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Memorandum

Subject:	Distributed resources potential study overview
From:	Andy Butcher, Alyssa Clemsen Roberts
То:	Platte River Power Authority Board of Directors
Date:	3/4/2020

Platte River Power Authority hired HDR, Inc. to analyze the potential of distributed energy resources (DERs) to support its 2020 integrated resources plan (IRP). The achievable DER potential was determined from a wholesale utility perspective and did not take into consideration constraints, costs or benefits related to integration of DER within the retail distribution utilities' systems.

As a result of the high level study, Platte River and the owner communities started a joint strategic planning process to more holistically evaluate and implement DER taking wholesale and retail perspectives into consideration. This strategy is expected to be completed in 2021. During this process, DER potential will be reconsidered with this broader perspective.

HDR evaluated the technical, economic and achievable potential for DERs, which includes distributed solar, energy efficiency and demand response (including distributed battery storage and control of electric vehicle charging).

The study's achievable-potential results provided inputs to Platte River's IRP. Specifically, these inputs include how DER can reduce Platte River's forecasted load growth and the associated costs of supply side resources. The study also includes the projected costs and benefits of achieving incremental levels of DER potential.

The attached study will be posted on the IRP microsite – <u>www.prpa.org/irp</u> – along with all other studies for the IRP. If you have any questions, please contact us.

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Distributed Energy Resources Potential Study



FINAL

Prepared for: Platte River Power Authority 2000 E Horsetooth Rd Fort Collins, CO 80525 February 24, 2020



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Executive Summary

Platte River Power Authority ("PRPA") retained HDR Inc. ("HDR") to develop a Distributed Energy Resources ("DER") potential projection for PRPA's service territory. This study provides input to an Integrated Resource Plan (IRP) that PRPA is currently developing for 2020. This DER potential study provides a transparent and consensusbased estimate of the DER potential for the following resources: energy efficiency ("EE"), demand response ("DR"), distributed solar photovoltaic ("PV"), battery storage, and combined heat and power ("CHP") growth in the residential, commercial, and industrial customer sectors. The DER potential of each resource has been evaluated for costeffectiveness and achievable potential.

The basis of evaluation is a framework and supporting executable model that incorporates a PRPA baseline electricity load and customer forecast and characterizes the potential for distributed energy resources in comparison to several avoided cost scenarios. This study uses primary information from various sources including aggregated PRPA customer load data, aggregated customer load data from the member cities of Fort Collins, Longmont, Loveland, and Estes Park, historical PRPA and member city DER program experience, and prior PRPA DER studies.

The distributed energy resources estimates are based on existing and proven technologies and are evaluated over a 20 year study period 2021 through 2040. The approach to determine achievable DER potential included an assessment of overall technical potential of applicable customers, an assessment of economic potential via comparison against avoided costs and a total resource cost (TRC) test, and an estimate of achievable potential considering market adoption barriers and maximum participation rates. Naturally occurring conservation or energy efficiency (i.e., efficiency that is driven by codes, standards or economic decisions made by customers outside of PRPA DER programs) is already captured by the base case load forecast (i.e. such energy is outside the results of this study).

Base Load Forecast

A base load customer forecast and end-use forecast was constructed from PRPA's annual forecast by disaggregating the between Residential and Commercial & Industrial customers based on various member city's load and customer information. Figure ES-1-1 shows the base load forecast by customer class.

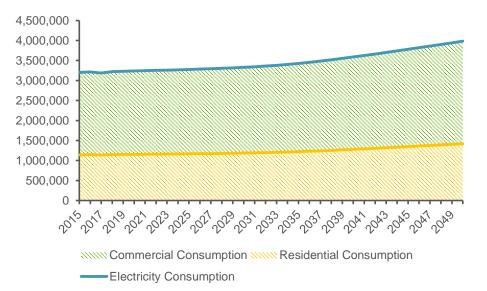
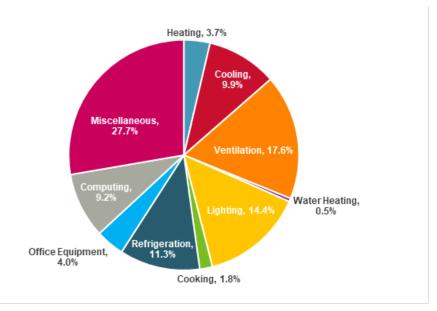


Figure ES-1-1. Electricity Consumption Forecast by Customer Class, MWh

Historically, residential customers represent around 88% of PRPA's customers, and have consumed roughly 35% of the total retail electricity sold by PRPA. Commercial & Industrial (C&I) customers represent only roughly 12% of PRPA customers, but are responsible for nearly two-thirds of total electricity consumption. The average consumption for C&I customers by end use is show in Figure ES-1-2 below.

Figure ES-1-2. End Use Consumption Shares: Commercial & Industrial, 2017



According to program information, PRPA had 12 actively funded DER programs common across the utility at the end of 2017. Within the common programs, PRPA reported a cumulative annual savings of 196,137 MWh and a cumulative 31.4 MW demand load reduction in from 2002 through 2017 in the EE programs common across PRPA. In

2017, PRPA reported 25,943 MWh of new incremental energy savings¹ and 4.06 MW of new demand reduction resulting from existing programs. The total utility funding for 2020 is expected to be about \$14.1 million to accomplish planned new incremental energy savings of 34,000 MWh, or a first year measure savings cost of about \$415/MWh (or a levelized cost of \$44.2/MWh based on 13 year measure life and 5% discount rate).

DER Estimated Potential

The following describes the methodology and results for the estimated technical, economic, and achievable potential for EE resource, DR resources, battery storage resources and distributed solar PV resources. The technical potential is representative of a theoretical maximum possible savings that could be achieved for all measures examined, ignoring any economic or market barriers. The economic potential is a subset of technical potential which reflects only the energy or demand savings that are economically viable (i.e. a resource that generate benefits which exceed the costs over the life of the measure). The achievable potential is a subset of economic potential and defined as a realistic implementation of DER measures, factoring in market barