Manufacturing	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	5,316	Inf	-
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Pulp & Paper	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	2,003	Inf	-
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Transportation & Equipment	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	6,680	Inf	-
Ind | Process Optimization | RET	Any non participating site	Whole Building/House	I_Wood Products	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.01	2,651	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	26	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	30	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	14	Inf	-

Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	18	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	30	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	11	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	37	Inf	-
Ind | Pump Equipment Upgrades | NEW	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	15	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	3,024	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	3,538	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	1,607	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	2,182	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	3,519	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	1,326	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	4,422	Inf	-
Ind | Pump Equipment Upgrades | RET	As found Pump	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.02	1,755	Inf	-
Ind | Reduce Steam Pressure | NEW	Higher Steam Pressure	Process Heat	I_Chemicals	NEW	therms consumed	6	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.14	1,245
Ind | Reduce Steam Pressure | NEW	Higher Steam Pressure	Process Heat	I_Food Products	NEW	therms consumed	6	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.14	1,315
Ind | Reduce Steam Pressure | NEW	Higher Steam Pressure	Process Heat	I_Nonmetallic Manufacturing	NEW	therms consumed	6	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.14	2,237
Ind | Reduce Steam Pressure | NEW	Higher Steam Pressure	Process Heat	I_Pulp & Paper	NEW	therms consumed	6	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.14	207
Ind | Reduce Steam Pressure | NEW	Higher Steam Pressure	Process Heat	I_Wood Products	NEW	therms consumed	6	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.14	680

Ind | Reduce Steam Pressure | RET	Higher Steam Pressure	Process Heat	I_Chemicals	RET	therms consumed	6	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.14	21,956
Ind | Reduce Steam Pressure | RET	Higher Steam Pressure	Process Heat	I_Food Products	RET	therms consumed	6	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.14	23,187
Ind | Reduce Steam Pressure | RET	Higher Steam Pressure	Process Heat	I_Nonmetallic Manufacturing	RET	therms consumed	6	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.14	39,437
Ind | Reduce Steam Pressure | RET	Higher Steam Pressure	Process Heat	I_Pulp & Paper	RET	therms consumed	6	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.14	3,655
Ind | Reduce Steam Pressure | RET	Higher Steam Pressure	Process Heat	I_Wood Products	RET	therms consumed	6	$0.01	0.0	0.0	1.00	$65,535.00	-	$0.14	11,990
Ind | Refrigeration Equipment VFD | NEW	As found Refrigeration System	Non-Res Refrigeration	I_Food Products	NEW	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.04	28	Inf	-
Ind | Refrigeration Equipment VFD | RET	As found Refrigeration System	Non-Res Refrigeration	I_Food Products	RET	kWh consumed	15	$0.01	0.0	0.0	1.00	$0.04	3,567	Inf	-
Ind | Refrigeration System Upgrades | NEW	As found Refrigeration System	Non-Res Refrigeration	I_Food Products	NEW	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.02	46	Inf	-
Ind | Refrigeration System Upgrades | RET	As found Refrigeration System	Non-Res Refrigeration	I_Food Products	RET	kWh consumed	10	$0.01	0.0	0.0	1.00	$0.02	5,984	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | NEW	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	NEW	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	0	Inf	-
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Chemicals	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	12	Inf	-
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Food Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	14	Inf	-

Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Hi Tech	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	7	Inf	-
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Metal Fabrication & Foundries	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	9	Inf	-
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Nonmetallic Manufacturing	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	14	Inf	-
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Pulp & Paper	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	5	Inf	-
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Transportation & Equipment	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	18	Inf	-
Ind | Ultra High Efficiency Motors | RET	NEMA Premium Motors	Fans, Blowers, Motors, Drives and Pumps	I_Wood Products	RET	kWh consumed	15	$0.00	0.0	0.0	1.00	$0.00	7	Inf	-
Res | Advanced Power Strips, Elec	Standard Power Strip - Home Office Only	Electronics and Office Equipment	R_Manufactured Homes	RET	Advanced Power Strips per house	5	$63.95	70.0	0.0	0.62	$0.16	3,018	Inf	-
Res | Advanced Power Strips, Elec	Standard Power Strip - Home Office Only	Electronics and Office Equipment	R_Multi Family	RET	Advanced Power Strips per house	5	$63.95	70.0	0.0	0.84	$0.16	21,085	Inf	-
Res | Advanced Power Strips, Elec	Standard Power Strip - Home Office Only	Electronics and Office Equipment	R_Single Family	RET	Advanced Power Strips per house	5	$63.95	70.0	0.0	0.62	$0.16	29,172	Inf	-
Res | Air Cleaner	Standard Room Air Cleaner - max 450 sq ft	Electronics and Office Equipment	R_Manufactured Homes	ROB	air cleaner	4	$203.03	203.2	0.0	0.20	$0.22	103	Inf	-
Res | Air Cleaner	Standard Room Air Cleaner - max 450 sq ft	Electronics and Office Equipment	R_Multi Family	ROB	air cleaner	4	$203.03	203.2	0.0	0.20	$0.22	631	Inf	-
Res | Air Cleaner	Standard Room Air Cleaner - max 450 sq ft	Electronics and Office Equipment	R_Single Family	ROB	air cleaner	4	$203.03	203.2	0.0	0.20	$0.22	2,087	Inf	-
Res | Air Sealing - Gas and Electric	Base Infiltration (0.60 ACH)	Space Heating and Cooling	R_Manufactured Homes	RET	home	10	$2,397.98	401.0	4.9	0.63	$0.61	15,246	$53.79	135,130
Res | Air Sealing - Gas and Electric	Base Infiltration (0.60 ACH)	Space Heating and Cooling	R_Multi Family	RET	home	10	$2,397.98	271.3	5.5	0.64	$0.89	41,462	$48.59	603,620
Res | Air Sealing - Gas and Electric	Base Infiltration (0.6 ACH)	Space Heating and Cooling	R_Single Family	RET	home	10	$2,397.98	135.8	31.1	0.65	$1.77	51,427	$8.63	8,494,157
Res | Air Source Heat Pump	Air Source Heat Pump <= 14 SEER, 8.2 HSPF	Space Heating and Cooling	R_Manufactured Homes	ROB	Heat Pump	12	$337.04	693.2	0.0	0.74	$0.03	1,024	Inf	-
Res | Air Source Heat Pump	Air Source Heat Pump <= 14 SEER, 8.2 HSPF	Space Heating and Cooling	R_Multi Family	ROB	Heat Pump	12	$383.28	788.3	0.0	0.90	$0.02	4,522	Inf	-
Res | Air Source Heat Pump	Air Source Heat Pump <= 14 SEER, 8.2 HSPF	Space Heating and Cooling	R_Single Family	ROB	Heat Pump	12	$423.43	870.9	0.0	0.57	$0.02	18,202	Inf	-

Res | Attic Insulation/Ceiling Insulation - Gas and Electric	R-15 Attic Insulation	Space Heating and Cooling	R_Manufactured Homes	RET	sq. ft. attic area	25	$1.33	1.2	0.0	0.15	$0.05	12,678	$11.55	47,310
Res | Attic Insulation/Ceiling Insulation - Gas and Electric	R-15 Attic Insulation	Space Heating and Cooling	R_Single Family	RET	sq. ft. attic area	25	$1.33	0.3	0.0	0.15	$0.24	29,888	$2.93	2,164,569
Res | Central AC Quality Installation Verification	No CAC QIV	Space Cooling	R_Manufactured Homes	NEW	QIV	7	$399.66	149.5	0.0	1.00	$0.37	40	Inf	-
Res | Central AC Quality Installation Verification	No CAC QIV	Space Cooling	R_Multi Family	NEW	QIV	7	$399.66	149.5	0.0	1.00	$0.37	105	Inf	-
Res | Central AC Quality Installation Verification	No CAC QIV	Space Cooling	R_Single Family	NEW	QIV	7	$399.66	149.5	0.0	1.00	$0.37	1,273	Inf	-
Res | Central Air Conditioner Replacement	Central AC SEER 13	Space Cooling	R_Manufactured Homes	ROB	AC	7	$399.66	108.0	0.0	1.00	$0.52	261	Inf	-
Res | Central Air Conditioner Replacement	Central AC SEER 13	Space Cooling	R_Multi Family	ROB	AC	7	$399.66	108.0	0.0	1.00	$0.52	149	Inf	-
Res | Central Air Conditioner Replacement	Central AC SEER 13	Space Cooling	R_Single Family	ROB	AC	7	$399.66	108.0	0.0	1.00	$0.52	2,653	Inf	-
Res | Central Air Conditioner Tune up	No tune-up Maintanance	Space Cooling	R_Manufactured Homes	RET	Tune Up	10	$79.93	164.8	0.0	1.00	$0.05	413	Inf	-
Res | Central Air Conditioner Tune up	No tune-up Maintanance	Space Cooling	R_Multi Family	RET	Tune Up	10	$79.93	164.8	0.0	1.00	$0.05	236	Inf	-
Res | Central Air Conditioner Tune up	No tune-up Maintanance	Space Cooling	R_Single Family	RET	Tune Up	10	$79.93	164.8	0.0	1.00	$0.05	4,201	Inf	-
Res | CFL Bulbs (Reflector)	Mixed Market Incandescent Bulb/Halogen Bulb	Lighting	R_Manufactured Homes	ROB	Lamps	4.557094	$2.10	0.0	0.0	1.00	$0.02	-	Inf	-
Res | CFL Bulbs (Reflector)	Mixed Market Incandescent Bulb/Halogen Bulb	Lighting	R_Multi Family	ROB	Lamps	4.557094	$2.10	0.0	0.0	0.78	$0.02	-	Inf	-
Res | CFL Bulbs (Reflector)	Mixed Market Incandescent Bulb/Halogen Bulb	Lighting	R_Single Family	ROB	Lamps	4.557094	$2.10	0.0	0.0	0.72	$0.02	-	Inf	-
Res | Clothes Dryer - Fuel Switch - MF	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Multi Family	NEW	Clothes Dryer	12	$334.86	789.5	-10.4	0.25	$0.04	394	Inf	(4,835)
Res | Clothes Dryer - Fuel Switch - SF	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Single Family	ROB	Clothes Dryer	12	$334.86	789.5	-10.4	0.68	$0.04	5,501	Inf	-
Res | Clothes Washer | Electric DHW	RTF Market Standard 2016 Clothes Washer - MEF 2.64 and WF 3.9 (Electric DHW & Dryer)	Appliances	R_Manufactured Homes	ROB	Washers	14.2	$142.09	7.7	0.0	0.40	$0.98	145	Inf	-

Res | Clothes Washer | Electric DHW	RTF Market Standard 2016 Clothes Washer - MEF 2.64 and WF 3.9 (Electric DHW & Dryer)	Appliances	R_Multi Family	ROB	Washers	14.2	$142.09	7.7	0.0	0.40	$0.98	392	Inf	-
Res | Clothes Washer | Electric DHW	RTF Market Standard 2016 Clothes Washer - MEF 2.64 and WF 3.9 (Electric DHW & Dryer)	Appliances	R_Single Family	ROB	Washers	14.2	$142.09	7.7	0.0	0.40	$0.98	609	Inf	-
Res | Clothes Washer | Gas DHW	RTF Market Standard 2016 Clothes Washer - MEF 2.64 and WF 3.9 (Electric DHW & Dryer)	Appliances	R_Manufactured Homes	ROB	Washers	14.2	$157.33	0.0	1.6	0.40	$65,535.00	-	$7.56	1,335
Res | Clothes Washer | Gas DHW	RTF Market Standard 2016 Clothes Washer - MEF 2.64 and WF 3.9 (Electric DHW & Dryer)	Appliances	R_Multi Family	ROB	Washers	14.2	$157.33	0.0	1.6	0.40	$65,535.00	-	$7.56	16,801
Res | Clothes Washer | Gas DHW	RTF Market Standard 2016 Clothes Washer - MEF 2.64 and WF 3.9 (Electric DHW & Dryer)	Appliances	R_Single Family	ROB	Washers	14.2	$157.33	0.0	1.6	0.40	$65,535.00	-	$7.56	122,978
Res | Dishwasher | Electric HW	Federal Standard Dishwasher - 307 kWh/yr and 5.0 gal/cycle	Appliances	R_Manufactured Homes	ROB	Dishwashers	15.4	$79.93	37.0	0.0	0.16	$0.15	144	Inf	-
Res | Dishwasher | Electric HW	Federal Standard Dishwasher - 307 kWh/yr and 5.0 gal/cycle	Appliances	R_Multi Family	ROB	Dishwashers	15.4	$79.93	37.0	0.0	0.16	$0.15	663	Inf	-
Res | Dishwasher | Electric HW	Federal Standard Dishwasher - 307 kWh/yr and 5.0 gal/cycle	Appliances	R_Single Family	ROB	Dishwashers	15.4	$79.93	37.0	0.0	0.16	$0.15	734	Inf	-
Res | Dishwasher | Gas HW	RTF Market Standard 2014 Dishwasher - 277 kWh/yr and 3.82 gal/cycle	Appliances	R_Manufactured Homes	ROB	Dishwashers	15.4	$79.93	16.3	0.9	0.16	$0.29	5	$5.05	104
Res | Dishwasher | Gas HW	RTF Market Standard 2014 Dishwasher - 277 kWh/yr and 3.82 gal/cycle	Appliances	R_Multi Family	ROB	Dishwashers	15.4	$79.93	16.3	0.9	0.16	$0.29	108	$5.05	2,217
Res | Dishwasher | Gas HW	RTF Market Standard 2014 Dishwasher - 277 kWh/yr and 3.82 gal/cycle	Appliances	R_Single Family	ROB	Dishwashers	15.4	$79.93	16.3	0.9	0.16	$0.29	563	$5.05	11,565
Res | Duct Insulation - Gas and Electric	No Duct Insulation	Space Heating and Cooling	R_Manufactured Homes	RET	home	20	$3,367.91	466.4	7.3	0.18	$0.48	5,053	$28.10	56,729

Res | Duct Insulation - Gas and Electric	No Duct Insulation	Space Heating and Cooling	R_Single Family	RET	home	20	$5,155.44	71.9	45.8	0.18	$4.78	7,533	$8.26	3,460,653
Res | Duct Sealing - Gas and Electric	No Duct Sealing	Space Heating and Cooling	R_Manufactured Homes	RET	home	18	$739.63	648.3	8.4	0.25	$0.06	9,757	-$1.15	91,007
Res | Duct Sealing - Gas and Electric	No Duct Sealing	Space Heating and Cooling	R_Multi Family	RET	home	20	$393.28	78.0	5.6	0.25	$0.23	4,647	$3.76	240,295
Res | Duct Sealing - Gas and Electric	No Duct Sealing	Space Heating and Cooling	R_Single Family	RET	home	20	$1,118.07	83.3	48.2	0.25	$0.73	12,117	$1.54	5,063,372
Res | Ductless Mini-Split Heat Pumps	Electric Resistance Heating	Space Heating	R_Manufactured Homes	ROB	Heater	18	$7,034.06	2029.0	0.0	0.15	$0.23	11,925	Inf	-
Res | Ductless Mini-Split Heat Pumps	Electric Resistance Heating	Space Heating	R_Multi Family	ROB	Heater	18	$7,034.06	2029.0	0.0	0.66	$0.23	121,944	Inf	-
Res | Ductless Mini-Split Heat Pumps - SF	Electric Resistance Heating	Space Heating	R_Single Family	ROB	Heater	18	$7,034.06	2029.0	0.0	0.26	$0.22	75,392	Inf	-
Res | ECM Motor MH	Standard Motor	Space Heating	R_Manufactured Homes	ROB	Furnace Motor	18	$742.30	223.2	0.0	0.90	$0.21	7,688	Inf	-
Res | ECM Motor SF MF	Standard Motor	Space Heating	R_Multi Family	ROB	Furnace Motor	18	$742.30	53.6	0.0	0.91	$0.48	631	Inf	-
Res | ECM Motor SF MF	Standard Motor	Space Heating	R_Single Family	ROB	Furnace Motor	18	$742.30	53.6	0.0	0.92	$0.48	18,275	Inf	-
Res | Electric Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Manufactured Homes	ROB	Clothes Dryer	12	$334.86	329.1	0.0	0.85	$0.09	6,583	Inf	-
Res | Electric Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Multi Family	ROB	Clothes Dryer	12	$334.86	329.1	0.0	0.85	$0.09	21,710	Inf	-
Res | Electric Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Single Family	ROB	Clothes Dryer	12	$334.86	329.1	0.0	0.85	$0.09	42,971	Inf	-
Res | Electric Resistance Heating - Fuel Switch - MF	Electric Resistance heating	Space Heating	R_Multi Family	NEW	Heater	20	$1,240.28	9839.3	-410.0	0.25	$0.04	39,634	Inf	(1,538,661)
Res | Electric Resistance Heating - Fuel Switch - SF	Electric Resistance heating	Space Heating	R_Single Family	ROB	Heater	20	$1,240.28	9839.3	-410.0	0.13	$0.03	84,999	Inf	-
Res | Electric Storage Water Heater	Electric Water Heater, 55 gal.	Hot Water	R_Manufactured Homes	ROB	water heater	13	$527.55	159.7	0.0	1.00	$0.28	7,919	Inf	-
Res | Electric Storage Water Heater	Electric Water Heater, 55 gal.	Hot Water	R_Multi Family	ROB	water heater	13	$527.55	159.7	0.0	1.00	$0.28	32,570	Inf	-
Res | Electric Storage Water Heater	Electric Water Heater, 55 gal.	Hot Water	R_Single Family	ROB	water heater	13	$527.55	159.7	0.0	1.00	$0.28	29,356	Inf	-
Res | Energy Efficient Building - Electric & Gas ST	Code compliant building	Whole Building/House	R_Multi Family	NEW	Base kWh consumed	20	$0.38	0.3	0.0	1.00	$0.01	135,621	-$0.04	2,311,828
Res | Energy Efficient Building - Gas Only ST	Code compliant building	Whole Building/House	R_Multi Family	NEW	Base therms consumed	20	$8.22	6.6	0.3	1.00	$65,535.00	-	$1.80	2,987,189
Res | ENERGY STAR CFL Bulbs (General Service Lamps)	Incandescent - EISA Standard	Lighting	R_Manufactured Homes	ROB	Lamps	7	$2.29	0.0	0.0	0.53	$0.07	-	Inf	-
Res | ENERGY STAR CFL Bulbs (General Service Lamps)	Incandescent - EISA Standard	Lighting	R_Multi Family	ROB	Lamps	7	$2.29	0.0	0.0	0.47	$0.07	-	Inf	-

Res | ENERGY STAR CFL Bulbs (General Service Lamps)	Incandescent - EISA Standard	Lighting	R_Single Family	ROB	Lamps	7	$2.29	0.0	0.0	0.89	$0.07	-	Inf	-
Res | ENERGY STAR CFL Bulbs (Specialty, Non-Reflector)	Incandescent - Specialty	Lighting	R_Manufactured Homes	ROB	Lamps	7	$3.58	0.0	0.0	0.97	$0.08	-	Inf	-
Res | ENERGY STAR CFL Bulbs (Specialty, Non-Reflector)	Incandescent - Specialty	Lighting	R_Multi Family	ROB	Lamps	7	$3.58	0.0	0.0	0.93	$0.08	-	Inf	-
Res | ENERGY STAR CFL Bulbs (Specialty, Non-Reflector)	Incandescent - Specialty	Lighting	R_Single Family	ROB	Lamps	7	$3.58	0.0	0.0	0.93	$0.08	-	Inf	-
Res | Energy Star Home, Electric & Gas ST	2012 IECC Code	Whole Building/House	R_Single Family	NEW	Base kWh consumed	20	$1.08	0.1	0.0	1.00	$0.66	128,741	$11.89	2,712,977
Res | Energy Star Home, Gas Only ST	2012 IECC Code	Whole Building/House	R_Single Family	NEW	Base therms consumed	20	$19.84	1.9	0.1	1.00	$65,535.00	-	$14.61	3,376,379
Res | Energy Star Television, Elec	Standard Television	Electronics and Office Equipment	R_Manufactured Homes	ROB	Per Television	6	$159.87	20.1	0.0	0.29	$1.25	669	Inf	-
Res | Energy Star Television, Elec	Standard Television	Electronics and Office Equipment	R_Multi Family	ROB	Per Television	6	$159.87	20.1	0.0	0.29	$1.25	2,383	Inf	-
Res | Energy Star Television, Elec	Standard Television	Electronics and Office Equipment	R_Single Family	ROB	Per Television	6	$159.87	20.1	0.0	0.29	$1.25	6,967	Inf	-
Res | Faucet Aerators - Bathroom, Electric WH	2.2 GPM - Bathroom	Hot Water	R_Manufactured Homes	RET	Bathroom Faucets	10	$21.23	76.1	0.0	0.43	$0.02	3,821	Inf	-
Res | Faucet Aerators - Bathroom, Electric WH	2.2 GPM - Bathroom	Hot Water	R_Multi Family	RET	Bathroom Faucets	10	$21.23	76.1	0.0	0.43	$0.02	9,662	Inf	-
Res | Faucet Aerators - Bathroom, Electric WH	2.2 GPM - Bathroom	Hot Water	R_Single Family	RET	Bathroom Faucets	10	$21.23	76.1	0.0	0.43	$0.02	14,838	Inf	-
Res | Faucet Aerators - Bathroom, Gas WH	2.2 GPM - Bathroom	Hot Water	R_Manufactured Homes	RET	Bathroom Faucets	10	$21.23	0.0	3.2	0.43	$65,535.00	-	$0.67	9,281
Res | Faucet Aerators - Bathroom, Gas WH	2.2 GPM - Bathroom	Hot Water	R_Multi Family	RET	Bathroom Faucets	10	$21.23	0.0	3.2	0.43	$65,535.00	-	$0.67	109,136
Res | Faucet Aerators - Bathroom, Gas WH	2.2 GPM - Bathroom	Hot Water	R_Single Family	RET	Bathroom Faucets	10	$21.23	0.0	3.2	0.43	$65,535.00	-	$0.67	789,756
Res | Faucet Aerators - Kitchen, Electric WH	2.2 GPM - Kitchen	Hot Water	R_Manufactured Homes	RET	Kitchen Faucets	10	$21.23	34.5	0.0	0.43	$0.05	771	Inf	-
Res | Faucet Aerators - Kitchen, Electric WH	2.2 GPM - Kitchen	Hot Water	R_Multi Family	RET	Kitchen Faucets	10	$21.23	34.5	0.0	0.43	$0.05	2,508	Inf	-
Res | Faucet Aerators - Kitchen, Electric WH	2.2 GPM - Kitchen	Hot Water	R_Single Family	RET	Kitchen Faucets	10	$21.23	34.5	0.0	0.43	$0.05	2,995	Inf	-
Res | Faucet Aerators - Kitchen, Gas WH	2.2 GPM - Kitchen	Hot Water	R_Manufactured Homes	RET	Kitchen Faucets	10	$21.23	0.0	1.5	0.43	$65,535.00	-	$1.47	1,870

Res | Faucet Aerators - Kitchen, Gas WH	2.2 GPM - Kitchen	Hot Water	R_Multi Family	RET	Kitchen Faucets	10	$21.23	0.0	1.5	0.43	$65,535.00	-	$1.47	28,277
Res | Faucet Aerators - Kitchen, Gas WH	2.2 GPM - Kitchen	Hot Water	R_Single Family	RET	Kitchen Faucets	10	$21.23	0.0	1.5	0.43	$65,535.00	-	$1.47	159,150
Res | Floor Insulation - Gas and Electric	Higher R-value based on PSE feedback	Space Heating	R_Manufactured Homes	RET	sq. ft	20	$3.35	0.6	0.0	0.24	$0.36	10,266	$30.68	72,618
Res | Floor Insulation - Gas and Electric	Higher R-value based on PSE feedback	Space Heating	R_Single Family	RET	sq. ft	20	$3.35	0.1	0.0	0.23	$1.49	22,694	$8.22	3,141,866
Res | Gas Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Manufactured Homes	ROB	Dryers	12	$334.86	0.0	2.6	0.83	$65,535.00	-	$12.90	2,115
Res | Gas Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Multi Family	ROB	Dryers	12	$334.86	0.0	2.6	0.83	$65,535.00	-	$12.90	825
Res | Gas Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Single Family	ROB	Dryers	12	$334.86	0.0	2.6	0.83	$65,535.00	-	$12.90	25,067
Res | Gas Fireplace	Standard Fireplace	Space Heating	R_Manufactured Homes	ROB	Heat Pump	19	$931.21	0.0	72.0	0.30	$65,535.00	-	$0.99	48,250
Res | Gas Fireplace	Standard Fireplace	Space Heating	R_Multi Family	ROB	Heat Pump	19	$931.21	0.0	72.0	0.30	$65,535.00	-	$0.99	286,204
Res | Gas Fireplace	Standard Fireplace	Space Heating	R_Single Family	ROB	Heat Pump	19	$931.21	0.0	72.0	0.30	$65,535.00	-	$0.99	2,486,994
Res | Gas Furnace Tune-up, RET	No gas furnace tune up	Space Heating	R_Manufactured Homes	RET	Furnace	2	$190.24	0.0	34.2	0.27	$65,535.00	-	$2.55	50,061
Res | Gas Furnace Tune-up, RET	No gas furnace tune up	Space Heating	R_Multi Family	RET	Furnace	2	$190.24	0.0	34.2	0.27	$65,535.00	-	$2.55	73,804
Res | Gas Furnace Tune-up, RET	No gas furnace tune up	Space Heating	R_Single Family	RET	Furnace	2	$190.24	0.0	34.2	0.27	$65,535.00	-	$2.55	1,921,415
Res | Gas Storage Water Heater	Gas Storage Water Heater	Hot Water	R_Manufactured Homes	ROB	water heater	12	$393.27	0.0	31.0	0.68	$65,535.00	-	$1.27	64,101
Res | Gas Storage Water Heater	Gas Storage Water Heater	Hot Water	R_Multi Family	ROB	water heater	12	$393.27	0.0	31.0	0.73	$65,535.00	-	$1.27	102,597
Res | Gas Storage Water Heater	Gas Storage Water Heater	Hot Water	R_Single Family	ROB	water heater	12	$393.27	0.0	31.0	0.63	$65,535.00	-	$1.27	3,564,515
Res | Gas Tankless Water Heater	Gas Storage Water Heater	Hot Water	R_Manufactured Homes	ROB	water heater	15	$1,987.12	0.0	86.5	0.68	$65,535.00	-	$1.99	39,251
Res | Gas Tankless Water Heater	Gas Storage Water Heater	Hot Water	R_Multi Family	ROB	water heater	15	$1,987.12	0.0	86.5	0.73	$65,535.00	-	$1.99	62,823
Res | Gas Tankless Water Heater	Gas Storage Water Heater	Hot Water	R_Single Family	ROB	water heater	15	$1,987.12	0.0	86.5	0.63	$65,535.00	-	$1.99	2,182,656
Res | Ground Source Heat Pump	Air Source Heat Pump <= 14 SEER, 8.2 HSPF	Space Heating and Cooling	R_Manufactured Homes	ROB	Ground Source Heat Pump	20	$11,916.44	3548.6	0.0	0.20	$0.22	8	Inf	-
Res | Ground Source Heat Pump	Air Source Heat Pump <= 14 SEER, 8.2 HSPF	Space Heating and Cooling	R_Single Family	ROB	Ground Source Heat Pump	20	$14,970.83	4458.2	0.0	0.48	$0.21	451	Inf	-
Res | Heat Pump - Fuel Switch - MF	Air Source Heat Pump <= 14 SEER, 8.2 HSPF	Space Heating	R_Multi Family	NEW	Heat Pump	20	$1,240.28	7738.2	-884.4	0.25	$0.14	2,156	Inf	(229,561)
Res | Heat Pump - Fuel Switch - SF	Air Source Heat Pump <= 14 SEER, 8.2 HSPF	Space Heating	R_Single Family	ROB	Heat Pump	20	$1,240.28	8548.9	-884.4	0.09	$0.12	52	Inf	-

Res | Heat Pump Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Manufactured Homes	ROB	Dryers	12	$756.16	428.5	0.0	0.64	$0.16	1,776	Inf	-
Res | Heat Pump Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Multi Family	ROB	Dryers	12	$756.16	428.5	0.0	0.64	$0.16	5,855	Inf	-
Res | Heat Pump Clothes Dryer	Federal Standard 2015 Dryer - CEF 3.73	Appliances	R_Single Family	ROB	Dryers	12	$756.16	428.5	0.0	0.64	$0.16	11,593	Inf	-
Res | Heat Pump Water Heater	RTF Market Standard Heat Pump Water Heater - EF 1.99	Hot Water	R_Manufactured Homes	ROB	electric water heater	10	$1,715.21	2490.3	0.0	0.85	$0.06	978	Inf	-
Res | Heat Pump Water Heater	RTF Market Standard Heat Pump Water Heater - EF 1.99	Hot Water	R_Multi Family	ROB	electric water heater	10	$1,715.21	2490.3	0.0	0.50	$0.06	3,998	Inf	-
Res | Heat Pump Water Heater	RTF Market Standard Heat Pump Water Heater - EF 1.99	Hot Water	R_Single Family	ROB	electric water heater	10	$1,715.21	2490.3	0.0	0.85	$0.06	49,970	Inf	-
Res | High Efficiency Boiler	Standard Boiler	Space Heating	R_Single Family	ROB	Boilers	26.6	$3,075.80	0.0	157.1	0.91	$65,535.00	-	$1.13	2,914,431
Res | High Efficiency Freezer	RTF Market Standard Freezer	Appliances	R_Manufactured Homes	ROB	Refrigerators	20	$77.29	32.0	0.0	0.70	$0.16	328	Inf	-
Res | High Efficiency Freezer	RTF Market Standard Freezer	Appliances	R_Multi Family	ROB	Refrigerators	20	$77.29	32.0	0.0	0.70	$0.16	185	Inf	-
Res | High Efficiency Freezer	RTF Market Standard Freezer	Appliances	R_Single Family	ROB	Refrigerators	20	$77.29	32.0	0.0	0.70	$0.16	3,269	Inf	-
Res | High Efficiency Furnace Replacement	Standard Gas Furnace, AFUE 80%	Space Heating	R_Manufactured Homes	ROB	Furnace	20	$2,232.12	0.0	165.8	0.81	$65,535.00	-	$1.01	478,395
Res | High Efficiency Furnace Replacement	Standard Gas Furnace, AFUE 80%	Space Heating	R_Multi Family	ROB	Furnace	20	$2,232.12	0.0	165.8	0.81	$65,535.00	-	$1.01	705,300
Res | High Efficiency Furnace Replacement	Standard Gas Furnace, AFUE 80%	Space Heating	R_Single Family	ROB	Furnace	20	$2,232.12	0.0	165.8	0.81	$65,535.00	-	$1.01	18,361,680
Res | High Efficiency Refrigerator	RTF Market Baseline Refrigerator	Appliances	R_Manufactured Homes	ROB	Refrigerators	17	$157.18	39.0	0.0	0.70	$0.29	1,544	Inf	-
Res | High Efficiency Refrigerator	RTF Market Baseline Refrigerator	Appliances	R_Multi Family	ROB	Refrigerators	17	$157.18	39.0	0.0	0.70	$0.29	5,039	Inf	-
Res | High Efficiency Refrigerator	RTF Market Baseline Refrigerator	Appliances	R_Single Family	ROB	Refrigerators	17	$157.18	39.0	0.0	0.70	$0.29	15,947	Inf	-
Res | High Efficiency Windows - Gas and Electric	U-value = 0.30 (WA Code)	Space Heating and Cooling	R_Manufactured Homes	ROB	home	15	$1,498.73	541.2	7.6	0.72	$0.20	17,864	$15.69	181,234
Res | High Efficiency Windows - Gas and Electric	U-value = 0.30 (WA Code)	Space Heating and Cooling	R_Multi Family	ROB	home	15	$999.16	364.2	8.5	0.72	$0.17	47,603	$9.18	797,464
Res | High Efficiency Windows - Gas and Electric	U-value = 0.30 (WA Code)	Space Heating and Cooling	R_Single Family	ROB	home	15	$1,998.31	180.1	48.0	0.72	$0.79	57,470	$3.49	11,055,875
Res | Home Energy Reports, Electric & Gas ST, NEW	No Home Energy Report	Whole Building/House	R_Manufactured Homes	NEW	base kWh consumed	1	$0.00	0.0	0.0	1.00	$0.05	545	-$0.52	8,159

Res | Home Energy Reports, Electric & Gas ST, NEW	No Home Energy Report	Whole Building/House	R_Multi Family	NEW	base kWh consumed	1	$0.00	0.0	0.0	1.00	$0.09	5,716	$1.92	155,061
Res | Home Energy Reports, Electric & Gas ST, NEW	No Home Energy Report	Whole Building/House	R_Single Family	NEW	base kWh consumed	1	$0.00	0.0	0.0	1.00	$0.03	16,378	-$0.13	473,115
Res | Home Energy Reports, Electric & Gas ST, RET	No Home Energy Report	Whole Building/House	R_Manufactured Homes	RET	base kWh consumed	1	$0.00	0.0	0.0	1.00	$0.05	5,125	-$0.06	92,273
Res | Home Energy Reports, Electric & Gas ST, RET	No Home Energy Report	Whole Building/House	R_Multi Family	RET	base kWh consumed	1	$0.00	0.0	0.0	1.00	$0.09	11,815	$1.94	335,540
Res | Home Energy Reports, Electric & Gas ST, RET	No Home Energy Report	Whole Building/House	R_Single Family	RET	base kWh consumed	1	$0.00	0.0	0.0	1.00	$0.03	49,601	-$0.08	1,485,234
Res | Home Energy Reports, Electric Only ST, NEW	No Home Energy Report	Whole Building/House	R_Manufactured Homes	NEW	kWh consumed	1	$0.00	0.0	0.0	1.00	$0.04	887	Inf	-
Res | Home Energy Reports, Electric Only ST, NEW	No Home Energy Report	Whole Building/House	R_Multi Family	NEW	kWh consumed	1	$0.00	0.0	0.0	1.00	$0.07	9,293	Inf	-
Res | Home Energy Reports, Electric Only ST, NEW	No Home Energy Report	Whole Building/House	R_Single Family	NEW	kWh consumed	1	$0.00	0.0	0.0	1.00	$0.04	26,624	Inf	-
Res | Home Energy Reports, Electric Only ST, RET	No Home Energy Report	Whole Building/House	R_Manufactured Homes	RET	kWh consumed	1	$0.00	0.0	0.0	1.00	$0.04	8,332	Inf	-
Res | Home Energy Reports, Electric Only ST, RET	No Home Energy Report	Whole Building/House	R_Multi Family	RET	kWh consumed	1	$0.00	0.0	0.0	1.00	$0.07	19,206	Inf	-
Res | Home Energy Reports, Electric Only ST, RET	No Home Energy Report	Whole Building/House	R_Single Family	RET	kWh consumed	1	$0.00	0.0	0.0	1.00	$0.04	80,634	Inf	-
Res | Home Energy Reports, Gas Only ST, NEW	No Home Energy Report	Whole Building/House	R_Manufactured Homes	NEW	therms consumed	1	$0.02	0.0	0.0	1.00	$65,535.00	-	$2.16	10,174
Res | Home Energy Reports, Gas Only ST, NEW	No Home Energy Report	Whole Building/House	R_Multi Family	NEW	therms consumed	1	$0.03	0.0	0.0	1.00	$65,535.00	-	$2.36	200,360
Res | Home Energy Reports, Gas Only ST, NEW	No Home Energy Report	Whole Building/House	R_Single Family	NEW	therms consumed	1	$0.01	0.0	0.0	1.00	$65,535.00	-	$1.30	588,806
Res | Home Energy Reports, Gas Only ST, RET	No Home Energy Report	Whole Building/House	R_Manufactured Homes	RET	therms consumed	1	$0.02	0.0	0.0	1.00	$65,535.00	-	$2.16	123,941
Res | Home Energy Reports, Gas Only ST, RET	No Home Energy Report	Whole Building/House	R_Multi Family	RET	therms consumed	1	$0.03	0.0	0.0	1.00	$65,535.00	-	$2.36	450,965
Res | Home Energy Reports, Gas Only ST, RET	No Home Energy Report	Whole Building/House	R_Single Family	RET	therms consumed	1	$0.01	0.0	0.0	1.00	$65,535.00	-	$1.30	1,996,154

Res | Indoor Fixture (hard wired, pin-based)	Incandescent Bulb 27 Watt	Lighting	R_Manufactured Homes	ROB	Lamps	20	$23.98	23.6	0.0	1.00	$0.06	5,354	Inf	-
Res | Indoor Fixture (hard wired, pin-based)	Incandescent Bulb 27 Watt	Lighting	R_Multi Family	ROB	Lamps	20	$23.98	23.6	0.0	0.99	$0.06	18,090	Inf	-
Res | Indoor Fixture (hard wired, pin-based)	Incandescent Bulb 27 Watt	Lighting	R_Single Family	ROB	Lamps	20	$23.98	23.6	0.0	0.99	$0.06	47,324	Inf	-
Res | Indoor Fluorescents T8	T12 Fluorescents	Lighting	R_Manufactured Homes	RET	Lamps	15	$54.02	10.8	-0.2	0.76	$0.42	1,813	Inf	(12,921)
Res | Indoor Fluorescents T8	T12 Fluorescents	Lighting	R_Multi Family	RET	Lamps	15	$54.02	10.8	-0.2	0.60	$0.42	2,521	Inf	(17,960)
Res | Indoor Fluorescents T8	T12 Fluorescents	Lighting	R_Single Family	RET	Lamps	15	$54.02	10.8	-0.2	0.72	$0.42	25,985	Inf	(185,156)
Res | Integrated Space and Water Heating	Gas furnace, Gas water heater (55 gal.)	Space Heating	R_Manufactured Homes	NEW	heating system	20	$6,234.74	0.0	323.8	0.10	$65,535.00	-	$1.44	356
Res | Integrated Space and Water Heating	Gas furnace, Gas water heater (55 gal.)	Space Heating	R_Manufactured Homes	ROB	heating system	20	$6,234.74	0.0	323.8	0.10	$65,535.00	-	$1.44	2,171
Res | Integrated Space and Water Heating	Gas furnace, Gas water heater (55 gal.)	Space Heating	R_Multi Family	NEW	heating system	20	$6,234.74	0.0	323.8	0.10	$65,535.00	-	$1.44	17,646
Res | Integrated Space and Water Heating	Gas furnace, Gas water heater (55 gal.)	Space Heating	R_Multi Family	ROB	heating system	20	$6,234.74	0.0	323.8	0.10	$65,535.00	-	$1.44	23,646
Res | Integrated Space and Water Heating	Gas furnace, Gas water heater (55 gal.)	Space Heating	R_Single Family	NEW	heating system	20	$6,234.74	0.0	323.8	0.10	$65,535.00	-	$1.44	775,301
Res | Integrated Space and Water Heating	Gas furnace, Gas water heater (55 gal.)	Space Heating	R_Single Family	ROB	heating system	20	$6,234.74	0.0	323.8	0.10	$65,535.00	-	$1.44	1,522,382
Res | LED (General Service Lamps)	Incandescent - EISA Standard	Lighting	R_Manufactured Homes	ROB	Lamps	12	$0.00	1.4	0.0	0.53	$0.02	14,493	Inf	-
Res | LED (General Service Lamps)	Incandescent - EISA Standard	Lighting	R_Multi Family	ROB	Lamps	12	$0.00	1.4	0.0	0.47	$0.02	43,963	Inf	-
Res | LED (General Service Lamps)	Incandescent - EISA Standard	Lighting	R_Single Family	ROB	Lamps	12	$0.00	1.4	0.0	0.89	$0.02	217,856	Inf	-
Res | LED (Reflector)	Mixed Market Incandescent Bulb/Halogen Bulb	Lighting	R_Manufactured Homes	ROB	Lamps	12	$0.00	3.7	0.0	1.00	$0.02	401	Inf	-
Res | LED (Reflector)	Mixed Market Incandescent Bulb/Halogen Bulb	Lighting	R_Multi Family	ROB	Lamps	12	$0.00	3.7	0.0	0.78	$0.02	4,731	Inf	-
Res | LED (Reflector)	Mixed Market Incandescent Bulb/Halogen Bulb	Lighting	R_Single Family	ROB	Lamps	12	$0.00	3.7	0.0	0.72	$0.02	94,819	Inf	-
Res | LED (Specialty, Non-Reflector)	Incandescent - Specialty	Lighting	R_Manufactured Homes	ROB	Lamps	12	$0.00	1.7	0.0	0.97	$0.00	4,704	Inf	-
Res | LED (Specialty, Non-Reflector)	Incandescent - Specialty	Lighting	R_Multi Family	ROB	Lamps	12	$0.00	1.7	0.0	0.93	$0.00	15,962	Inf	-

Res | LED (Specialty, Non-Reflector)	Incandescent - Specialty	Lighting	R_Single Family	ROB	Lamps	12	$0.00	1.7	0.0	0.93	$0.00	87,053	Inf	-
Res | LED Exit Signs (Multi-Family only)	Incandescent Exit Signs	Lighting	R_Multi Family	ROB	LED exit signs	20	$127.89	264.9	0.0	0.51	$0.02	4,419	Inf	-
Res | Low-Flow Showerheads, Electric WH	2.24 GPM (RBSA Baseline: Manufactured)	Hot Water	R_Manufactured Homes	RET	Showerheads	10	$29.13	223.1	0.0	0.92	-$0.01	9,994	Inf	-
Res | Low-Flow Showerheads, Electric WH	2.24 GPM (RBSA Baseline: Manufactured)	Hot Water	R_Multi Family	RET	Showerheads	10	$29.13	223.1	0.0	0.81	-$0.01	30,218	Inf	-
Res | Low-Flow Showerheads, Electric WH	2.24 GPM (RBSA Baseline: Manufactured)	Hot Water	R_Single Family	RET	Showerheads	10	$29.13	223.1	0.0	0.81	-$0.01	41,024	Inf	-
Res | Low-Flow Showerheads, Gas WH	2.24 GPM (RBSA Baseline: Manufactured)	Hot Water	R_Manufactured Homes	RET	Showerheads	10	$29.13	0.0	9.4	0.92	$65,535.00	-	$0.11	24,275
Res | Low-Flow Showerheads, Gas WH	2.24 GPM (RBSA Baseline: Manufactured)	Hot Water	R_Multi Family	RET	Showerheads	10	$29.13	0.0	9.4	0.81	$65,535.00	-	$0.11	341,284
Res | Low-Flow Showerheads, Gas WH	2.24 GPM (RBSA Baseline: Manufactured)	Hot Water	R_Single Family	RET	Showerheads	10	$29.13	0.0	9.4	0.81	$65,535.00	-	$0.11	2,183,255
Res | Outdoor Fixture (hard wired, pin-based)	Halogen Bulb 55 Watt	Lighting	R_Manufactured Homes	ROB	Lamps	20	$31.97	79.4	0.0	1.00	$0.02	201	Inf	-
Res | Outdoor Fixture (hard wired, pin-based)	Halogen Bulb 55 Watt	Lighting	R_Multi Family	ROB	Lamps	20	$31.97	79.4	0.0	1.00	$0.02	14,730	Inf	-
Res | Outdoor Fixture (hard wired, pin-based)	Halogen Bulb 55 Watt	Lighting	R_Single Family	ROB	Lamps	20	$31.97	79.4	0.0	0.98	$0.02	36,820	Inf	-
Res | Programmable Thermostat - NEW	Manual thermostat	Space Heating and Cooling	R_Manufactured Homes	NEW	Thermostats	11	$79.93	344.9	3.8	0.42	$0.02	1,013	$2.18	5,115
Res | Programmable Thermostat - NEW	Manual thermostat	Space Heating and Cooling	R_Multi Family	NEW	Thermostats	11	$79.93	356.8	6.3	0.42	$0.00	18,863	$1.15	119,493
Res | Programmable Thermostat - NEW	Manual thermostat	Space Heating and Cooling	R_Single Family	NEW	Thermostats	11	$79.93	93.3	17.9	0.36	$0.03	6,412	$0.43	298,106
Res | Programmable Thermostat - RET	Manual thermostat	Space Heating and Cooling	R_Manufactured Homes	RET	Thermostats	11	$159.87	344.9	3.8	0.42	$0.04	9,515	$4.43	48,069
Res | Programmable Thermostat - RET	Manual thermostat	Space Heating and Cooling	R_Multi Family	RET	Thermostats	11	$159.87	356.8	6.3	0.42	$0.02	38,986	$2.50	246,970
Res | Programmable Thermostat - RET	Manual thermostat	Space Heating and Cooling	R_Single Family	RET	Thermostats	11	$159.87	93.3	17.9	0.36	$0.11	19,419	$0.90	902,845
Res | Refrigerator Recycling	Existing Non-Efficient Refrigerator	Appliances	R_Manufactured Homes	RET	Refrigerators	1	$0.00	584.0	0.0	0.01	-$0.01	128	Inf	-
Res | Refrigerator Recycling	Existing Non-Efficient Refrigerator	Appliances	R_Multi Family	RET	Refrigerators	1	$0.00	584.0	0.0	0.01	-$0.01	348	Inf	-
Res | Refrigerator Recycling	Existing Non-Efficient Refrigerator	Appliances	R_Single Family	RET	Refrigerators	1	$0.00	584.0	0.0	0.01	-$0.01	2,037	Inf	-

Res | Room AC Replacement	Federal Standard 2014 Room AC - CEER 10.9 (8,000-13,999 Btuh)	Space Cooling	R_Manufactured Homes	ROB	RAC	5	$39.97	2.0	0.0	1.00	$3.64	10	Inf	-
Res | Room AC Replacement	Federal Standard 2014 Room AC - CEER 10.9 (8,000-13,999 Btuh)	Space Cooling	R_Multi Family	ROB	RAC	5	$39.97	2.0	0.0	1.00	$3.64	84	Inf	-
Res | Room AC Replacement	Federal Standard 2014 Room AC - CEER 10.9 (8,000-13,999 Btuh)	Space Cooling	R_Single Family	ROB	RAC	5	$39.97	2.0	0.0	0.68	$3.64	61	Inf	-
Res | Smart Thermostat - NEW, Manual Baseline	Manual Thermostat	Space Heating and Cooling	R_Manufactured Homes	NEW	Thermostats	11	$319.73	599.8	4.2	0.42	$0.05	0	$7.09	2
Res | Smart Thermostat - NEW, Manual Baseline	Manual Thermostat	Space Heating and Cooling	R_Multi Family	NEW	Thermostats	11	$319.73	797.2	7.0	0.42	$0.03	13	$1.83	84
Res | Smart Thermostat - NEW, Manual Baseline	Manual Thermostat	Space Heating and Cooling	R_Single Family	NEW	Thermostats	11	$319.73	308.5	19.9	0.36	$0.08	15	$1.00	687
Res | Smart Thermostat - NEW, Programmable Baseline	Programmable Thermostat	Space Heating and Cooling	R_Manufactured Homes	NEW	Thermostats	11	$239.80	254.9	0.4	1.00	$0.09	1,021	$51.24	1,213
Res | Smart Thermostat - NEW, Programmable Baseline	Programmable Thermostat	Space Heating and Cooling	R_Multi Family	NEW	Thermostats	11	$239.80	440.4	0.7	1.00	$0.05	31,745	$7.96	36,404
Res | Smart Thermostat - NEW, Programmable Baseline	Programmable Thermostat	Space Heating and Cooling	R_Single Family	NEW	Thermostats	11	$239.80	215.2	2.0	1.00	$0.11	26,855	$6.19	179,005
Res | Smart Thermostat - RET, Manual Baseline	Manual Thermostat	Space Heating and Cooling	R_Manufactured Homes	RET	Thermostats	11	$399.66	599.8	4.2	0.42	$0.06	1,128	$9.12	5,698
Res | Smart Thermostat - RET, Manual Baseline	Manual Thermostat	Space Heating and Cooling	R_Multi Family	RET	Thermostats	11	$399.66	797.2	7.0	0.42	$0.04	13,506	$3.04	85,561
Res | Smart Thermostat - RET, Manual Baseline	Manual Thermostat	Space Heating and Cooling	R_Single Family	RET	Thermostats	11	$399.66	308.5	19.9	0.36	$0.11	6,800	$1.43	316,142
Res | Smart Thermostat - RET, Programmable Baseline	Programmable Thermostat	Space Heating and Cooling	R_Manufactured Homes	RET	Thermostats	11	$399.66	254.9	0.4	1.00	$0.15	9,590	$91.75	11,400
Res | Smart Thermostat - RET, Programmable Baseline	Programmable Thermostat	Space Heating and Cooling	R_Multi Family	RET	Thermostats	11	$399.66	440.4	0.7	1.00	$0.09	65,610	$32.26	75,240

Res | Smart Thermostat - RET, Programmable Baseline	Programmable Thermostat	Space Heating and Cooling	R_Single Family	RET	Thermostats	11	$399.66	215.2	2.0	1.00	$0.18	81,334	$14.75	542,134
Res | Solar Water Heater	RTF Market Standard Heat Pump Water Heater - EF 1.99	Hot Water	R_Manufactured Homes	ROB	water heater	20	$12,579.85	2306.9	0.0	0.30	$0.37	35	Inf	-
Res | Solar Water Heater	RTF Market Standard Heat Pump Water Heater - EF 1.99	Hot Water	R_Multi Family	ROB	water heater	20	$12,579.85	2306.9	0.0	0.30	$0.37	143	Inf	-
Res | Solar Water Heater	RTF Market Standard Heat Pump Water Heater - EF 1.99	Hot Water	R_Single Family	ROB	water heater	20	$12,579.85	2306.9	0.0	0.10	$0.37	1,784	Inf	-
Res | Stand-Alone Freezer - Removal	Existing Non-Efficient Freezer	Appliances	R_Manufactured Homes	RET	Freezers	1	$0.00	313.0	0.0	1.00	-$0.01	1,413	Inf	-
Res | Stand-Alone Freezer - Removal	Existing Non-Efficient Freezer	Appliances	R_Multi Family	RET	Freezers	1	$0.00	313.0	0.0	1.00	-$0.01	2,316	Inf	-
Res | Stand-Alone Freezer - Removal	Existing Non-Efficient Freezer	Appliances	R_Single Family	RET	Freezers	1	$0.00	313.0	0.0	1.00	-$0.01	19,251	Inf	-
Res | Tankless Water Heater - Fuel Switch - MF	Electric Water Heater, 55 gal.	Hot Water	R_Multi Family	NEW	water heater	15	$2,784.85	4598.8	-127.3	0.13	$0.06	24,327	Inf	(627,289)
Res | Tankless Water Heater - Fuel Switch - SF	Electric Water Heater, 55 gal.	Hot Water	R_Single Family	ROB	water heater	15	$2,784.85	4598.8	-127.3	0.19	$0.06	73,586	Inf	-
Res | Wall Insulation - Gas and Electric	R-21 (WA Code - Single Family and Manufactured Homes Only)	Space Heating and Cooling	R_Manufactured Homes	RET	sq. ft	20	$2.36	3.8	0.0	0.15	$0.02	40,186	$5.22	155,394
Res | Wall Insulation - Gas and Electric	R-21 (WA Code - Single Family and Manufactured Homes Only)	Space Heating and Cooling	R_Single Family	RET	sq. ft	20	$2.36	0.9	0.1	0.04	$0.12	36,647	$1.58	2,762,961
Res | Water Heater Tank Blanket/Insulation, Electric WH	No Tank Insulation	Hot Water	R_Manufactured Homes	RET	Water Heaters	7.5	$36.77	147.1	0.0	0.10	$0.02	764	Inf	-
Res | Water Heater Tank Blanket/Insulation, Electric WH	No Tank Insulation	Hot Water	R_Multi Family	RET	Water Heaters	7.5	$36.77	147.1	0.0	0.05	$0.02	1,221	Inf	-
Res | Water Heater Tank Blanket/Insulation, Electric WH	No Tank Insulation	Hot Water	R_Single Family	RET	Water Heaters	7.5	$36.77	147.1	0.0	0.10	$0.02	2,944	Inf	-
Res | Water Heater Tank Blanket/Insulation, Gas WH	No Tank Insulation	Hot Water	R_Manufactured Homes	RET	Water Heaters	7.5	$36.77	0.0	7.1	0.10	$65,535.00	-	$0.52	2,101

Res | Water Heater Tank Blanket/Insulation, Gas WH	No Tank Insulation	Hot Water	R_Multi Family	RET	Water Heaters	7.5	$36.77	0.0	7.1	0.05	$65,535.00	-	$0.52	15,615
Res | Water Heater Tank Blanket/Insulation, Gas WH	No Tank Insulation	Hot Water	R_Single Family	RET	Water Heaters	7.5	$36.77	0.0	7.1	0.10	$65,535.00	-	$0.52	177,447
Res | Water Heater Temperature Setback, Electric WH, NEW	No temperature setback	Hot Water	R_Manufactured Homes	NEW	Water Heaters	4	$0.00	39.5	0.0	0.45	$0.00	99	Inf	-
Res | Water Heater Temperature Setback, Electric WH, NEW	No temperature setback	Hot Water	R_Multi Family	NEW	Water Heaters	4	$0.00	39.5	0.0	0.79	$0.00	2,542	Inf	-
Res | Water Heater Temperature Setback, Electric WH, NEW	No temperature setback	Hot Water	R_Single Family	NEW	Water Heaters	4	$0.00	39.5	0.0	0.45	$0.00	1,185	Inf	-
Res | Water Heater Temperature Setback, Electric WH, RET	No temperature setback	Hot Water	R_Manufactured Homes	RET	Water Heaters	4	$0.00	39.5	0.0	0.45	$0.00	920	Inf	-
Res | Water Heater Temperature Setback, Electric WH, RET	No temperature setback	Hot Water	R_Multi Family	RET	Water Heaters	4	$0.00	39.5	0.0	0.79	$0.00	5,191	Inf	-
Res | Water Heater Temperature Setback, Electric WH, RET	No temperature setback	Hot Water	R_Single Family	RET	Water Heaters	4	$0.00	39.5	0.0	0.45	$0.00	3,548	Inf	-
Res | Water Heater Temperature Setback, Gas WH, NEW	No temperature setback	Hot Water	R_Manufactured Homes	NEW	Water Heaters	4	$0.00	0.0	1.7	0.45	$65,535.00	-	$0.00	241
Res | Water Heater Temperature Setback, Gas WH, NEW	No temperature setback	Hot Water	R_Multi Family	NEW	Water Heaters	4	$0.00	0.0	1.7	0.79	$65,535.00	-	$0.00	28,797
Res | Water Heater Temperature Setback, Gas WH, NEW	No temperature setback	Hot Water	R_Single Family	NEW	Water Heaters	4	$0.00	0.0	1.7	0.45	$65,535.00	-	$0.00	63,289
Res | Water Heater Temperature Setback, Gas WH, RET	No temperature setback	Hot Water	R_Manufactured Homes	RET	Water Heaters	4	$0.00	0.0	1.7	0.45	$65,535.00	-	$0.00	2,242
Res | Water Heater Temperature Setback, Gas WH, RET	No temperature setback	Hot Water	R_Multi Family	RET	Water Heaters	4	$0.00	0.0	1.7	0.79	$65,535.00	-	$0.00	58,816
Res | Water Heater Temperature Setback, Gas WH, RET	No temperature setback	Hot Water	R_Single Family	RET	Water Heaters	4	$0.00	0.0	1.7	0.45	$65,535.00	-	$0.00	189,420

Res | Window Film - Gas and Electric	Single or Double pane window, no solar film, screen or low-e coating	Space Heating and Cooling	R_Manufactured Homes	RET	home	20	$1,079.09	33.8	0.5	0.95	$2.20	1,937	$164.51	20,155
Res | Window Film - Gas and Electric	Single or Double pane window, no solar film, screen or low-e coating	Space Heating and Cooling	R_Multi Family	RET	home	20	$719.39	22.8	0.5	0.98	$2.15	5,290	$98.48	90,897
Res | Window Film - Gas and Electric	Single or Double pane window, no solar film, screen or low-e coating	Space Heating and Cooling	R_Single Family	RET	home	20	$1,438.79	11.3	3.1	0.93	$8.82	6,076	$34.92	1,198,824

Table 25. Detailed Energy Efficiency and Fuel Conversion Measure Descriptions

Measure Name	Detailed Description
Com | Advanced Power Strips	Advanced power strip that turns off equipment plugged into it when not in use
Com | Air Cooled Chillers	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER
Com | Anti-Sweat Heater Controls	Control that regulates the operation of anti-sweat heaters on glass doors of commercial refrigerators and walk-ins based on the ambient humidity.
Com | Boiler - SHW	Boiler with a capacity of 75,000 Btu/h or larger with a minimum thermal efficiency of 84% or higher
Com | Building Automation Systems - kWh	Building Energy Management System that monitors and controls the building's energy use
Com | Building Automation Systems - therm	Building Energy Management System that monitors and controls the building's energy use
Com | Centrifugal Chillers	Centrifugal chiller with an efficiency of 0.60 Full Load Value (FLV) and 0.54 Integrated Part Load Value (IPLV)
Com | Ceramic Metal Halide - Exterior	Install ceramic metal halide instead of high pressure sodium lamp
Com | CFL Fixture - Interior	Install CFL fixture instead of incandescent or halogen fixture
Com | Chiller-Water Side Economizer	Water-side economizer with a new plate and frame exchanger
Com | Clothes Washer_Edry,EDHW	Clothes washer with Modified Energy Factor of 2.2 or greater
Com | Clothes Washer_Edry,GDHW	Clothes washer with Modified Energy Factor of 2.2 or greater
Com | Clothes Washer_Gdry,EDHW	Clothes washer with Modified Energy Factor of 2.2 or greater
Com | Clothes Washer_Gdry,GDHW	Clothes washer with Modified Energy Factor of 2.2 or greater
Com | Commercial Ice Makers	Cube or nugget type ice machine that meets CEE Tier 2 efficiency level
Com | Comprehensive Retrocommissioning, kWh	Comprehensive process of checking and fixing building systems to bring them back to efficient operation if they have deteriorated over time
Com | Comprehensive Retrocommissioning, therm	Comprehensive process of checking and fixing building systems to bring them back to efficient operation if they have deteriorated over time
Com | Direct Evaporative Pre-Cooling	Evaporative pre-cooling of air-cooled condensers on direct expansion HVAC units
Com | Ductless Mini-Split Heat Pumps	Ductless mini-split heat pump with SEER rating of 15 and HSPF of 8.5
Com | ECM Fan Motor System on Walk-in/Reach-in Refrigeration	Replace PSC or shaded pole motors in walk-in and reach-in refrigeration systems with more efficient ECM motors
Com | Efficient Dryer_Electric	Electric dryer with Combined Efficiency Factor of 3.8
Com | Efficient Dryer_Gas	Gas dryer with Combined Efficiency Factor of 3.48
Com | Electric Combination Ovens	Electric combination ovens that meet ENERGY STAR specifications
Com | Electric Convection Ovens	Electric convection ovens that meet ENERGY STAR specifications
Com | Electric Exhaust Hood	Commercial cooking equipment exhaust hood with demand-controlled ventilation that operates only as much as needed

Measure Name	Detailed Description
Com | Electric Fryer	Electric fryer that meets ENERGY STAR specification
Com | Electric Furnace - Fuel Switch	Gas furnace with input energy less than 225,000 Btu/hr with an Annual Fuel Utilization Efficiency (AFUE) rating of 90% or greater, instead of an electric furnace
Com | Electric Griddles	Electric griddle with 70% cooking efficiency
Com | Electric Pressureless Steamer	Electric pressureless steamer that meets ENERGY STAR specification
Com | ENERGY STAR Commercial Dishwashers - Elec HW	Commercial dishwasher that meets ENERGY STAR specification
Com | ENERGY STAR Commercial Dishwashers - Gas HW	Commercial dishwasher that meets ENERGY STAR specification
Com | Evaporator Fan Controls	Control that regulates the operation of evaporator fans in commercial refrigeration
Com | Exterior LED Area and Wall Lights	Install LED instead of metal halide or high pressure sodium in an exterior location
Com | Exterior Pin-based CFLs	Install high-wattage, pin-based CFL fixture that will only accept CFLs instead of an incandescent lamp
Com | Fixture Mounted Occupancy Sensor	Sensor on a light fixture that turns off the light when no movement is detected for a period of time (indicating that a room is not occupied)
Com | Floating-Head Pressure Controls	Controls that adjust operating pressure of a commercial refrigeration system based on ambient temperature conditions
Com | Gas Boiler - Mid Efficiency	Gas boiler with 90% efficiency
Com | Gas Charbroiler	Use infrared gas charbroiler
Com | Gas Combination Ovens	Combination oven that meets ENERGY STAR specification
Com | Gas Condensing Boiler	Gas condensing boiler with 90% or greater efficiency
Com | Gas Convection Ovens	Gas convection oven that meets ENERGY STAR specification
Com | Gas Conveyor Ovens	Gas conveyor oven that meets California Energy Wise specifications
Com | Gas Fryer	Gas fryer that meets ENERGY STAR specification
Com | Gas Furnace - High Efficiency	Gas furnace with input energy less than 225,000 Btu/hr with an Annual Fuel Utilization Efficiency (AFUE) rating of 90% or greater
Com | Gas Rack Ovens	Gas rack oven that meets ENERGY STAR specification
Com | Gas Steam Cooker	Gas steam cooker that meets ENERGY STAR specification
Com | Heat Pump, Air Source	Air Source Heat Pump with an efficiency of 16 SEER
Com | High Bay T8/T5 HO - Interior	Install T8 or T5 high bay fixtures instead of metal halide or high pressure sodium
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	Commercial new construction that uses 10% less electricity than current design practices
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	Commercial new construction that uses 10% less gas than current design practices

Measure Name	Detailed Description
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	Commercial new construction that uses 25% less electricity than current design practices
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	Commercial new construction that uses 25% less gas than current design practices
Com | Hot Food Holding Cabinets	Gas hot food holding cabinet that meets ENERGY STAR specification
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	Ventilation systems with heat recovery capabilities
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	Ventilation systems with heat recovery capabilities
Com | Instantaneous Water Heater	Instantaneous gas water heater sized 50,000 Btu/hr and above with a minimum thermal efficiency of 90% or higher
Com | LED Exit Signs	Use LED bulbs in exit signs
Com | LED Fixture - Interior	Install LED interior fixture instead of incandescent or halogen fixture
Com | LED Refrigeration Case Lighting - Strip	Use LEDs in refrigerated cases instead of T8 or T12
Com | Low-Flow Pre-Rinse Spray Valves (Electric)	Low-flow spray valves for rinsing dishes in a commercial kitchen
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	Low-flow spray valves for rinsing dishes in a commercial kitchen
Com | Low Wattage T8 Fixture with EEB	Replace T8 or T12 fluorescent fixture with a low-wattage T8 fixture with electronic ballast
Com | Natural Gas Storage Water Heaters	Storage gas water heater sized 75,000 Btu/hr and above with a minimum thermal efficiency of 84% or higher
Com | New Display Case with Doors (Medium Temperature)	Install a display case with doors instead of an open display case
Com | Night Curtains on Low and Medium Temperature Vertical Display Case	Adding curtains to refrigerated display cases that can be closed during hours when the building is unoccupied to keep cold air from escaping.
Com | Ozone Laundry	Add ozone to wash water so that lower water temperature can be used
Com | Packaged Terminal AC (PTAC) Equipment	PTAC condensing units with efficiency of 13.4 SEER and 11.4 EER
Com | Photocell	Sensor that detects ambient light and modulates lighting accordingly
Com | Pulse Start Metal Halide - Exterior	Install pulse-start metal halide lamp instead of standard metal halide or high pressure sodium lamp
Com | Refrigeration Recommissioning	Recommission refrigeration system (maintenance that comprehensively improves operation of system)
Com | Screw-In LED - Interior	Install LED lamp instead of incandescent or halogen lamp
Com | Scroll/Screw Chillers	Advanced Efficiency Standard Chiller rated at 0.50 kW/Ton at full load
Com | SEER Rated Split or Rooftop AC	Direct expansion AC unit with efficiency of 14.4 SEER or greater
Com | Server - High Efficiency	Computer server that meets ENERGY STAR specification
Com | Server Virtualization	Consolidate server functions into minimal hardware that is shared by users instead of having separate servers

Measure Name	Detailed Description
Com | Smart Thermostats (Small Commercial) - kWh	Smart thermostat that adapts to user behavior
Com | Smart Thermostats (Small Commercial) - therm	Smart thermostat that adapts to user behavior
Com | Storage Water Heater - Fuel Switch	Switching from electric to gas storage water heater sized 75,000 Btu/hr and above with a minimum thermal efficiency of 84% or higher
Com | Strategic Energy Management - kWh	Method for continuously improving operation of equipment and processes
Com | Strategic Energy Management - therm	Method for continuously improving operation of equipment and processes
Com | Strip Curtains	Adding strip curtains to walk-in refrigerator doors to reduce air infiltration
Com | T5 Fixture w/EB - Interior	Replace T8 or T12 fluorescent fixtures with T5 fixtures with electronic ballasts
Com | Troffer LED	Replace T8 or T12 fluorescent fixtures with troffer LEDs
Com |Occupancy-Based PTAC Controls	Controls that adjust operation of a PTAC based on whether the room is occupied
Com |VFD on HVAC Fans/Pumps	Install variable frequency drive (VFD) on HVAC fans and pumps
Ind | Ag Pump Controls | RET	Install variable frequency drive (VFD) controls on agricultural pumps
Ind | Air Compressor Improvements | NEW	Improving air compressor operation by fixing leaks and adding or repairing control systems and filter dryers.
Ind | Air Compressor Improvements | RET	Improving air compressor operation by fixing leaks and adding or repairing control systems and filter dryers.
Ind | Boiler Tune Up | NEW	Maintaining burners and tuning up the operation of boilers
Ind | Boiler Tune Up | RET	Maintaining burners and tuning up the operation of boilers
Ind | Centrifugal Fan | NEW	Upgrade to more efficient fan systems including fan blades and dampers
Ind | Centrifugal Fan | RET	Upgrade to more efficient fan systems including fan blades and dampers
Ind | Clean Room Upgrades | NEW	Installing EC fan motors and air conditioner economizers
Ind | Clean Room Upgrades | RET	Installing EC fan motors and air conditioner economizers
Ind | Condenser Boiler | NEW	Installing a condensing boiler that recovers heat by condensing water out of flue gases
Ind | Condenser Boiler | RET	Installing a condensing boiler that recovers heat by condensing water out of flue gases
Ind | De Strat Fans Electric | NEW	Install de-stratification fans to improve air circulation
Ind | De Strat Fans Electric | RET	Install de-stratification fans to improve air circulation
Ind | De Strat Fans Gas | NEW	Install de-stratification fans to improve air circulation
Ind | De Strat Fans Gas | RET	Install de-stratification fans to improve air circulation
Ind | Efficient Conveyor Belts | NEW	Upgrading to more efficient conveyor belts
Ind | Efficient Conveyor Belts | RET	Upgrading to more efficient conveyor belts
Ind | Fan System Optimization | NEW	Install VFD and on/off controls on fans
Ind | Fan System Optimization | RET	Install VFD and on/off controls on fans
Ind | Furnace Covers | NEW	Install covers on heated furnace tanks

Measure Name	Detailed Description
Ind | Furnace Covers | RET	Install covers on heated furnace tanks
Ind | Heat recovery	Recover waste heat and reuse it for other processes that require heat
Ind | High Efficiency Fans | NEW	Install premium efficiency fan motor
Ind | High Efficiency Fans | RET	Install premium efficiency fan motor
Ind | High Efficiency Oven | NEW	Improving oven burners and controls
Ind | High Efficiency Oven | RET	Improving oven burners and controls
Ind | LED Street Lighting	Install LED street lighting instead of HID lighting
Ind | Lighting Improvements | NEW	Add or upgrade lighting controls
Ind | Lighting Improvements | RET	Add or upgrade lighting controls
Ind | Process Boiler Load Controls | NEW	Add controls that adjust operation of process boiler based on load
Ind | Process Boiler Load Controls | RET	Add controls that adjust operation of process boiler based on load
Ind | Process Optimization | RET	Low cost/no cost process operation and maintenance improvements
Ind | Pump Equipment Upgrades | NEW	Upgrade to VFD pump and properly size pump for the intended use
Ind | Pump Equipment Upgrades | RET	Upgrade to VFD pump and properly size pump for the intended use
Ind | Reduce Steam Pressure | NEW	Reduce boiler steam pressure
Ind | Reduce Steam Pressure | RET	Reduce boiler steam pressure
Ind | Refrigeration Equipment VFD | NEW	Use VFD fans in refrigeration evaporators and condensers
Ind | Refrigeration Equipment VFD | RET	Use VFD fans in refrigeration evaporators and condensers
Ind | Refrigeration System Upgrades | NEW	Upgrade refrigeration equipment by installing better doors and controls; conduct maintenance of equipment
Ind | Refrigeration System Upgrades | RET	Upgrade refrigeration equipment by installing better doors and controls; conduct maintenance of equipment
Ind | Ultra High Efficiency Motors | NEW	Install motors with greater than NEMA efficiency
Ind | Ultra High Efficiency Motors | RET	Install motors with greater than NEMA efficiency
Res | Advanced Power Strips, Elec	Advanced power strip that turns off equipment plugged into it when not in use
Res | Air Cleaner	High efficiency room air cleaner
Res | Air Sealing - Gas and Electric	Seal air leaks to reduce air changes per hour (ACH) from 0.6 to 0.36
Res | Air Source Heat Pump	Air Source Heat Pump with efficiency of 14.5 SEER and 9 HSPF
Res | Attic Insulation/Ceiling Insulation - Gas and Electric	Adding attic and ceiling insulation
Res | Central AC Quality Installation Verification	Improving the operation of central AC units by commissioning them, adding controls, and ensuring they are the right size for the application
Res | Central Air Conditioner Replacement	Replacing existing AC with an 18 SEER AC
Res | Central Air Conditioner Tune up	Tune up and maintenance of central AC

Measure Name	Detailed Description
Res | CFL Bulbs (Reflector)	Install CFL reflector lamp instead of incandescent or halogen lamp
Res | Clothes Dryer - Fuel Switch - MF	Install high efficiency gas clothes dryer instead of electric clothes dryer
Res | Clothes Dryer - Fuel Switch - SF	Install high efficiency gas clothes dryer instead of electric clothes dryer
Res | Clothes Washer | Electric DHW	Clothes washer that meets ENERGY STAR specification
Res | Clothes Washer | Gas DHW	Clothes washer that meets ENERGY STAR specification
Res | Dishwasher | Electric HW	Dishwasher that meets ENERGY STAR specification
Res | Dishwasher | Gas HW	Dishwasher that meets ENERGY STAR specification
Res | Duct Insulation - Gas and Electric	Insulating HVAC air ducts
Res | Duct Sealing - Gas and Electric	Sealing HVAC air ducts
Res | Ductless Mini-Split Heat Pumps	Install efficient mini-split ductless heat pump with electric zonal Heat
Res | Ductless Mini-Split Heat Pumps - SF	Install efficient mini-split ductless heat pump with electric zonal Heat
Res | ECM Motor MH	Use ECM fan motor instead of PSC or Shaded Pole Motor in furnace in manufactured housing
Res | ECM Motor SF MF	Use ECM fan motor instead of PSC or Shaded Pole Motor in furnace in single family or multi family housing
Res | Electric Clothes Dryer	Electric clothes dryer that meets ENERGY STAR specification
Res | Electric Resistance Heating - Fuel Switch - MF	Install high-efficiency gas furnace instead of electric resistance heating in a multi-family home
Res | Electric Resistance Heating - Fuel Switch - SF	Install high-efficiency gas furnace instead of electric resistance heating in a single-family home
Res | Electric Storage Water Heater	Electric storage water heater with 0.95 energy factor
Res | Energy Efficient Building - Electric & Gas ST	Multi-family building that consumes 30% less energy than a code-compliant building (Electric and Gas Service Territory)
Res | Energy Efficient Building - Gas Only ST	Multi-family building that consumes 30% less energy than a code-compliant building (Gas-Only Service Territory)
Res | ENERGY STAR CFL Bulbs (General Service Lamps)	Install CFL general service lamp instead of incandescent lamp
Res | ENERGY STAR CFL Bulbs (Specialty, Non-Reflector)	Install CFL specialty bulb instead of incandescent bulb
Res | Energy Star Home, Electric & Gas ST	Home that uses 10% less energy than a home built to 2012 IECC Code standards (Electric and Gas Service Territory)
Res | Energy Star Home, Gas Only ST	Home that uses 10% less energy than a home built to 2012 IECC Code standards (Gas-Only Service Territory)
Res | Energy Star Television, Elec	Television that meets ENERGY STAR specification
Res | Faucet Aerators - Bathroom, Electric WH	Aerators on bathroom faucets that reduce flow to 0.5 gallons per minute
Res | Faucet Aerators - Bathroom, Gas WH	Aerators on bathroom faucets that reduce flow to 0.5 gallons per minute
Res | Faucet Aerators - Kitchen, Electric WH	Aerators on kitchen faucets that reduce flow to 1.5 gallons per minute

Measure Name	Detailed Description
Res | Faucet Aerators - Kitchen, Gas WH	Aerators on kitchen faucets that reduce flow to 1.5 gallons per minute
Res | Floor Insulation - Gas and Electric	Install floor insulation up to R-30
Res | Gas Clothes Dryer	Gas clothes dryer that meets ENERGY STAR specification
Res | Gas Fireplace	Gas furnace with an AFUE rating of 70% or higher
Res | Gas Furnace Tune-up, RET	Conduct maintenance to improve the operation of gas furnace
Res | Gas Storage Water Heater	Gas storage water heater with an Efficiency Factor of 0.67 or greater
Res | Gas Tankless Water Heater	Gas tankless water heater with an Efficiency Factor of 0.96 or greater
Res | Ground Source Heat Pump	Ground source heat pump that meets ENERGY STAR specification
Res | Heat Pump - Fuel Switch - MF	Install high-efficiency gas furnace instead of a heat pump in a multi-family home
Res | Heat Pump - Fuel Switch - SF	Install high-efficiency gas furnace instead of a heat pump in a single-family home
Res | Heat Pump Clothes Dryer	High efficiency heat pump clothes dryer with UCEF of 3.4 or greater
Res | Heat Pump Water Heater	Heat pump water heater with an Efficiency Factor of 2.0 or greater
Res | High Efficiency Boiler	Boiler with a thermal efficiency of 95%
Res | High Efficiency Freezer	Freezer that meets ENERGY STAR specification
Res | High Efficiency Furnace Replacement	Gas furnace with AFUE rating of 95%
Res | High Efficiency Refrigerator	Refrigerator that meets ENERGY STAR specification
Res | High Efficiency Windows - Gas and Electric	Windows with a U-value of 0.22
Res | Home Energy Reports, Electric & Gas ST, NEW	Send home energy reports to household occupants to inform them of their energy use and suggest ways to reduce energy use
Res | Home Energy Reports, Electric & Gas ST, RET	Send home energy reports to household occupants to inform them of their energy use and suggest ways to reduce energy use
Res | Home Energy Reports, Electric Only ST, NEW	Send home energy reports to household occupants to inform them of their energy use and suggest ways to reduce energy use
Res | Home Energy Reports, Electric Only ST, RET	Send home energy reports to household occupants to inform them of their energy use and suggest ways to reduce energy use
Res | Home Energy Reports, Gas Only ST, NEW	Send home energy reports to household occupants to inform them of their energy use and suggest ways to reduce energy use
Res | Home Energy Reports, Gas Only ST, RET	Send home energy reports to household occupants to inform them of their energy use and suggest ways to reduce energy use
Res | Indoor Fixture (hard wired, pin-based)	Use pin-based fixture that is compatible with fluorescent bulbs only (to prevent installation of incandescent bulbs)
Res | Indoor Fluorescents T8	Replace T12 fluorescent bulbs with T8 bulbs
Res | Integrated Space and Water Heating	Use an integrated space heating and water heating system instead of a separate gas furnace and gas water heater

Measure Name	Detailed Description
Res | LED (General Service Lamps)	Install LED bulb instead of incandescent bulb
Res | LED (Reflector)	Install LED reflector bulb instead of incandescent or halogen bulb
Res | LED (Specialty, Non-Reflector)	Install LED specialty bulb instead of incandescent bulb
Res | LED Exit Signs (Multi-Family only)	Use LEDs in exit signs instead of incandescent bulbs
Res | Low-Flow Showerheads, Electric WH	Showerhead that restricts flow to 1.5 gallons per minute
Res | Low-Flow Showerheads, Gas WH	Showerhead that restricts flow to 1.5 gallons per minute
Res | Outdoor Fixture (hard wired, pin-based)	Use pin-based exterior fixture that is compatible with fluorescent bulbs only (to prevent installation of incandescent bulbs)
Res | Programmable Thermostat - NEW	Thermostat that can be programmed by the user to change temperature settings according to a schedule
Res | Programmable Thermostat - RET	Thermostat that can be programmed by the user to change temperature settings according to a schedule
Res | Refrigerator Recycling	Removing and recycling second refrigerator
Res | Room AC Replacement	Room air conditioner that meets ENERGY STAR specification
Res | Smart Thermostat - NEW, Manual Baseline	Smart thermostat that adapts to user behavior and can be controlled by wifi
Res | Smart Thermostat - NEW, Programmable Baseline	Smart thermostat that adapts to user behavior and can be controlled by wifi
Res | Smart Thermostat - RET, Manual Baseline	Smart thermostat that adapts to user behavior and can be controlled by wifi
Res | Smart Thermostat - RET, Programmable Baseline	Smart thermostat that adapts to user behavior and can be controlled by wifi
Res | Solar Water Heater	Water heater that uses solar thermal energy to provide supplemental heat
Res | Stand-Alone Freezer - Removal	Removing and recycling extra stand-alone freezer
Res | Tankless Water Heater - Fuel Switch - MF	Install a tankless gas water heater instead of an electric water heater
Res | Tankless Water Heater - Fuel Switch - SF	Install a tankless gas water heater instead of an electric water heater
Res | Wall Insulation - Gas and Electric	Upgrade wall insulation to R-21 insulating value, with R-5 sheathing
Res | Water Heater Tank Blanket/Insulation, Electric WH	Wrap water heater tank in R-10 insulation
Res | Water Heater Tank Blanket/Insulation, Gas WH	Wrap water heater tank in R-10 insulation
Res | Water Heater Temperature Setback, Electric WH, NEW	Set water heater temperature to 120 F instead of a higher temperature

Measure Name	Detailed Description
Res | Water Heater Temperature Setback, Electric WH, RET	Set water heater temperature to 120 F instead of a higher temperature
Res | Water Heater Temperature Setback, Gas WH, NEW	Set water heater temperature to 120 F instead of a higher temperature
Res | Water Heater Temperature Setback, Gas WH, RET	Set water heater temperature to 120 F instead of a higher temperature
Res | Window Film - Gas and Electric	Adding solar film to existing single or double pane windows

Table 26. Glossary of Initialisms and Abbreviations

Initialism/ Abbreviation	Definition
AC	Air conditioner
Ag	Agricultural
CFL	Compact fluorescent lamp
Com	Commercial (sector)
DHW	Domestic hot water
EB	Electronic ballast
ECM	Electronically Commutated Motor
EDHW	Electric domestic hot water
Edry	Electric dryer
EEB	Energy efficient ballast
Elec	Electric
Gdry	Gas dryer
GDWH	Gas domestic hot water
GSL	General service lamps
HO	High output
HVAC	Heating, ventilation, and air conditioning
HW	Hot water
Ind	Industrial (sector)
kWh	Kilowatt-hour
kWh	Kilowatt
LED	Light-emitting diode
MF	Multi-family (customer segment)
MH	Manufactured homes (customer segment)
MW	Megawatt
MWh	Megawatt-hour
PTAC	Packaged terminal air conditioner
Res	Residential (sector)
RET	Retrofit
ROB	Replace on burnout

SEER	Seasonal energy efficiency rating
SF	Single family (customer segment)
SHW	Steam hot water
ST	Service territory (electric only, gas only, or combined)
VFD	Variable frequency drive
WH	Water heating

Table 27. Unit Definitions and Conversions

Impact Type	Unit Abbreviation	Unit Name	Base Unit	Conversion
Electric Energy	kWh	Kilowatt-hour	Watt-hour (Wh)	1 kWh = 1,000 Wh
	MWh	Megawatt-hour	Watt-hour (Wh)	1 MWh = 1,000,000 Wh
	aMW	Average megawatt	Megawatt-hour (MWh)	1 aMW = 8760 MWh
Electric Demand	kW	Kilowatt	Watt (W)	1 kW = 1,000 W
	MW	Megawatt	Watt (W)	1 MW = 1,000,000 W
Gas Energy	Therm	Therm	British thermal unit (BTU)	1 therm = 100,000 BTU
	Dth	Dekatherm	Therm	1 Dth = 10 therms
	MDth	Thousand dekatherms	Dekatherm (Dth)	1 MDth = 1,000 Dth
	MMTherms	Million therms	Therm	1 MMTherms = 1,000,000 therms

Table 28. Maximum Achievability Factors Less Than 85%

Measure Name	Maximum Achievability Factor
Com | Building Automation Systems - kWh	80%
Com | Building Automation Systems - therm	80%
Com | Electric Furnace - Fuel Switch	63%
Com | Fixture Mounted Occupancy Sensor	65%
Com | High Efficiency Comprehensive New Construction - 10% Better - kWh	75%
Com | High Efficiency Comprehensive New Construction - 10% Better - therm	75%
Com | High Efficiency Comprehensive New Construction - 25% Better - kWh	65%
Com | High Efficiency Comprehensive New Construction - 25% Better - therm	65%
Com | HVAC Heat Recovery / Energy Recovery Ventilator - NEW	75%
Com | HVAC Heat Recovery / Energy Recovery Ventilator - RET	75%
Com | Low-Flow Pre-Rinse Spray Valves (Gas)	75%
Com | Storage Water Heater - Fuel Switch	63%
Ind | Air Compressor Improvements | NEW	65%
Ind | Air Compressor Improvements | RET	65%
Ind | Boiler Tune Up | NEW	45%
Ind | Boiler Tune Up | RET	50%
Ind | Condenser Boiler | NEW	45%
Ind | Condenser Boiler | RET	50%
Ind | De Strat Fans Gas | NEW	45%
Ind | De Strat Fans Gas | RET	50%
Ind | Furnace Covers | NEW	45%
Ind | Furnace Covers | RET	50%
Ind | Heat recovery	50%
Ind | High Efficiency Oven | NEW	45%

Ind | High Efficiency Oven | RET	50%
Ind | Process Boiler Load Controls | NEW	45%
Ind | Process Boiler Load Controls | RET	50%
Ind | Pump Equipment Upgrades | NEW	65%
Ind | Pump Equipment Upgrades | RET	65%
Ind | Reduce Steam Pressure | NEW	45%
Ind | Reduce Steam Pressure | RET	50%
Res | Clothes Dryer - Fuel Switch - MF	5%
Res | Clothes Dryer - Fuel Switch - SF	5%
Res | Clothes Washer | Electric DHW	75%
Res | Clothes Washer | Gas DHW	75%
Res | Dishwasher | Electric HW	75%
Res | Dishwasher | Gas HW	75%
Res | Electric Resistance Heating - Fuel Switch - MF	63%
Res | Electric Resistance Heating - Fuel Switch - SF	63%
Res | Energy Efficient Building - Electric & Gas ST	65%
Res | Energy Efficient Building - Gas Only ST	65%
Res | Energy Star Home, Electric & Gas ST	75%
Res | Energy Star Home, Gas Only ST	75%
Res | Heat Pump - Fuel Switch - MF	63%
Res | Heat Pump - Fuel Switch - SF	63%

APPENDIX B. METHODOLOGICAL CONSISTENCY WITH THE SEVENTH NORTHWEST POWER PLAN

Navigant used great care to maintain methodological consistency with the Northwest Power and Conservation Council's (the Council's) Seventh Power Plan (Seventh Plan) wherever possible. This appendix provides a comparison of the methodology employed in PSE's 2017 integrated resource planning (IRP) process to the benchmarks established by the Council. Key analytical components of this CPA where Navigant's methodology is explicitly consistent with the Council's methodology are described in more detail below.

B.1 Technical Resource Potential Assessment

1. Review wide array of energy efficiency technologies and practices across all sectors and major customer segments.

   This assessment includes a comprehensive list of energy efficiency measures. Navigant reviewed current PSE program offerings, the Regional Technical Forum (RTF), the Seventh Power Plan, the previous IRP, other regional programs, and potential model measure lists from other jurisdictions to identify energy efficiency measures with the highest expected impact. Table 24 provides further details on the measures analyzed.

2. Methodology

   a. Technical feasibility savings = Number of applicable units * incremental savings per applicable unit

   b. Applicable units accounts for the following:

      i. Fuel saturations (e.g., electric vs. gas domestic hot water)

         Navigant's analysis accounted for fuel saturations based on data specific to PSE's service territory. The team used PSE's 2010 Residential Characteristics Research Report and the 2014 Commercial Building Stock Analysis (CBSA) as key data sources.

      ii. Building characteristics (single family vs. mobile homes, basement/non-basement, etc.)

         Navigant relied on data from the 2011 Regional Building Stock Assessment (RBSA), 2014 CBSA, and Seventh Plan as well as PSE billing data and load forecasts to account for current and future building characteristics.

      iii. System saturations, (e.g., heat pump vs. zonal, central air conditioning vs. window air conditioning)

         Whenever possible, the DSR team relied on data from PSE's service territory by leveraging a variety of regional resources including the 2011 RBSA, 2014 CBSA, Seventh Plan, RTF Measure Workbooks, and PSE program data.

      iv. Current measure saturations

Wherever possible, the team relied on data from PSE's service territory by leveraging a variety of regional sources including the 2011 RBSA, 2014 CBSA, Seventh Plan, RTF Measure Workbooks, and PSE program data.

v. New and existing equipment units

New and existing equipment units were calculated based on estimates of current and forecasted building stock. Section 2.1.2 provides more details on the building stock forecast methodology. This methodology was discussed in detail with both Council and PSE staff.

vi. Measure life (stock turnover cycle)

The present analysis assumes that equipment turnover/burnout occurs at a rate inversely proportional to the effective useful lifetime (EUL) of the inefficient equipment, and only equipment that turns over in a given year is eligible for replacement by more efficient equipment. This exponential decay of existing baseline stock is only applicable to replace on burnout (ROB) or lost opportunity measures.

vii. Measure substitutions (e.g., duct sealing of homes with forced-air resistance furnaces vs. conversion of homes to heat pumps with sealed ducts)

Navigant's analysis accounted for competition among efficient measures competing for the same end use installation to avoid double counting.

c. Incremental savings per applicable unit accounts for the following:

i. Expected kilowatt and kilowatt-hour savings shaped by time of day, day of week, and month of year

Energy and demand savings were either based on deemed values from regional sources such as the RTF Measure Workbooks, the Seventh Plan, or PSE program evaluation data, or were calculated using engineering algorithms. Demand savings were estimated using hourly load shapes provided by PSE along with information on PSE's peak load hours.

ii. Savings over baseline efficiency

Navigant accounted for both federal appliance standards per the US Department of Energy (DOE) as well as the current Washington State Energy Code (WSEC) in determining baseline efficiency levels.

iii. Climate: heating/cooling degree days and solar availability

Savings estimates were based on the typical climate in PSE's service territory.

iv. Measure interactions (e.g., lighting and HVAC)

Interactive effects are accounted for during measure characterization as a reduction in measure savings.

B.2 Economic Potential: Ranking Based on Resource Valuation

1. Total resource cost (TRC) is the criterion for economic screening. TRC includes all costs and benefits of the measure, regardless of who pays for or receives them.

a. TRC cost-benefit ratio ≥ 1.0

Cost-benefit ratios were not calculated. This analysis instead relied on the TRC net levelized cost of conserved energy (see below).

b. Levelized cost of conserved energy (CCE) could substitute for TRC if CCE was adjusted to account for non-kWh benefits, including deferred T&D, quantifiable non-energy benefits, environmental benefits, and the Regional Act's 10% conservation credit.

For each measure considered for analysis, a total resource net levelized cost of energy saved, or TRC net LCOE, was computed. This TRC net LCOE was then utilized as the key metric for comparison with PSE's supply-side resources in its IRP modeling. As described in the main body of the report, the levelized cost calculation incorporated deferred T&D benefits, quantifiable non-energy benefits, secondary fuel benefits, and the 10% conservation credit. Section 2.1.8 provides details of how these key cost and benefit components were incorporated into the levelized cost calculation and includes the full list of cost and benefit streams, discount rate assumptions, and project life.

B.3 Achievable Technical Potential

1. Annual acquisition targets established through Integrated Resource Acquisition Planning process (i.e., portfolio modeling)

   The TRC net LCOEs described above were subsequently used to bundle different resources into distinct cost groups for inclusion into PSE's IRP model. This allowed the IRP model to identify optimal amounts of annual demand-side resources (DSRs) given projected energy prices, load growth, and supply-side resources

2. Conservation competes against all other resource options in the portfolio analysis

   a. Conservation resource supply curves separated into:

      i. Discretionary (non-lost opportunity)

      The analysis considered discretionary measures (RET replacement type) applicable to existing equipment or building stock.

      ii. Lost opportunity

      The analysis considered lost opportunity measures (ROB or NEW replacement types) where existing baseline equipment may be replaced with its efficient counterpart only at the time of retirement.

   b. Annual achievable technical potential constrained by historic ramp rates for discretionary and lost opportunity resources

   Navigant leveraged the suite of ramp rates provided by the Council and assigned a single ramp rate to each measure based on the technical characteristics and the availability of likely delivery channels for that measure. Navigant reviewed the Seventh Plan data files to ensure explicit alignment in measure ramp rate assignments wherever possible.

3. Revise technical, economic, and achievable potential based on changes in market conditions (e.g., revised codes or standards), program accomplishments, evaluations, and experience

This analysis accounts for federal appliance standards per the U.S. Department of Energy and the current WSEC, as well as past PSE program accomplishments, evaluations, and experience of PSE program staff.

APPENDIX C. DISTRIBUTED GENERATION SOLAR PV

This section of the report outlines the approach used and key results estimated in Navigant's analysis of distributed generation (DG) solar PV technical and market potential across the residential, commercial, and industrial sectors from 2018 to 2037.

C.1 Approach to Estimating Technical Potential

Technical potential is the amount of solar PV that can be installed on rooftops considering resource availability and quality, technical system performance, and physical availability of suitable area for development. Navigant used a constrained rooftop space approach combined with a solar PV module power density calculation to estimate technical potential for each sector in PSE's electric service territory. This constrained rooftop space methodology accounts for shading, setback restrictions due to fire and building codes, roof orientation, and tilt angle. By aggregating the cumulative effects of these constraints, Navigant calculated an overall solar access factor for each sector, which is used to constrain the total available rooftop space for each sector to that technically suitable for the installation of solar PV. The final equation used to calculate solar PV technical potential is provided in Equation C-1.

Equation C-1. Solar PV Technical Potential

$$\textit{Technical Potential (MW)} = \textit{Roof Area (Square Feet) X PV Access Factors (\% of roof area) X Module Power Density (W/square feet)}$$

Roof Area

For the residential and commercial sectors, Navigant calculated the available roof area based on building floor area (square feet) from the Regional Building Stock Assessment (RBSA) and Commercial Building Stock Assessment (CBSA), and assumptions on number of floors per home and per building, respectively. Available roof area was then estimated by dividing the overall square footage by the number of floors. Estimates on average number of floors for residential were obtained from the RBSA and for commercial were obtained from the Commercial Building Energy Consumption Survey (CBECS). For the industrial sector, roof area was calculated by dividing PSE's industrial sector load data by energy use intensity (EUI), taken from CBECS. To account for growth in the roof area forecasts in all sectors, Navigant leveraged PSE's load forecast.

Access Factor

Navigant reduced the available roof area to account for technical constraints also referred to as the access factor. To estimate access factors, Navigant utilized raw Light Detection and Ranging (LIDAR) data from the National Renewable Energy Laboratory's (NREL's) rooftop solar PV technical potential study and filtered it to match PSE's service territory.[62] A summary of the key constraints and assumptions accounted for in the access factor based on the NREL LIDAR data is shown below. The resulting access factors are provided in Table C-2.

[62] Gagnon et al. NREL. "Rooftop Solar Photovoltaic Technical Potential in the United States: A Detailed Assessment."

Table C-1. Access Factor Technical Constraints and Assumptions

Constraint	Explanation
System Footprint	**Residential:** All buildings characterized as small by NREL were classified as residential. Residential buildings with less than 30 m^2 of contiguous suitable area were excluded. **Commercial & Industrial (C&I):** All medium and large buildings with at least 10 m^2 of contiguous suitable area were included as technical potential. Medium-sized buildings were mapped to commercial, and large buildings were mapped to industrial.
Shading	Roof areas obstructed by trees, chimneys, vent stacks, and other items on the roof or adjacent to the building were excluded.
Tilt	All tilt values greater than 60° were removed.
Azimuth	Only roofs facing SE, S, SW, or W were included, and areas bordered by more than three unique azimuths were excluded.

Table C-2. PSE Solar PV Access Factors by Sector

Residential	Commercial	Industrial
27%	54%	65%

Module Power Density

The final step in calculating solar PV technical potential is to estimate how much power can be generated by the solar panels per square feet of roof space. To calculate module power density, Navigant started by taking an average of module power density of "made in Washington" panels.[63] The resulting raw module power density (assuming no tilt adjustment—i.e., if the panel was installed flat on a roof) is 14.4 W/SF. Navigant then made adjustments to account for tilt and sloped roofs. For residential, the DSR team assumed 92% of roofs are sloped at a 30° tilt with the rest at 10°. For non-residential, the team assumed a 10° tilt. The final power densities used to calculate technical potential are shown in Table C-3. These power densities are assumed to grow at 1% per year to account for efficiency improvements[64].

Table C-3. Module Power Density by Sector

Residential	Commercial	Industrial
17.06 W/sq.ft	15.5 W/sq.ft	15.5 W/sq.ft

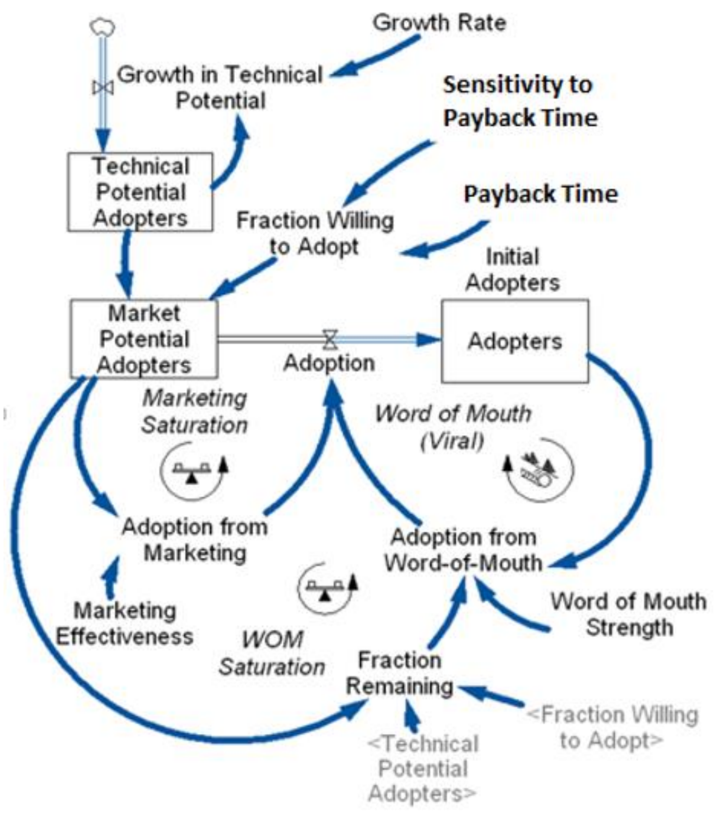
[63] List of manufacturers that have been approved to receive the "made in Washington" production incentives can be accessed at: http://dor.wa.gov/Docs/Pubs/IndustSpecific/ManufacturingList.pdf (accessed November 2016).
[64] *International Technology Roadmap for Photovoltaic (ITRPV), 2015 Results*. Seventh Edition, March 2016.

C.2 Approach to Estimating Market Potential

After calculating technical potential, Navigant forecasted market potential[65], which represents the number of customers expected to adopt solar PV given a realistic diffusion trajectory over time. The DSR team used a payback-based market approach in conjunction with a Bass diffusion model to forecast the adoption of host-owned solar PV in PSE's electric service territory as illustrated in Figure C-1.[66]

Using this approach, Navigant first calculated the fraction of technical *potential* adopters willing to adopt in the long-run given enough time and access to information. This market penetration calculation is based on the customer payback period and a set of payback acceptance curves. In the next step, Navigant simulated the flow of the potential adopters to adopters by two primary mechanisms: adoption from external influences such as marketing and advertising, and adoption from internal influences or word of mouth. The resulting adoption trajectory is the fully constrained forecast and is the most realistic expectation of solar PV adoption under different incentive scenarios.

Figure C-1. Illustration of PV Adoption Model Methodology



[65] Navigant refers to the realistic potential for solar PV adoption as market potential because it is calculated according to a different methodology compared to achievable technical potential described for the other DSRs in various other sections of this report.
[66] The scope of this analysis was to look at host-owned (or purchased) PV systems. As such, third-party-owned systems were not considered in this analysis given the current policy and incentive mechanisms in place in Washington State.

Customer Payback Period
Simple payback period is a key determinant of long-run market share when forecasting solar PV market potential. The payback period represents the length of time after which an initial investment has paid for itself. This is a common metric used to evaluate the viability of energy efficiency and renewable energy technologies from a customer's perspective and is an important factor in the purchase decision.

Equation C-2 shows the simple payback calculation for residential customers, and Equation C-3 shows the calculation for the C&I market. Data on system size, installation costs, estimated annual capacity factor, and other key financial modeling inputs were obtained from a variety of sources that are described in Appendix C.3.

Equation C-2. Residential Simple Payback

$$\frac{Installed\ Costs\ -\ \ Federal\ incentives}{Annual\ Electric\ Bill\ Savings + REAP^{67}\ Incentives\ \ - O\&M\ Costs}$$

Equation C-3. C&I Simple Payback

$$\frac{Installed\ Costs\ -\ \ Federal\ incentives}{(1 - Tax\ Rate) * (Annual\ Electric\ Bill\ Savings - O\&M\ Costs) + REAP\ Incentives + MACRS^{68}}$$

The residential and C&I sectors were each treated differently in the payback calculations due to differences in each sector's ability to monetize the Federal Investment Tax Credit (ITC) incentives and other tax benefits (e.g., accelerated depreciation). Below, the DSR team describes how each sector (residential vs. C&I) was treated differently in the above payback equations.

Federal ITC
The federal ITC currently allows consumers to take a 30% tax credit for the solar PV system cost. The ITC was assumed to apply to all sectors. For residential customers, the ITC is assumed to be 0% after 2021, while for C&I customers, the ITC sunsets to 10% post 2021.[69]

Annual After-Tax Bill Savings
For C&I customers, energy expenses can be deducted from taxable incomes. As such, only the after-tax bill savings were included in the denominator of the payback equation (i.e., Bill Savings*(1-Combined Effective Tax Rate). Bill savings (pre-tax) were calculated per Equation C-4.

Equation C-4. Annual Bill Savings

$$Bill\ Savings\ (\$) = Annual\ Production\ (kWh)\ X\ Utility\ Retail\ Rate\ (\$/kWh)$$

See Appendix C.3 for assumptions regarding tax rates, annual production, and PSE's retail rate.

Avoided Taxes due to Depreciation

[67] REAP is the Washington Renewable Energy Advantage Program Incentive

[68] Modified Accelerate Cost-Recovery System (MACRS) allows businesses to recover investments in solar PV through depreciation deductions. Solar PV assets are on a depreciation schedule of 5 years, as specified by the IRS. See https://www.irs.gov/publications/p946/ch04.html (accessed November 2016).

[69] Database of State Incentives for Renewable Energy (DSIRE)

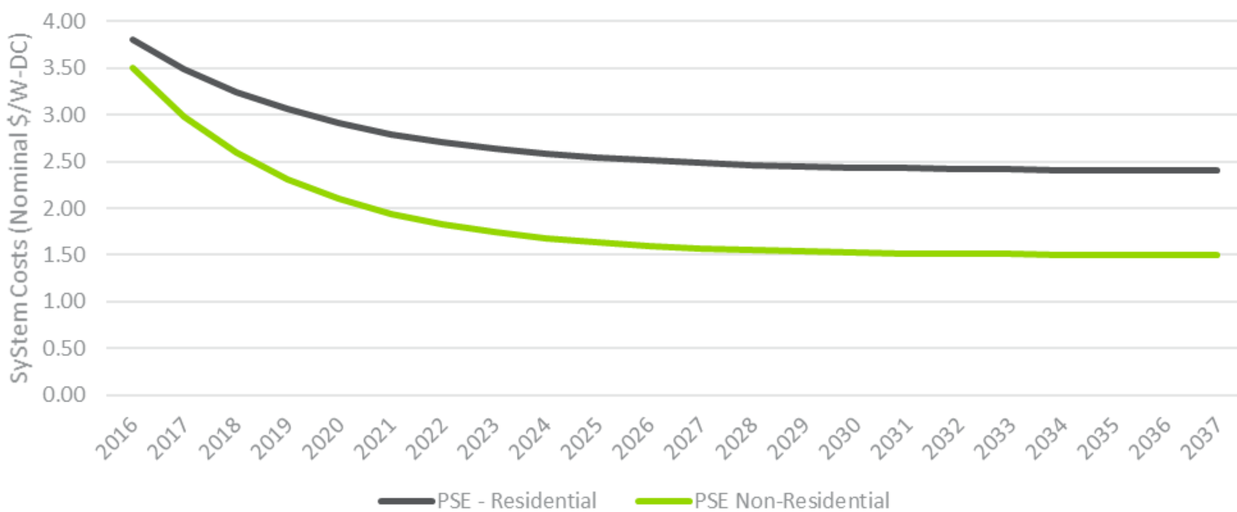
For C&I customers, avoided taxes due to depreciation were added to the assumed annual savings. The cost basis for the 5-year accelerated depreciation was reduced by 50% of the federal ITC. See Appendix C.3 for assumptions on depreciation schedules.

Solar PV Costs

Navigant developed solar PV installation cost estimates for host-owned systems in PSE's service territory. As displayed in Figure C-2, Navigant developed separate cost forecasts for residential and non-residential PV system installations. The 2016 costs are based on PSE's average installed system cost. Navigant's solar cost forecast is based on a combination of bottom-up component-level cost forecasts (including learning curves), interviews with market leaders (including equipment manufacturers and installers), benchmarking against third-party market reports, and professional judgment.

Learning curves are used for appropriate components and drive cost declines due to module efficiency improvements and learning rates. Components for which learning rates are assessed are modules and inverters (under global learning rates) as well as labor, electrical balance of system (BOS), and structural BOS (under US national learning rates). In the near term, adjustments are made to account for market forces such as supply/demand and regulatory changes. In the long term, price reductions are projected to decline as the market saturates, industry matures, and efficiency gains become harder to achieve.

Figure C-2. Solar PV Installed System Cost Forecast

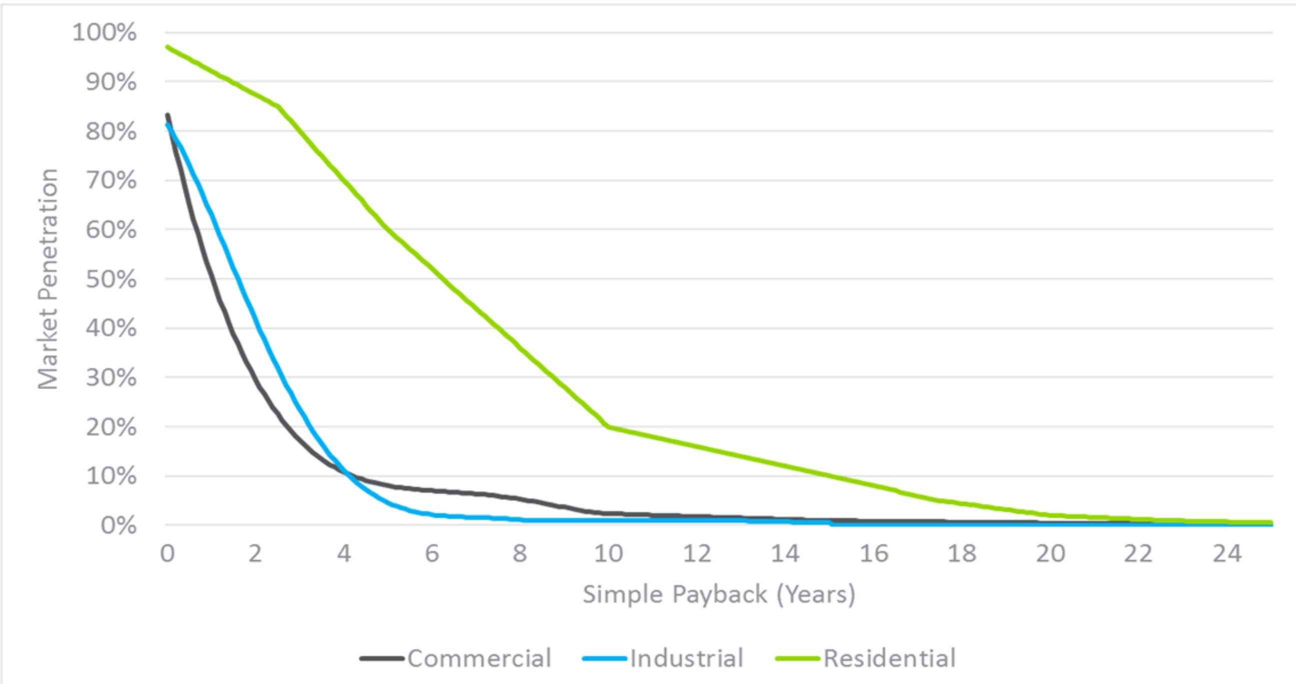


Payback Acceptance Curves

To calculate long-run market penetration, Navigant used payback acceptance curves. The long-run market penetration or fraction willing to adopt can be thought of as the percentage of customers that are willing to purchase a technology provided those individuals are fully aware of the technology and its relative merits (e.g., the energy and cost savings features of the technology). For distributed solar PV, a key differentiating factor is the energy and cost savings associated with installing a PV system. For host-owned systems, the benefits often come at a premium upfront cost. In market potential studies, market penetration is thus often calculated as a function of the payback period of the solar PV technology. While such approaches have limitations, they are nonetheless directionally reasonable and simple enough to permit estimation of market share.

In this study, Navigant used a set of payback acceptance curves from two different sources for the residential and C&I sectors, respectively. This is intended to capture the fact that these two market segments make purchasing decisions differently. The final payback curves used for this study are shown in Figure C-3.

Figure C-3. Payback Acceptance Curves[70]



Because the payback period of solar PV can change over time, as technology costs and/or energy costs change over time or incentives change, the market penetration can also change over time. The market penetration is, therefore, recalculated for every year within the market simulation to ensure the dynamics of technology adoption take this into consideration. After calculating market penetration, the DSR team used the classic Bass diffusion model[71] to simulate the S-shaped approach to long-run market penetration that is commonly observed.

Scenario Analysis

Navigant analyzed two solar PV scenarios with its market penetration model to capture the impact of future policy and incentive changes that could affect the outlook of the PV market in PSE's territory. Table C-4 provides a summary of the two scenarios that were modeled in this study.

[70] For residential, see Sigrin and Drury. "Diffusion into New Markets: Economic Returns Required by Households to Adopt Rooftop Photovoltaics," NREL 2014. For C&I, payback acceptance curves are based upon Navigant's work for various utilities, federal government organizations, and state/local organizations. The curves were developed from customer surveys, mining of historical program data, and industry interviews.

[71] Bass, Frank. "A new product growth model for consumer durables." Management Science 15 (5): 215–227. 1969.

Table C-4. Solar PV Scenarios

	Sector	Description
Base Case	Residential	Existing policies and incentives remain in effect. 1. Renewable Energy Advantage Program (REAP) incentives expire June 30, 2020 and State Sales Tax Exemption expires on June 30, 2018. 2. System installed 2016 onward will not receive incentives post 2020. REAP incentives ramp down over operating years. 3. Maximum incentive: $5,000
	C&I	Existing policies and incentives remain in effect. 1. REAP incentives expire June 30, 2020 and State Sales Tax Exemption expires on June 30, 2018. 2. System installed 2016 onward will not receive incentives post 2020. REAP incentives ramp down over operating years. 3. Maximum incentive: $5,000
Best Case	Residential	Most favorable policy options based on Draft Legislation H-4761.2 2016 Session. 1. REAP incentives expire June 30, 2020 and continuation of the State Sales Tax Exemption through end of study period. 2. Systems installed 2016 onward will receive a locked-in incentive payment for a 7-year period. 3. Maximum incentive: $5,000
	C&I	Most favorable policy options based on Draft Legislation H-4761.2 2016 Session. 1. REAP incentives expire June 30, 2020 and continuation of the State Sales Tax Exemption through end of study period. 2. Systems installed 2016 onward will receive a locked-in incentive payment for a 7-year period. 3. Maximum incentive: $25,000

C.3 Distributed Generation Solar Data Sources and Assumptions

This appendix section summarizes key data input assumptions and sources used in Navigant's payback-based market adoption model.

Table C-5. Solar PV Data Sources and Assumptions

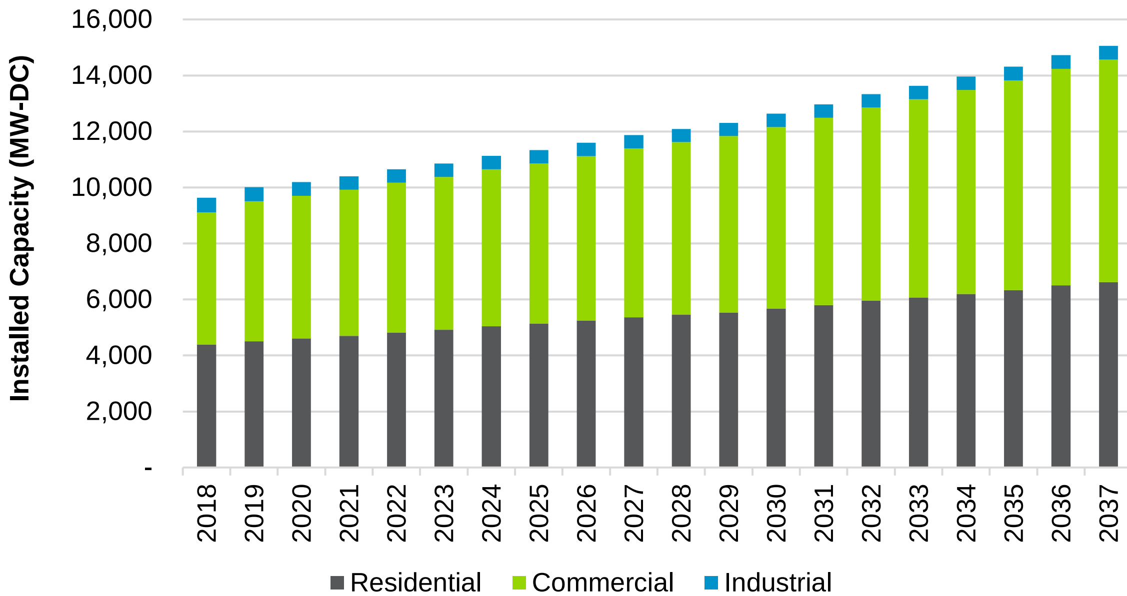
	Input	Value	Source/Notes
Residential Net Cost Assumptions	System life (years)	25	Navigant assumption
	Installed cost (nominal $/W-DC)	$3.80/W$_{DC}$ in 2016 $3.10/W$_{DC}$ in 2020 $2.32/W$_{DC}$ in 2037	Navigant analysis—cost declines account for panel efficiency improvements, hardware cost reductions, and sales and operating cost reductions
	System size (kW)	7.5 kW	Average system size based on PSE data
	Fixed O&M ($/kW-year)	20	NREL, inflated at 2.5% per year
	ITC	**2018:** 30% **2019:** 30% **2020:** 26% **2021:** 22% **2022 and beyond:** 0%	Database of State Incentives for Renewable Energy (DSIRE)
	Federal income tax	35%	US federal tax rate
	State income tax	6.5%	Department of Revenue, Washington State
Residential PV Savings Assumptions	Net metering rate	$0.11/kWh in 2016 $0.12/kWh in 2020 $0.15/kWh in 2037	PSE retail rate forecast
	Annual capacity factor (%)/kWh/kW-DC	11.42% (1,000 kWh/kW-DC)	Average annual production from PSE data, validated based on NREL SAM Model runs (S and SW facing, mean azimuth of 202.5) for US WA Seattle (TMY2) – 10° tilt
	Annual degradation (%/year)	0.5%/year	Industry standard
	REAP incentive rate	$0.47/kWh in 2016	PSE’s REAP webpage

	Input	Value	Source/Notes
C&I Net Cost Assumptions	System life (years)	25	Navigant assumption
	Installed cost (nominal $/W-DC)	$4.04/$W_{DC}$ in 2016 $2.92/$W_{DC}$ in 2020 $1.50/$W_{DC}$ in 2037	Navigant analysis—cost declines account for panel efficiency improvements, hardware cost reductions, and sales and operating cost reductions as well as economies of scale
	System size (kW)	17.07 kW for C, 10 0kW for I	Average system size based on PSE data
	Fixed O&M ($/kW-year)	15	NREL, inflated at 2.5% per year
	ITC	**2018:** 30% **2019:** 30% **2020:** 26% **2021:** 22% **2022 and beyond:** 10%	DSIRE
	Federal income tax	35%	US federal tax rate
	State income tax	6.5%	Department of Revenue, Washington State
C&I PV Savings Assumptions	Net metering rate	$0.103/kWh in 2016 $0.105/kWh in 2020 (C) $0.157/kWh in 2037 $0.098/kWh in 2016 $0.101/kWh in 2020 (I) $0.145/kWh in 2037	PSE retail rate forecast
	Annual capacity factor (%)/ kWh/kW-DC	11.42% (1,000 kWh/kW-DC)	Average annual production from PSE data, validated based on NREL SAM Model runs (S and SW facing, mean azimuth of 202.5) for US WA Seattle (TMY2) – 10° tilt
	Annual degradation (%/year)	0.5%/year	Industry standard
	REAP incentive rate	$0.47/kWh in 2016	PSE's REAP webpage
	Depreciation type	5-year MACRS	DSIRE

C.4 Technical and Market Potential by Sector

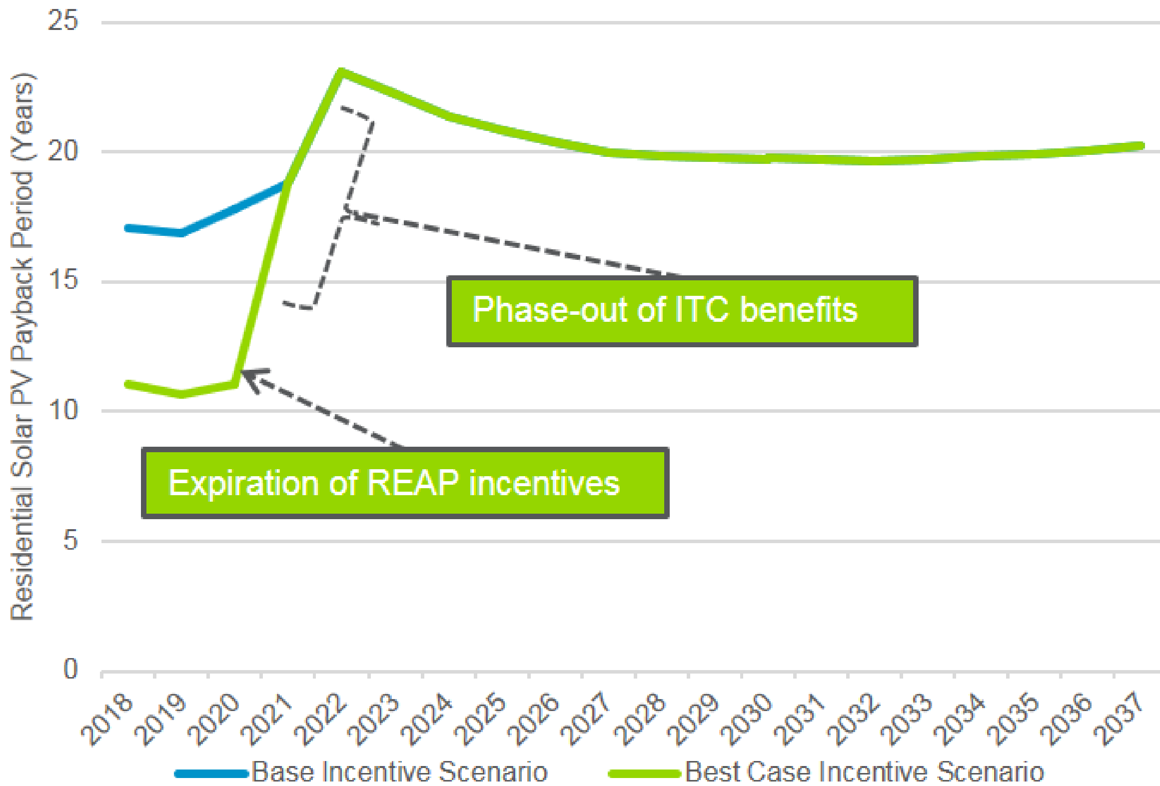
Based on the approach described in the previous sections, Navigant estimates that PSE's total technical potential from solar PV installed from 2018 to 2037 is 15,055 MW. Out of this, 6,620 MW is expected to come from the residential sector, 7,943 MW from the commercial sector, and about 492 MW from the industrial sector. The high amount of technical potential in the residential and commercial sectors is attributable to the larger amount of available roof area compared with the industrial sector. Solar PV technical potential grows over time due to forecasted growth in PSE's customer base.

Figure C-4. Solar PV Technical Potential by Sector



After calculating technical potential, Navigant then calculated market potential for solar PV using the methodology described in Section 2.4. A key determinant of the long-run potential for solar PV is the customer payback period, which is sensitive to the assumed incentive scenario as shown below. Across all sectors, payback period increases in the early years due to the expiration of REAP incentives and the phase out of the federal ITC. As costs decline and utility rates increase, payback comes down in the long-run.

Figure C-5. Residential Solar PV Payback Period



In the early years, payback under the base incentive scenario is consistently higher than the best case incentive scenario. This is because the best case scenario assumes that customers will receive a locked-in incentive payment for a 7-year period, while in the base scenario the incentive payments are assumed to ramp down over the operating years of the PV system before expiring in 2020. Post 2020, after the REAP incentives expire, the payback period under both scenarios are estimated to be the same. The further increase in payback periods between 2020 and 2022 is due to the phase out of ITC benefits, which also negatively impacts customer economics. Compared with the residential sector, the C&I sectors are projected to have lower payback periods over the study period because of their ability to monetize the MACRS depreciation benefits. In general, for a given payback period, residential customers are more likely to adopt PV than C&I customers.

Figure C-6. Commercial Solar PV Payback Period

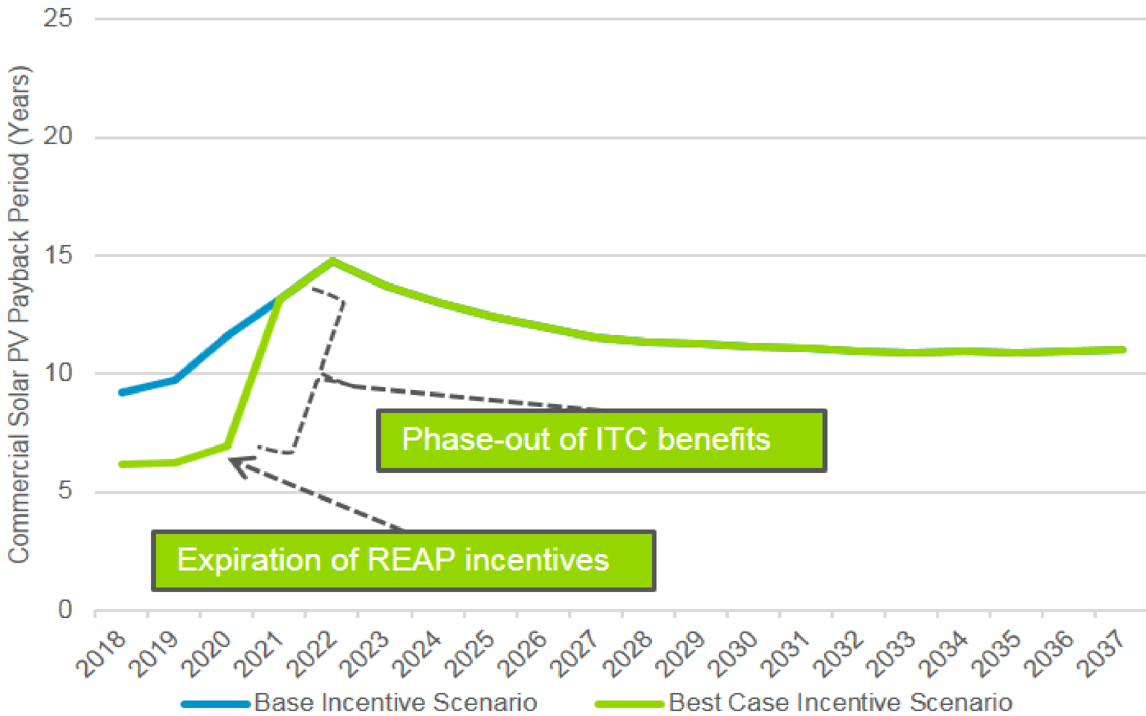
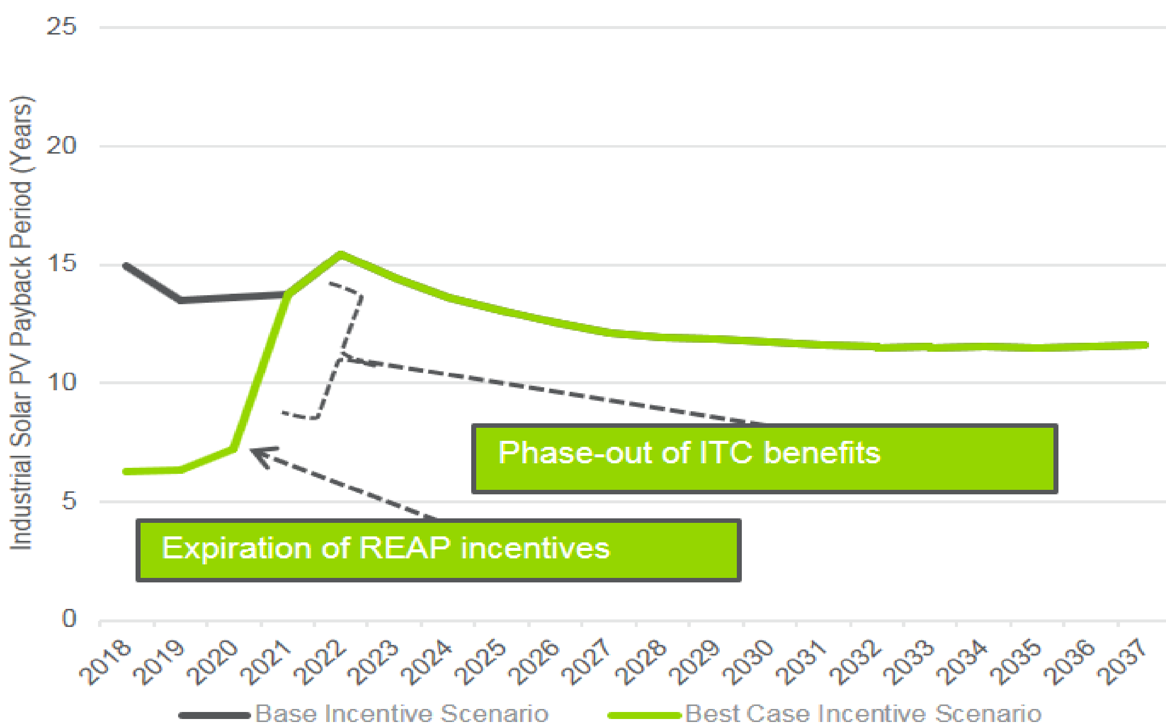
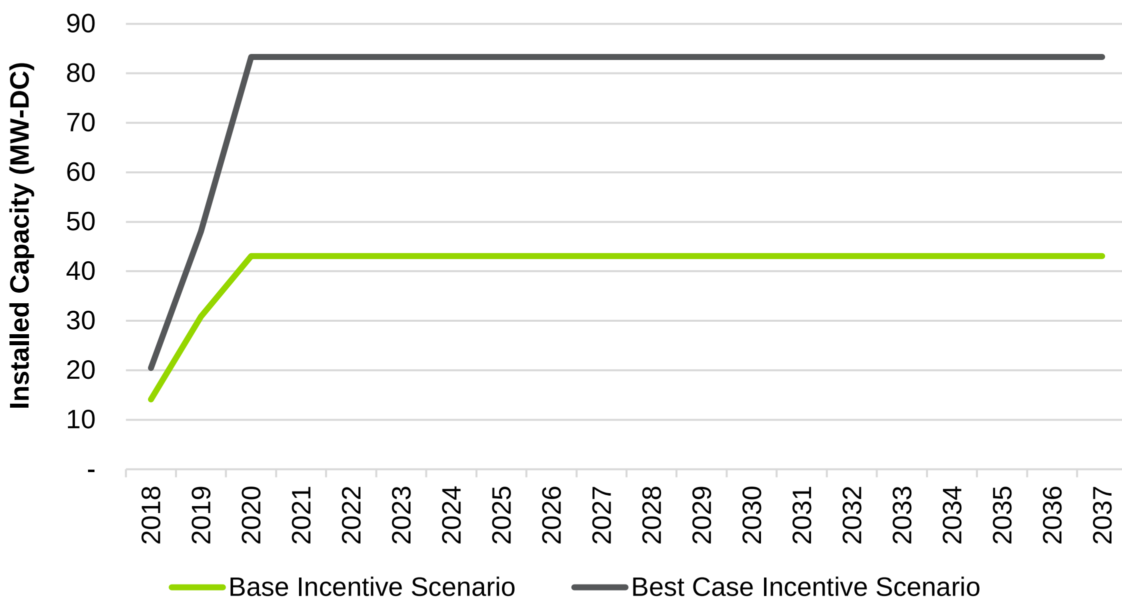


Figure C-7. Industrial Solar PV Payback Period



The next three figures show the cumulative solar PV market potential by scenario for each sector. In the residential sector, the most significant driver of customer adoption is the assumed incentive level, as reflected in the scenarios. The best case scenario results in lower customer payback periods and thus higher adoption through 2020 compared with the base scenario. After the incentives expire and the ITC phase out occurs, residential PV growth in both scenarios becomes stagnant as payback periods increase to levels at which potential customers would not be likely to adopt the technology. The stagnation of adoption after the expiry of incentives and tax benefits indicates that these financial benefits are key drivers of adoption, even under long-run forecasted declines in technology cost.

Figure C-8. Cumulative Residential Solar PV Market Potential by Scenario



In the C&I sectors, while the payback period decreases from the base scenario to the best case scenario, the impact on adoption is less pronounced due to the inherent slope of the payback acceptance curves. While the commercial sector is negatively impacted by the expiration of the incentives in the near term, in the long-run it shows more resilience as adoption picks up with further system cost declines, utility rate increases, and continued depreciation benefits. The industrial sector overall shows limited market potential due to limited roof area as well as well as expected reduction in load growth with time.

Figure C-9. Cumulative Commercial Solar PV Market Potential by Scenario

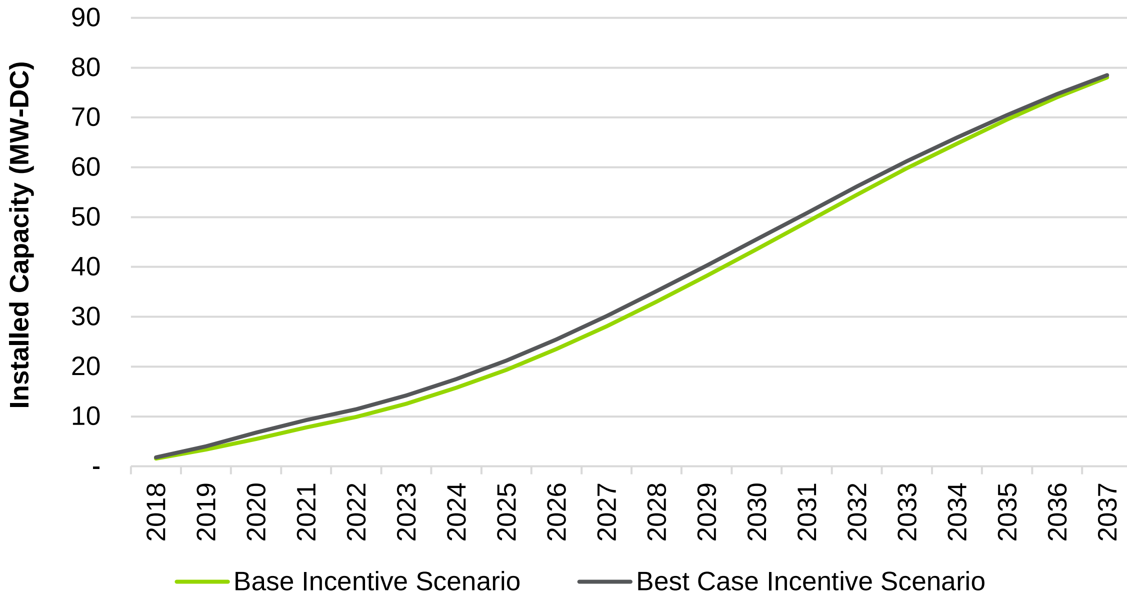
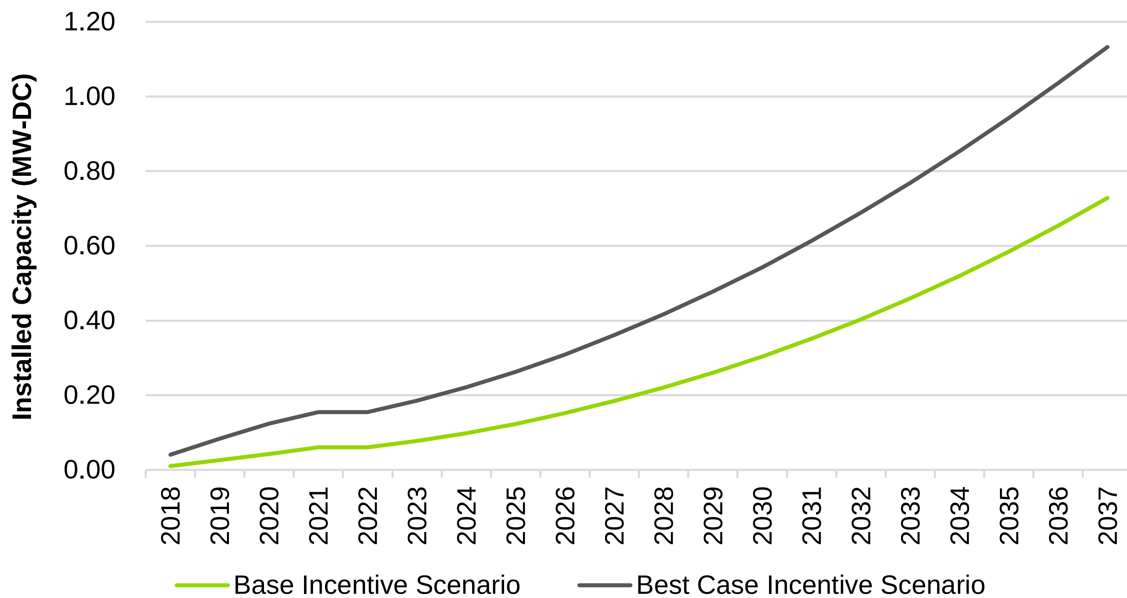


Figure C-10. Cumulative Industrial Solar PV Market Potential by Scenario



APPENDIX D. ENERGY STORAGE

D.1 Objective and Scope

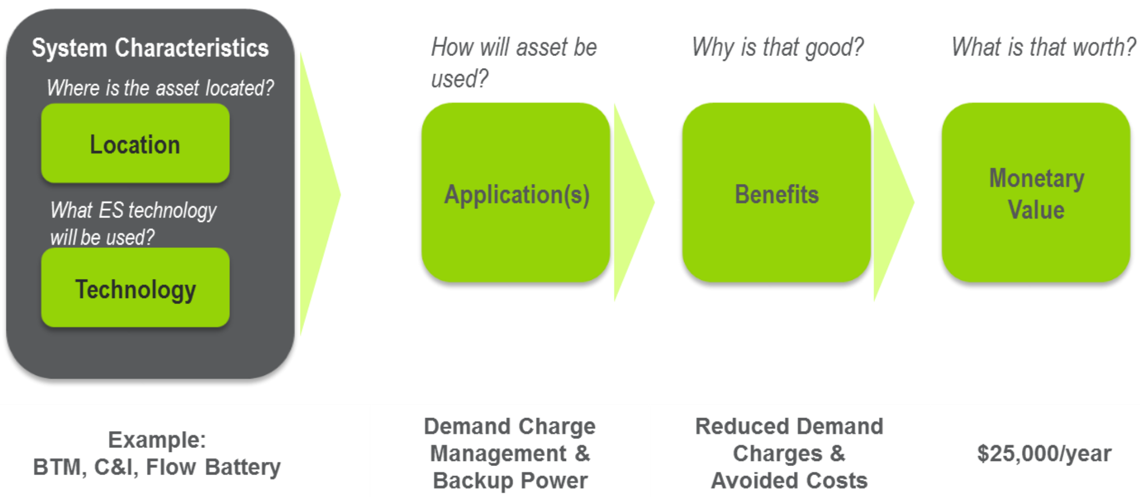
The objective of the energy storage analysis is to determine the economic feasibility of behind-the-meter (BTM) energy storage in PSE's service territory. The analysis is limited to BTM energy storage given the existing rate structure and is performed from the customer perspective. As such, the costs shown reflect those paid by the end consumer, and the benefits shown only reflect those that accrue to the end user and do not reflect any external benefits to the grid, PSE, or environment as a whole.

D.2 Approach to Estimating Feasibility

The analysis is based on the framework shown in Figure D-1:

- Where is the system located, and what technology is being used?
- What applications is the system performing?
- What are the benefits of performing these applications?
- What is the monetary value of these benefits?

Figure D-1. Energy Storage Benefit Framework



Lithium ion was selected as a representative technology based on its market leading position for BTM applications. The applications analysed were chosen from the larger list of all potential energy storage applications based on which applications have associated monetary value in PSE's service territory. For example, renewables integration is a potential application for energy storage, but it was eliminated as an option due to the lack of an associated revenue stream.

The storage systems cost was estimated based on Navigant Research's price forecasts for the average fully installed system price for systems available in the United States. The forecasts allowed for differentiation based on system size (with lower $/kW costs for larger systems) and differentiation for storage system duration (with higher $/kW costs for longer duration systems).

The storage systems were sized to match a set of representative residential and commercial load profiles provided by PSE. An iterative approach was used, evaluating systems with kW ratings of 1%, 2%, 5%, 10% and 25% of facility peak load (with a minimum 3kW system size) and storage duration of 1, 2, and 4 hours. Each combination of kW and duration was evaluated for each representative load profile to find the most economically beneficial combination.

The benefits were estimated based on the relevant applications and included:

- **Demand charge management:** Valued based on the appropriate tariff, customers hourly load profile, and any thresholds or step changes in the tariff
- **Power factor charge management:** Valued based on the appropriate tariff, assuming the minimum of:
    - The inverter capacity * 8760 * % of available hours
    - The kVAR needed to go from an 80% power factor to a 100% power factor
- **Sustained outages:** Valued based on avoided cost of a conventional portable gasoline generator ($200/kW) or stationary diesel generator ($500/kW)
- **Momentary outages:** Valued assuming five interruptions per year—$130/kW-outage for C&I customers and $3/kW-outage for residential customers

The final cost-benefit calculation resulted from the storage cost estimate for the given system as compared to the relevant benefits. The results were compared on a net present value (NPV) basis, assuming a 10% discount rate to pull both costs (O&M) and benefits (noted above).

D.3 Energy Storage Results

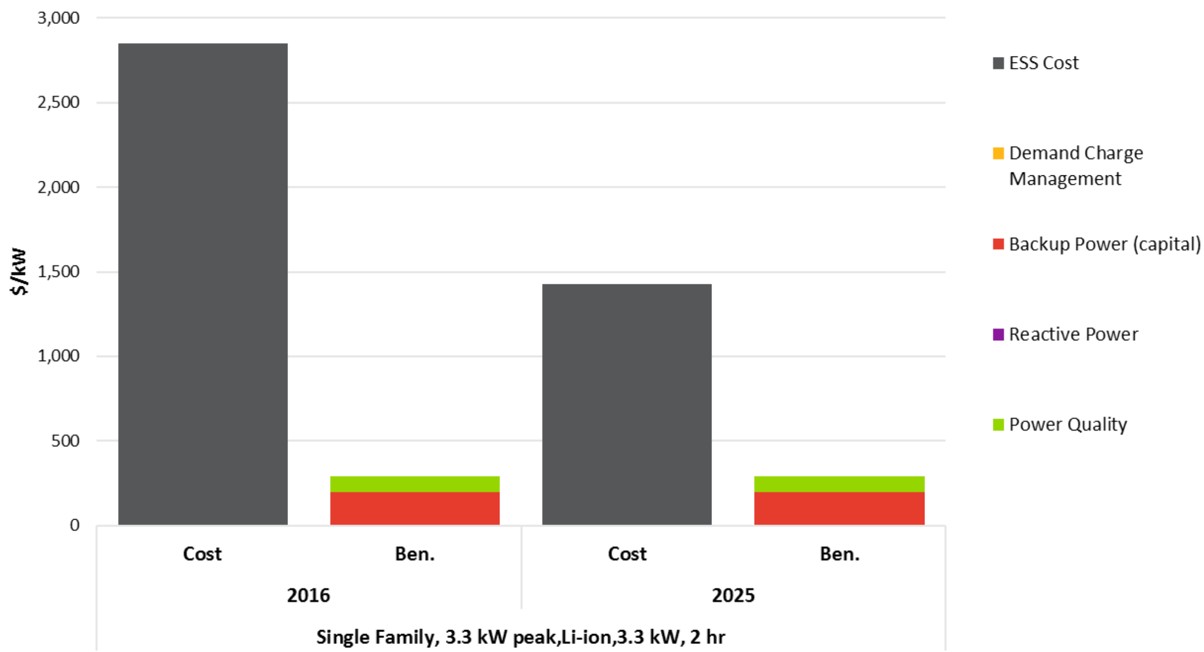
Relevant Applications
Given the current rate structure in PSE's service territory, the potential BTM energy storage applications with associated monetary benefits were:

- **Demand charge management**, where storage systems discharge to limit the peak usage of a facility to reduce the associated demand charges
- **Power factor charge management**, where storage systems provide reactive power to lower the associated power factor charges
- **Sustained outages**, where systems provide power when the grid is down, instead of having this power provided by a traditional backup generator
- **Momentary outages**, where systems prevent momentary outages and the associated customer inconvenience

Customer Economics
For residential customers, the minimum 3 kW system size was generally used. However, the economics were extremely unfavorable due to a lack of potential benefits. The only potential benefits were the ability

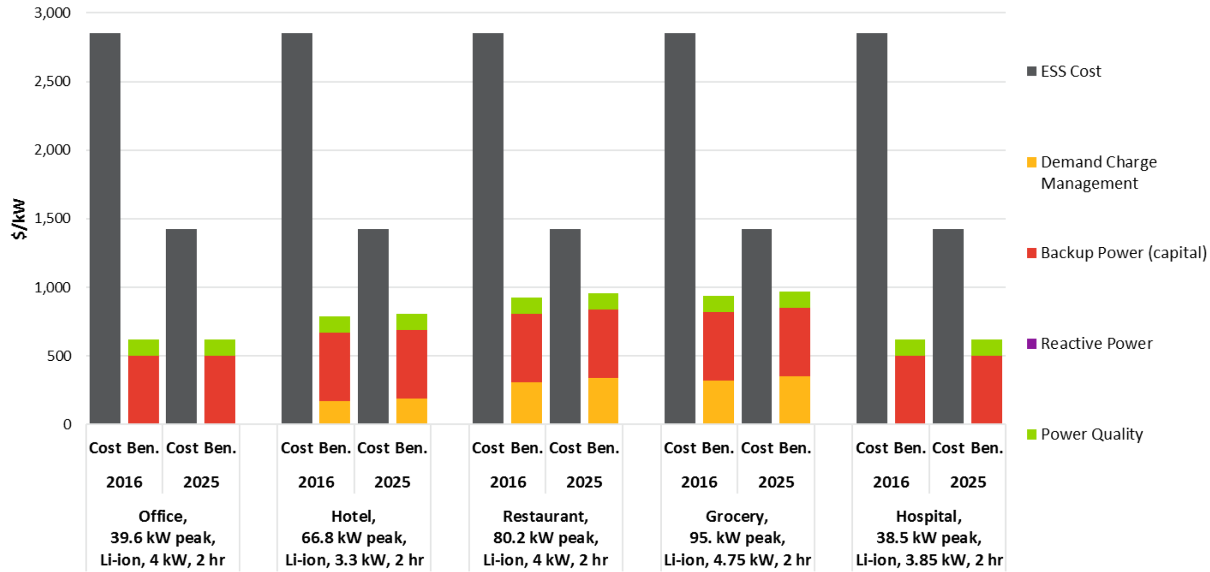
to avoid investing in a traditional residential portable generator and the minor power quality benefits from having an uninterrupted power supply.

Figure D-2. Residential Single-Family Cost-Benefit



For commercial customers, the optimal combination of kW rating and storage duration for the represented load profiles resulted in storage systems that were generally less than 10 kW. This resulted in the higher small system costs being applied instead of the lower large system costs. The potential benefits increased due to the potential to reduce demand charges and power factor charges. However, the resulting economics still showed benefits approximately 30% lower than the associated in 2025. It should be noted that for larger customers with peaky loads, energy storage may be an economical option much sooner than 2025.

Figure D-3. Commercial Customer Cost-Benefit



APPENDIX E. DEMAND RESPONSE

This appendix presents the key assumptions for DR potential estimation, technical potential results for both summer and winter and the achievable technical potential results for summer.

E.1 Key Assumptions for Potential Estimation

Table 29 below shows the DR program participation assumptions, expressed as a percentage of eligible customers.

Table 29. DR Program Participation Assumptions by DR Option and Customer Class (% of eligible customers)[72]

DR Option	Customer Class	Participation (Winter 4 -Hour Event Duration)[73]
Direct Load Control[74]	Residential	25%
	Small C&I, Medium C&I	7-8%
C&I Curtailment[75]	Large C&I, Extra Large C&I	5%-40%[76]
Economic DR[77]	Large C&I, Extra Large C&I	2.5%-20%[78]
Dynamic Pricing[79]	Residential	20%
	All C&I classes	15%

[72] Participation assumptions are based on benchmarking with other utility experiences.

[73] The table shows participation assumptions for 4-hour events. Assumed 10% higher participation in 2-hour events than 4-hour events.

[74] This represents the participation in DLC-Thermostat for space heating control. The study assumed that water heating control applies to customers with both electric space heating and electric water heating.

[75] Assumed that half of the total participants are controlled manually and the other half is Auto-DR enabled.

[76] The range represents variation in participation assumptions by C&I building type. For e.g., hospitals and hotels, typically have lower willingness to participate, and represent lower end of the range. On the other hand, office and retail are likely to have higher willingness to participate and represent the higher end of the range.

[77] Assumed that half of the total participants are controlled manually and the other half is Auto-DR enabled.

[78] Participation in Economic DR is assumed to be half of the participation levels in C&I Curtailment. This is supported by program data reported in the FERC DR National Survey Database.

[79] Assumes a CPP opt-in offer. Participation assumptions are based on the Brattle Group's Pricing Program Database (Ref: Demand Response Market Research: Portland General Electric, 2016 to 2035; January 2016).

Table 30 below shows the unit impact assumptions by DR sub-option, customer class and end use.

Table 30. Unit Energy Impact Assumptions by DR Option, Customer Class, and End Use

DR Option	Customer Class	End Use	Units	Impact Assumptions (Winter 4 hr. Load Reduction)[80]
Direct Load Control-Thermostat	Residential	Central Heating, Heat Pump	kW per unit	1.75[81]
Direct Load Control-Switch		Water Heating	kW per unit	0.581[82]
Direct Load Control-Thermostat	Small and Medium C&I	Central Heating, Heat Pump	kW per unit	2.63[83]
C&I Curtailment, Economic DR[84]	Large C&I, Extra Large C&I	Central Heating, Heat Pump	% of end use load	35%-42% (manual) 72% (Auto-DR)
C&I Curtailment, Economic DR	Large C&I, Extra Large C&I	Lighting	% of end use load	37-61%[85]
		Process	% of end use load	30%-36%
		Refrigeration	% of end use load	10%
		Water Heating	% of end use load	25%
Dynamic Pricing – w/o enabling tech.[86]	Residential	All	% of total load	14%
	Small C&I	All	% of total load	0.5%
	Medium C&I, Large C&I, Extra Large C&I	All	% of total load	6%
Dynamic Pricing – with enabling tech.[87]	Residential	All	% of total load	27%
	Small C&I, Medium C&I	All	% of total load	8-9%
	Large C&I, Extra Large C&I	All	% of total load	12%

[80] 2-hour event impacts are approximately 10% higher than 4-hour event impacts.

[81] Based on PSE's Direct Load Control Pilot experience.

[82] Based on PSE's Direct Load Control Pilot experience.

[83] Impact is assumed to be 1.5 times residential impact.

[84] Participation assumptions for C&I Curtailment and Economic DR are based on best available information sources in the industry (References: 2015 CA DR Potential Study, Phase II Appendices, 2016; Grid Integration of Aggregated Demand Response, Part I, Load Availability Profiles and Constraints for the Western Interconnection; 2013).

[85] Range represents variation by building type for lighting controls.

[86] Assumes a CPP offer with 4:1 peak to off-peak price ratio. Assumptions are based on Brattle Group's Pricing Program Database. (Ref: Demand Response Market Research: Portland General Electric, 2016 to 2035; January 2016).

[87] Assumes a CPP offer with 4:1 peak to off-peak price ratio. Assumptions are based on Brattle Group's Pricing Program Database (Ref: Demand Response Market Research: Portland General Electric, 2016 to 2035; January 2016)..

E.2 Technical Potential Results

Below, Table 31 through Table 38 show the values for DR technical potential in winter and summer, for 4-hr. and 2-hr. events. Numbers are represented in both MW and percent of winter peak.

Table 31. Winter DR Technical Potential – 4 Hr. Event Duration (MW)

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Direct Load Control-Switch	296	295	293	290	289	287	287	285	285	287	287	287	289	292	294	295	296	298	302	302
Direct Load Control-Thermostat	373	373	368	366	365	363	363	361	363	366	366	367	372	376	381	384	388	392	398	400
Dynamic Pricing- w/o enabling tech.	384	383	379	375	373	371	371	368	369	371	371	371	375	378	381	382	385	387	392	393
Dynamic Pricing- with enabling tech.	750	748	740	733	730	726	726	720	722	726	726	725	732	739	746	748	753	758	767	770
C&I Curtailment-Manual	172	171	167	167	165	164	163	162	163	165	164	166	168	171	174	176	179	182	185	187
C&I Curtailment-Auto-DR	221	220	215	215	213	211	210	209	211	212	212	214	217	221	224	227	231	234	238	241
Economic DR- Manual	172	171	167	167	165	164	163	162	163	165	164	166	168	171	174	176	179	182	185	187
Economic DR- Auto-DR	221	220	215	215	213	211	210	209	211	212	212	214	217	221	224	227	231	234	238	241

Table 32. Winter DR Technical Potential – 4 Hr. Event Duration (% of Winter Peak)

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Direct Load Control-Switch	6.8%	6.9%	6.9%	6.8%	6.8%	6.8%	6.7%	6.7%	6.6%	6.7%	6.6%	6.5%	6.5%	6.5%	6.5%	6.4%	6.4%	6.4%	6.4%	6.3%
Direct Load Control-Thermostat	8.6%	8.7%	8.7%	8.6%	8.6%	8.6%	8.5%	8.5%	8.4%	8.5%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%
Dynamic Pricing- w/o enabling tech.	8.8%	8.9%	8.9%	8.8%	8.8%	8.8%	8.7%	8.6%	8.6%	8.6%	8.6%	8.5%	8.4%	8.5%	8.4%	8.3%	8.3%	8.3%	8.3%	8.2%
Dynamic Pricing- with enabling tech.	17.3%	17.4%	17.4%	17.2%	17.2%	17.1%	17.1%	16.9%	16.7%	16.8%	16.7%	16.5%	16.5%	16.5%	16.4%	16.3%	16.3%	16.2%	16.2%	16.1%
C&I Curtailment-Manual	4.0%	4.0%	3.9%	3.9%	3.9%	3.9%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.9%	3.9%	3.9%	3.9%
C&I Curtailment-Auto-DR	5.1%	5.1%	5.1%	5.0%	5.0%	5.0%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	5.0%	5.0%	5.0%	5.0%	5.0%
Economic DR- Manual	4.0%	4.0%	3.9%	3.9%	3.9%	3.9%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.9%	3.9%	3.9%	3.9%
Economic DR- Auto-DR	5.1%	5.1%	5.1%	5.0%	5.0%	5.0%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	5.0%	5.0%	5.0%	5.0%	5.0%

Table 33. Winter DR Technical Potential – 2 Hr. Event Duration (MW)

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Direct Load Control- Switch	324	323	320	317	316	314	314	312	312	314	314	314	316	319	322	322	324	326	330	331
Direct Load Control- Thermostat	395	395	390	388	387	384	384	383	384	387	387	389	394	398	403	406	410	414	420	423
Dynamic Pricing- w/o enabling tech.	384	383	379	375	373	371	371	368	369	371	371	371	375	378	381	382	385	387	392	393
Dynamic Pricing- with enabling tech.	750	748	740	733	730	726	726	720	722	726	726	725	732	739	746	748	753	758	767	770
C&I Curtailment- Manual	187	186	181	181	180	178	177	176	178	179	179	181	183	186	189	192	195	198	201	204
C&I Curtailment- Auto-DR	237	236	230	230	228	226	225	224	226	228	227	230	234	237	241	245	248	252	256	260
Economic DR- Manual	187	186	181	181	180	178	177	176	178	179	179	181	183	186	189	192	195	198	201	204
Economic DR- Auto-DR	237	236	230	230	228	226	225	224	226	228	227	230	234	237	241	245	248	252	256	260

Table 34. Winter DR Technical Potential – 2 Hr. Event Duration (% of Winter Peak)

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Direct Load Control-Switch	7.5%	7.5%	7.5%	7.4%	7.4%	7.4%	7.4%	7.3%	7.2%	7.3%	7.2%	7.2%	7.1%	7.1%	7.1%	7.0%	7.0%	7.0%	6.9%	6.9%
Direct Load Control-Thermostat	9.1%	9.2%	9.2%	9.1%	9.1%	9.1%	9.0%	9.0%	8.9%	9.0%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.8%
Dynamic Pricing- w/o enabling tech.	8.8%	8.9%	8.9%	8.8%	8.8%	8.8%	8.7%	8.6%	8.6%	8.6%	8.6%	8.5%	8.4%	8.5%	8.4%	8.3%	8.3%	8.3%	8.3%	8.2%
Dynamic Pricing- with enabling tech.	17.3%	17.4%	17.4%	17.2%	17.2%	17.1%	17.1%	16.9%	16.7%	16.8%	16.7%	16.5%	16.5%	16.5%	16.4%	16.3%	16.3%	16.2%	16.2%	16.1%
C&I Curtailment-Manual	4.3%	4.3%	4.3%	4.2%	4.2%	4.2%	4.2%	4.1%	4.1%	4.2%	4.1%	4.1%	4.1%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.3%
C&I Curtailment-Auto-DR	5.5%	5.5%	5.4%	5.4%	5.4%	5.3%	5.3%	5.3%	5.3%	5.3%	5.2%	5.2%	5.3%	5.3%	5.3%	5.3%	5.4%	5.4%	5.4%	5.4%
Economic DR- Manual	4.3%	4.3%	4.3%	4.2%	4.2%	4.2%	4.2%	4.1%	4.1%	4.2%	4.1%	4.1%	4.1%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.3%
Economic DR- Auto-DR	5.5%	5.5%	5.4%	5.4%	5.4%	5.3%	5.3%	5.3%	5.3%	5.3%	5.2%	5.2%	5.3%	5.3%	5.3%	5.3%	5.4%	5.4%	5.4%	5.4%

Table 35. Summer DR Technical Potential – 4 Hr. Event Duration (MW)

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Direct Load Control-Switch	32	32	31	31	31	31	31	31	31	31	31	31	32	32	33	33	33	34	34	34
Direct Load Control-Thermostat	340	341	336	336	334	332	332	331	334	337	337	340	345	351	356	360	365	371	377	380
Dynamic Pricing- w/o enabling tech.	202	201	199	197	196	195	195	193	194	195	195	195	197	199	201	202	204	206	208	209
Dynamic Pricing- with enabling tech.	506	505	499	495	492	489	489	486	487	490	490	490	495	500	505	508	511	516	522	524
C&I Curtailment-Manual	188	186	182	181	180	178	177	176	177	179	178	180	183	185	188	191	194	197	200	202
C&I Curtailment-Auto-DR	270	269	262	262	260	257	256	255	258	259	259	262	266	270	274	278	282	287	292	295
Economic DR- Manual	188	186	182	181	180	178	177	176	177	179	178	180	183	185	188	191	194	197	200	202
Economic DR- Auto-DR	270	269	262	262	260	257	256	255	258	259	259	262	266	270	274	278	282	287	292	295

Table 36. Summer DR Technical Potential – 4 Hr. Event Duration (% of Summer Peak)

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Direct Load Control-Switch	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Direct Load Control-Thermostat	12.0%	12.1%	12.1%	12.1%	12.0%	12.0%	12.0%	11.9%	11.9%	11.9%	11.9%	11.9%	11.9%	11.9%	11.9%	11.9%	11.9%	11.8%	11.8%	11.8%

Dynamic Pricing- w/o enabling tech.	7.1%	7.2%	7.2%	7.1%	7.1%	7.0%	7.0%	7.0%	6.9%	6.9%	6.9%	6.8%	6.8%	6.7%	6.7%	6.7%	6.6%	6.6%	6.5%	6.5%
Dynamic Pricing- with enabling tech.	17.9%	17.9%	18.0%	17.8%	17.7%	17.7%	17.6%	17.5%	17.4%	17.3%	17.3%	17.1%	17.0%	16.9%	16.9%	16.7%	16.6%	16.5%	16.4%	16.2%
C&I Curtailment- Manual	6.6%	6.6%	6.5%	6.5%	6.5%	6.4%	6.4%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.2%
C&I Curtailment- Auto-DR	9.5%	9.5%	9.5%	9.4%	9.4%	9.3%	9.2%	9.2%	9.2%	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%	9.2%	9.2%	9.2%	9.2%	9.1%
Economic DR- Manual	6.6%	6.6%	6.5%	6.5%	6.5%	6.4%	6.4%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.2%
Economic DR- Auto-DR	9.5%	9.5%	9.5%	9.4%	9.4%	9.3%	9.2%	9.2%	9.2%	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%	9.2%	9.2%	9.2%	9.2%	9.1%

Table 37. Summer DR Technical Potential – 2 Hr. Event Duration (MW)

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Direct Load Control-Switch	34	34	33	33	33	33	33	33	33	33	33	33	34	34	34	35	35	35	36	36
Direct Load Control-Thermostat	351	351	346	346	345	342	342	342	344	347	348	351	356	361	366	371	376	381	387	391
Dynamic Pricing- w/o enabling tech.	202	201	199	197	196	195	195	193	194	195	195	195	197	199	201	202	204	206	208	209
Dynamic Pricing- with enabling tech.	506	505	499	495	492	489	489	486	487	490	490	490	495	500	505	508	511	516	522	524
C&I Curtailment- Manual	212	211	206	205	204	202	201	200	202	203	202	205	208	211	214	218	221	224	228	231
C&I Curtailment- Auto-DR	297	296	289	289	287	284	283	282	284	286	286	289	294	298	303	308	312	318	323	327

Economic DR-Manual	212	211	206	205	204	202	201	200	202	203	202	205	208	211	214	218	221	224	228	231
Economic DR-Auto-DR	297	296	289	289	287	284	283	282	284	286	286	289	294	298	303	308	312	318	323	327

Table 38. Summer DR Technical Potential – 2 Hr. Event Duration (% of Summer Peak)

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Direct Load Control-Switch	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.1%	1.1%	1.1%	1.1%	1.1%
Direct Load Control-Thermostat	12.4%	12.5%	12.5%	12.5%	12.4%	12.4%	12.3%	12.3%	12.3%	12.2%	12.3%	12.2%	12.2%	12.2%	12.2%	12.2%	12.2%	12.2%	12.2%	12.1%
Dynamic Pricing-w/o enabling tech.	7.1%	7.2%	7.2%	7.1%	7.1%	7.0%	7.0%	7.0%	6.9%	6.9%	6.9%	6.8%	6.8%	6.7%	6.7%	6.7%	6.6%	6.6%	6.5%	6.5%
Dynamic Pricing-with enabling tech.	17.9%	17.9%	18.0%	17.8%	17.7%	17.7%	17.6%	17.5%	17.4%	17.3%	17.3%	17.1%	17.0%	16.9%	16.9%	16.7%	16.6%	16.5%	16.4%	16.2%
C&I Curtailment-Manual	7.5%	7.5%	7.4%	7.4%	7.3%	7.3%	7.2%	7.2%	7.2%	7.2%	7.1%	7.2%	7.1%	7.1%	7.2%	7.2%	7.2%	7.2%	7.2%	7.1%
C&I Curtailment-Auto-DR	10.5%	10.5%	10.4%	10.4%	10.3%	10.2%	10.2%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.2%	10.2%	10.1%
Economic DR-Manual	7.5%	7.5%	7.4%	7.4%	7.3%	7.3%	7.2%	7.2%	7.2%	7.2%	7.1%	7.2%	7.1%	7.1%	7.2%	7.2%	7.2%	7.2%	7.2%	7.1%
Economic DR-Auto-DR	10.5%	10.5%	10.4%	10.4%	10.3%	10.2%	10.2%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.2%	10.2%	10.1%

E.3 Summer DR Achievable Technical Potential by Program

Figure E-1 below shows the summer achievable technical potential results by DR option over PSE's 20-year planning period (2018-2037) for a 4-hour event duration. Figure E-2 shows the same results expressed as a percentage of PSE's system peak. PSE's summer DR potential is estimated to grow from 11 MW in 2018 to 137 MW in 2037, which would represent 4.2% of PSE's forecasted peak in 2037.

Figure E-1. Summer DR Achievable Technical Potential by DR Option, 4-Hour Event Duration (MW): 2018-2037

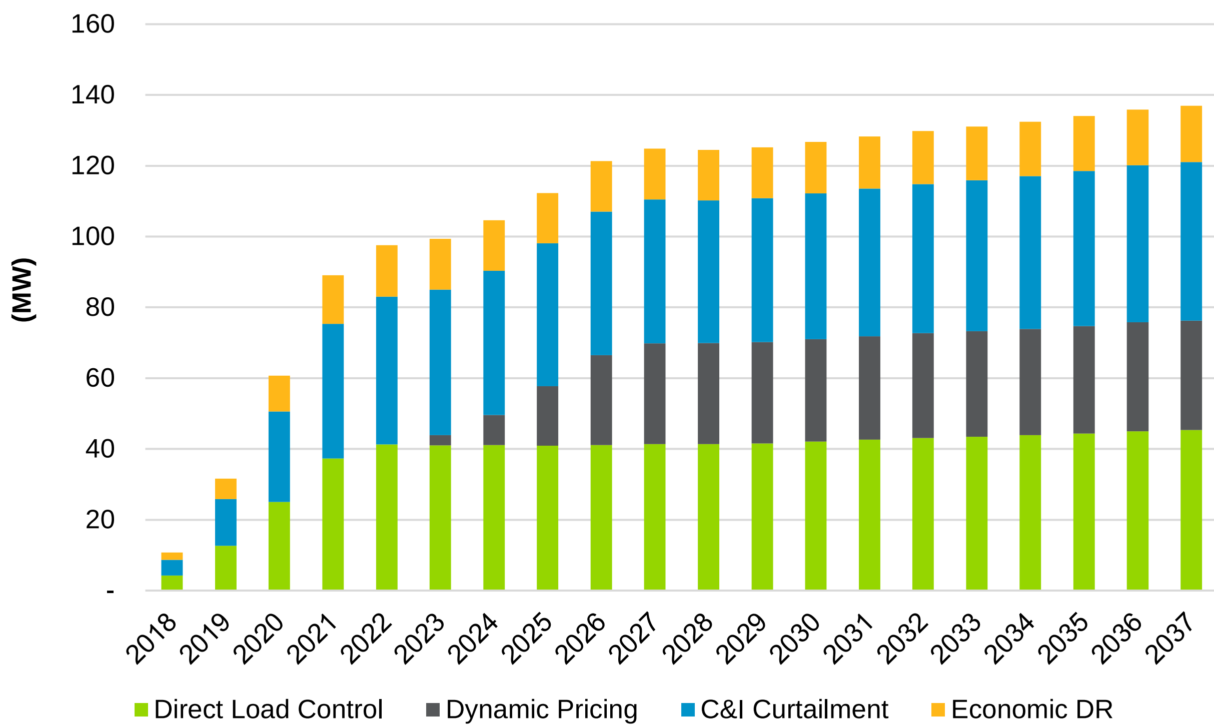


Figure E-2. Summer DR Achievable Technical Potential by DR Option, 4-Hour Event Duration (Percentage of System Peak): 2018-2037

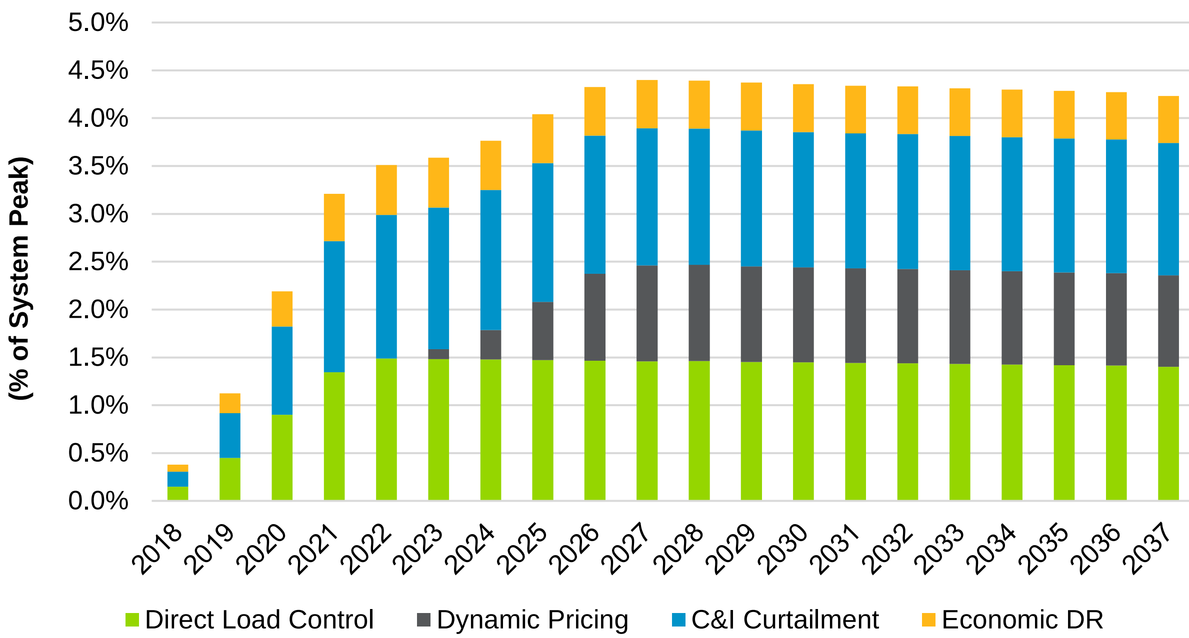


Figure E-3 breaks down the summer DR achievable technical potential results by sub-option and 4-hour event duration. Among the different sub-options included in the study, DLC-Thermostat has the highest share of potential. It grows from 4 MW in 2018 to 43 MW by 2037. DLC-Switch has the lowest share of potential.

Figure E-3. Summer DR Achievable Technical Potential by DR Sub-Option, 4-Hour Event Duration (MW): 2018-2037

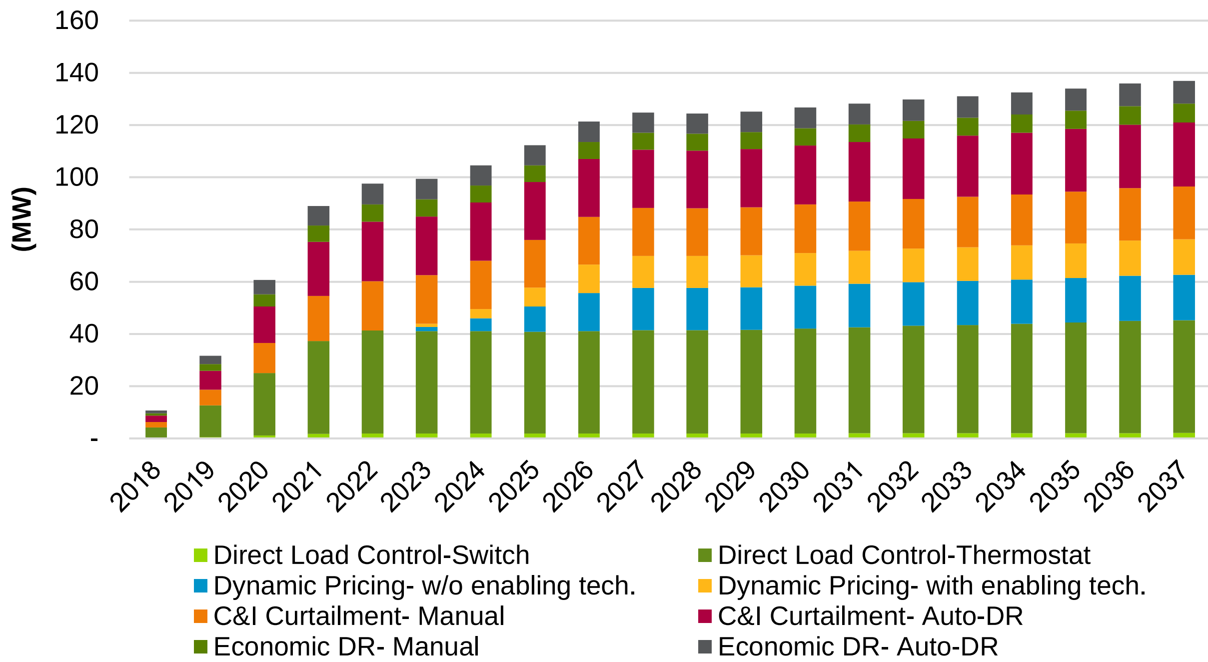


Figure E-4 and Figure E-5 show the summer DR achievable technical potential, expressed in megawatts, for a 2-hour event duration by DR option and sub-option, respectively. The overall potential with 2-hour events is approximately 16%-18% higher than the potential associated with 4-hour events. As shown in the two figures, total potential is expected to grow from 13 MW in 2018 to almost 159 MW by 2037.

Figure E-4. Summer DR Achievable Technical Potential by DR Option, 2 -Hour Event Duration (MW): 2018-2037

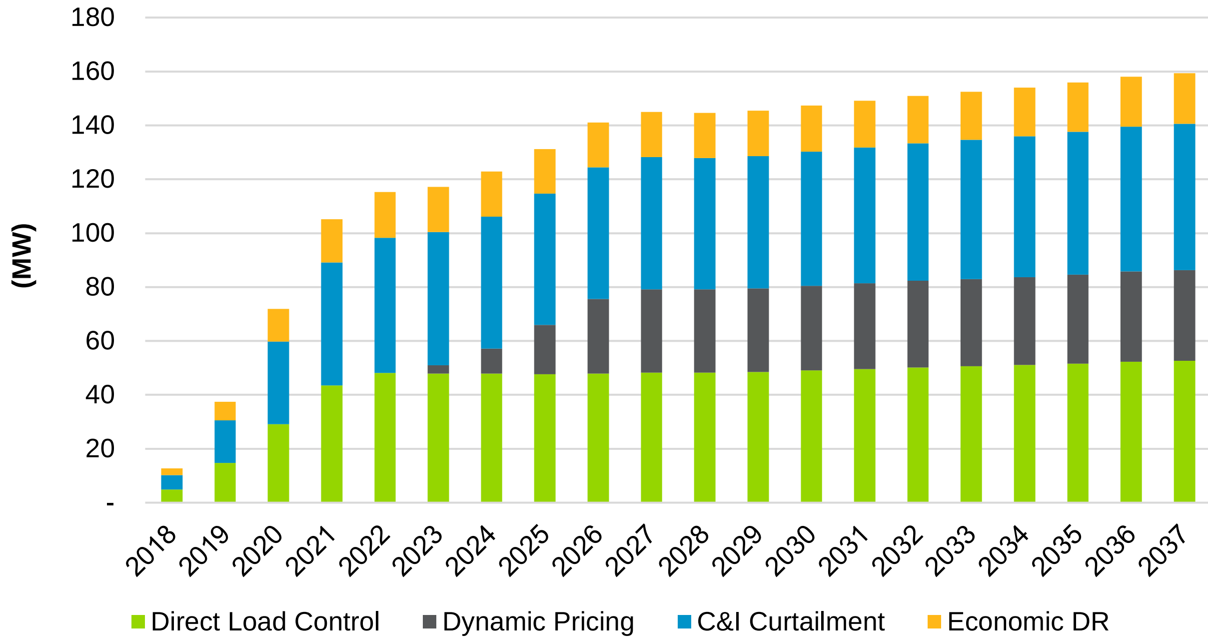
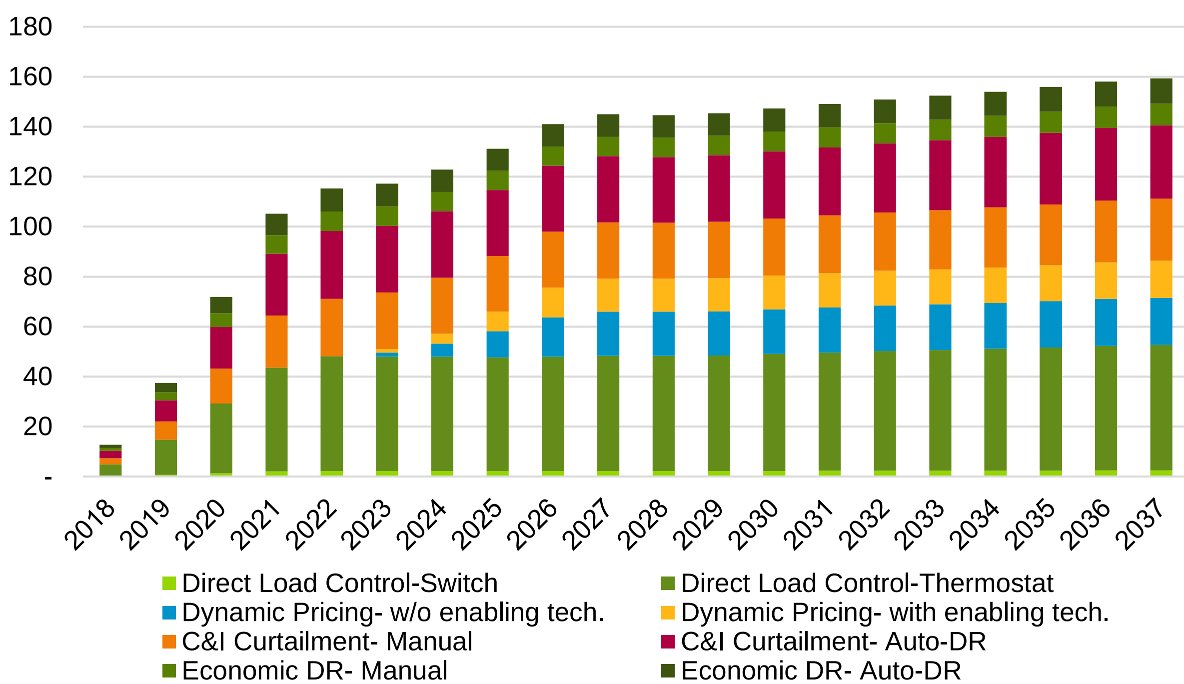


Figure E-5. Summer DR Achievable Technical Potential by DR Sub-Option, 2-Hour Event Duration (MW): 2018-2037



E.4 Summer DR Achievable Technical Potential by Customer Class

Figure E-6 presents a snapshot of the 2037 achievable technical potential by customer class for the 4-hour event duration in summer. Residential customers have approximately 32% share in the total potential, with C&I customers accounting for the remaining potential. The total potential from residential customers reaches 45 MW in 2037. The summer DR potential for residential and small and medium C&I is made up of Direct Load Control (DLC) and Dynamic Pricing, while large C&I and extra-large C&I classes have the majority of their potential from C&I Curtailment. Extra-large C&I has the largest potential among the C&I classes.

Figure E-6. Summer DR Achievable Technical Potential by Customer Class, 4-Hour Event Duration (MW): 2037

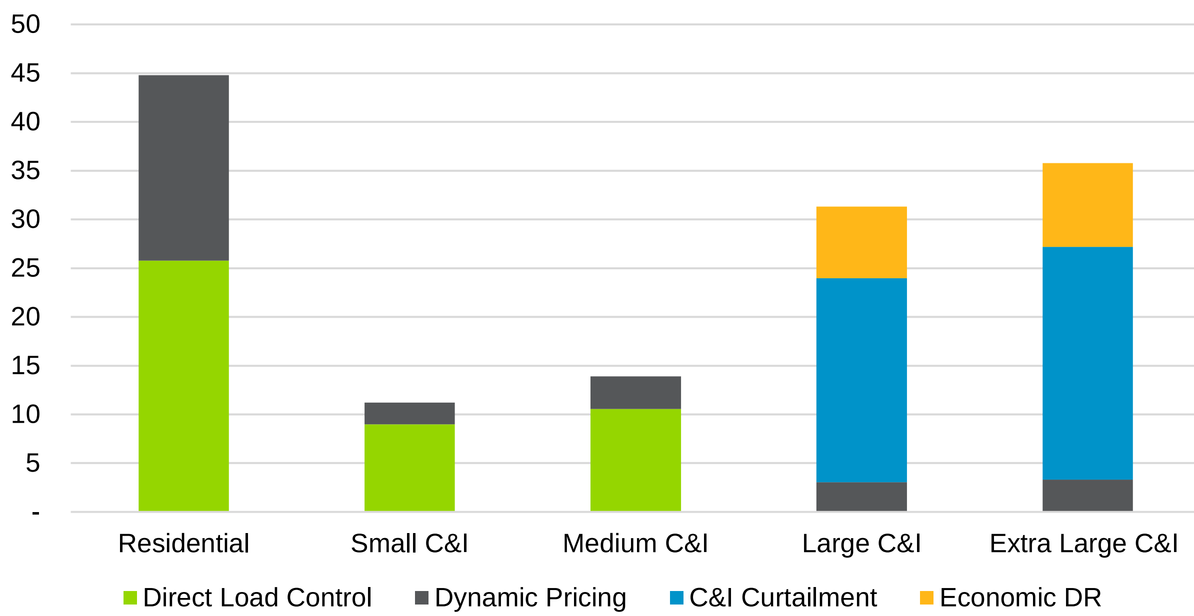
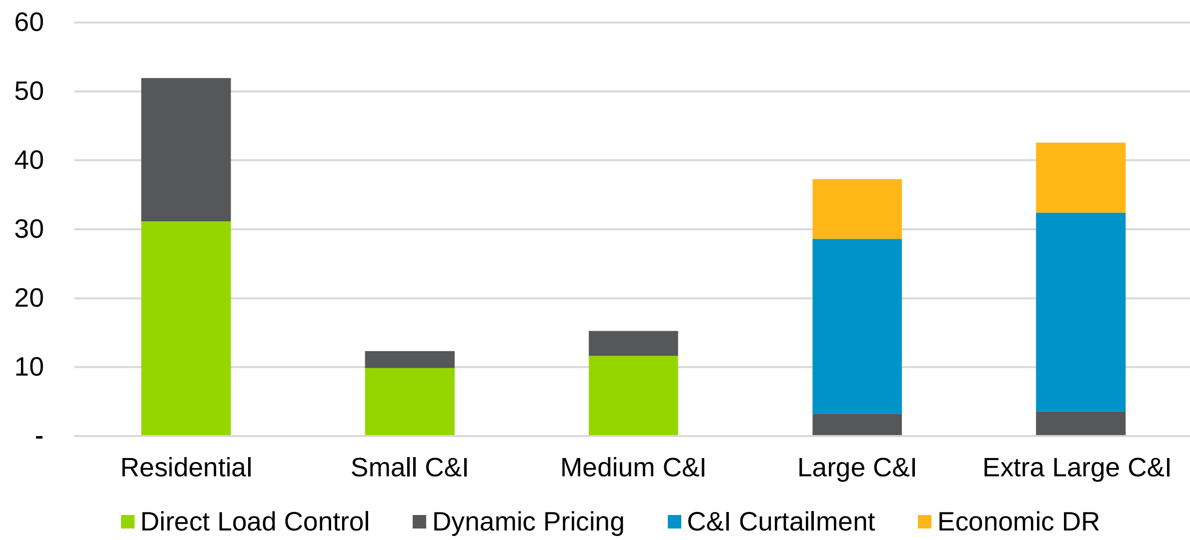


Figure E-7 shows 2037 summer DR potential results by customer class for the 2-hour event duration. Residential customer potential increases to 52 MW in 2037 for the 2-hour event duration relative to 45 MW for the 4-hour event duration. Most of the potential increase is associated with DLC. Small and medium C&I potential also increases approximately 10% for 2-hour events. Large C&I and extra-large C&I potential increases nearly 20% for 2-hour events versus 4-hour events, primarily associated with potential increase from the C&I Curtailment option.

Figure E-7. Summer DR Achievable Technical Potential by Customer Class, 2-Hour Event Duration (MW): 2037



E.5 Summer DR Achievable Technical Potential by Building Type

Figure E-8 shows the 4-hour event duration summer achievable technical potential results by customer segment. The residential building type has the overall highest potential load (45 MW in 2037), primarily from DLC. The commercial building types with the highest contribution in potential are retail and office. These two building types constitute 85% of the total potential from all C&I customers. A large fraction of the potential from these segments is derived from C&I Curtailment.

Figure E-8. Summer DR Achievable Technical Potential by Building Type, 4-Hour Event Duration (MW): 2037

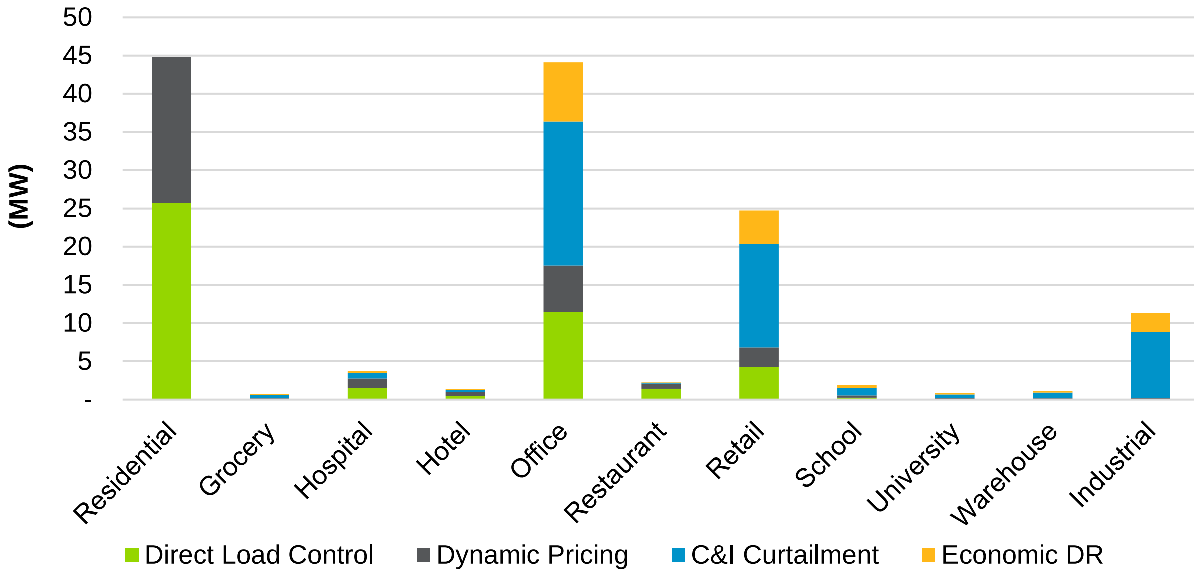
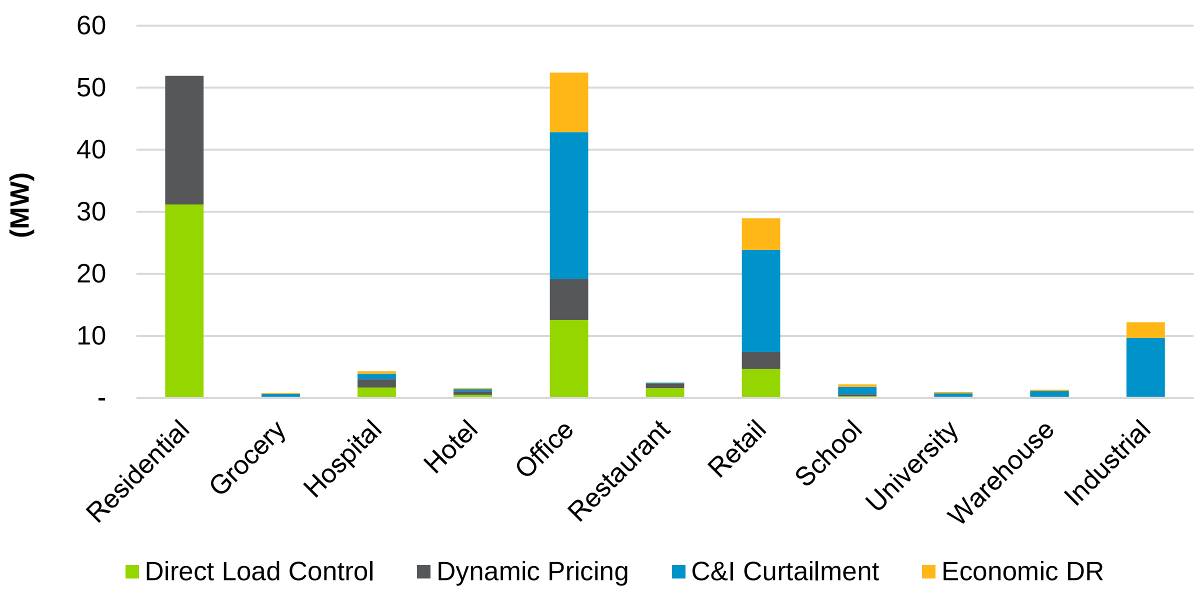


Figure E-9 shows 2037 potential for summer by building type for the 2-hour event duration. Compared to the 4-hour event duration, total potential is up 16% to 52 MW for residential. Office and retail building types grow approximately 18% and still lead the commercial potential.

Figure E-9. Summer DR Achievable Technical Potential by Building Type, 2 Hour Event Duration (MW): 2037



E.6 Summer DR Achievable Technical Potential by End Use

Figure E-10 shows summer DR achievable technical potential by end use in 2037. Electric space cooling has the highest contribution, accounting for 53% of total summer potential. Among other end uses, lighting and heat pump provide the next largest levels of potential in 2037 at 24 MW and 9 MW, respectively. This translates into 24% share in the total potential.

Figure E-10. Summer DR Achievable Technical Potential by End Use, 4-Hour Event Duration (MW): 2037

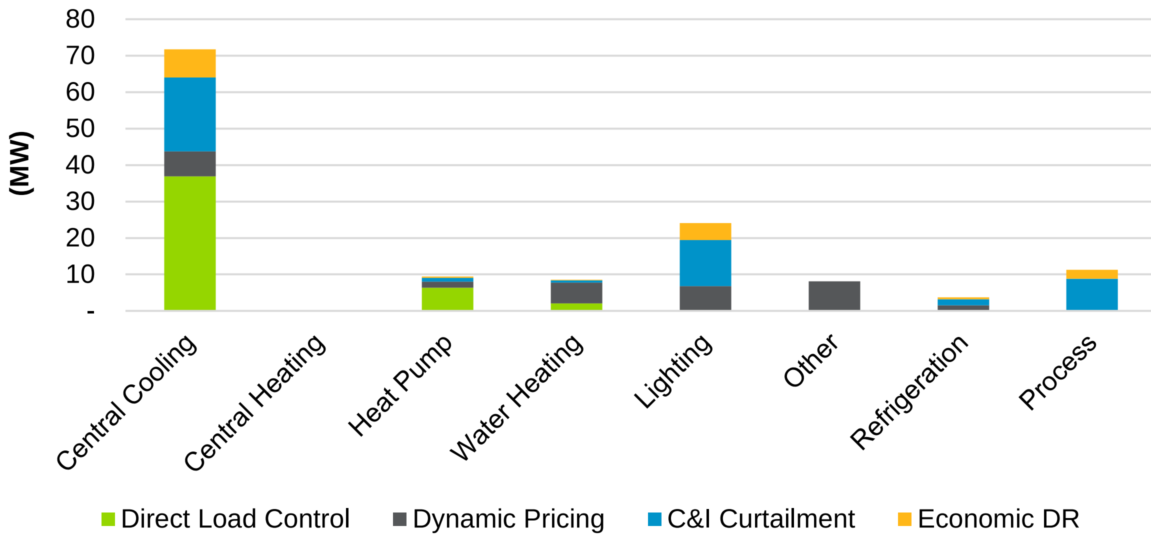
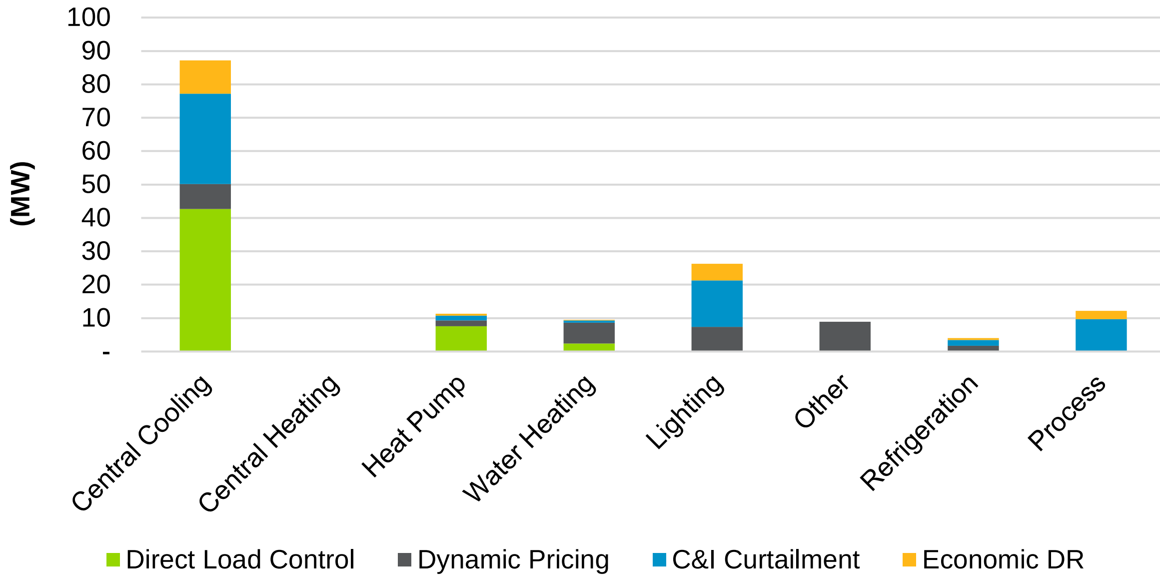


Figure E-11 shows 2037 summer DR potential by end use for the 2-hour event duration. 2037 potential from central cooling shows the greatest increase—a 22% growth for 2-hour events compared to 4-hour events. Central cooling potential is up to 87 MW and lighting potential is 26 MW in 2037. Also, heat pump is higher by approximately 19% at 11 MW. Potential from lighting, process, refrigeration and other end uses is approximately 8% higher for 2-hour events than for 4-hour events.

Figure E-11. Summer DR Achievable Technical Potential by End Use, 2-Hour Event Duration (MW): 2037



APPENDIX F. OTHER KEY INPUT ASSUMPTIONS

F.1 LED Cost Curves

The following LED cost curves were generated and input into the measure characterization analysis for residential and commercial LED measures.

Figure F-1. DOE Price Projections for LED Lamps

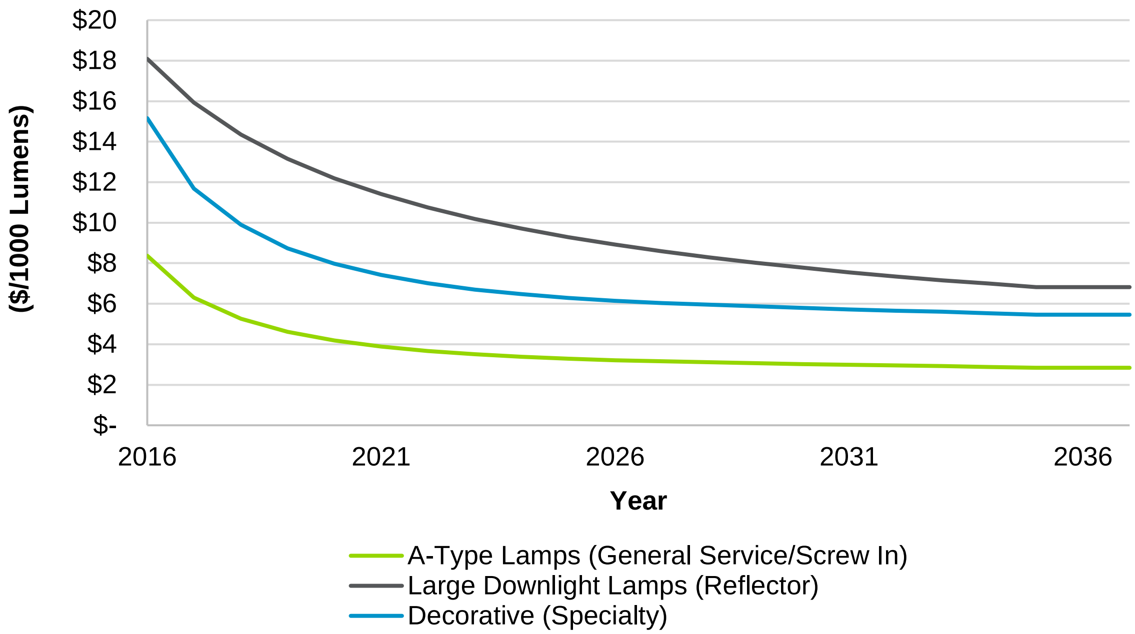
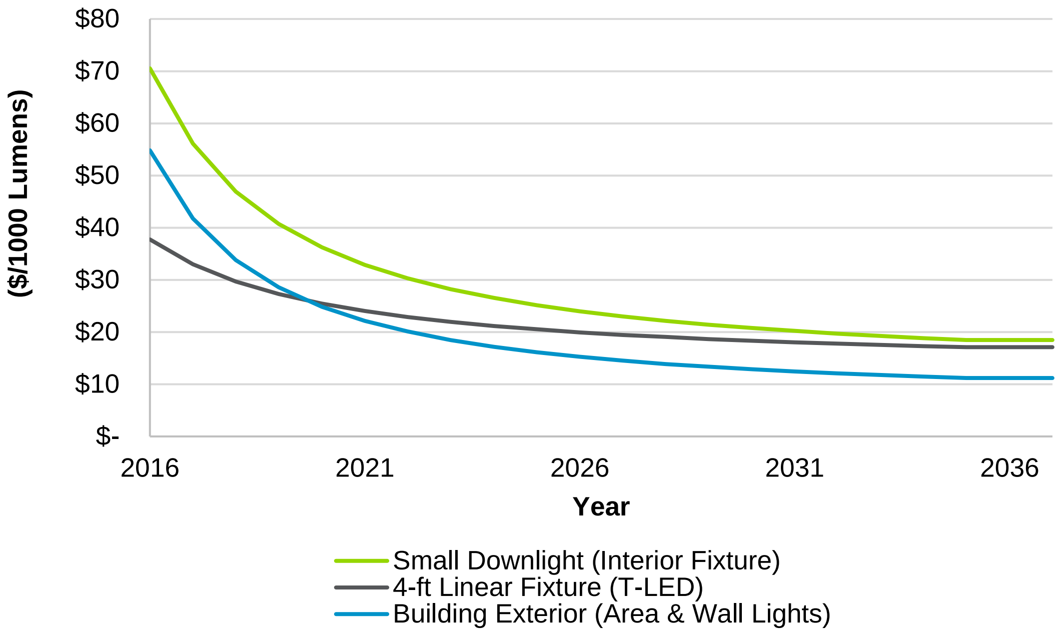


Figure F-2. DOE Price Projections for LED Luminaires



- Navigant developed a web-scraped database[88] of pricing and specifications for over 15,000 LED lighting products and has been collecting data continuously since 2010. Major data sources include Home Depot, Lowe’s, Walmart, Sears, Target, Ace Hardware, Menards, Best Buy, ATG Stores, Grainger, Platt, GSA Advantage, 1000bulbs.com, Amazon, E-conolight.com, BulbAmerica.com, and ProLighting.com.
- Navigant has developed historical, current, and forward-looking estimates of retail sale price for a variety of product categories, which forms the basis for the trends in LED price decline shown on this slide. Navigant took all relevant federal lighting standards into account in its lighting analysis.

[88] *Navigant. Energy Savings Forecast of Solid-State Lighting in General Illumination Applications.* Prepared for the US DOE Solid-State Lighting Program, September 2016.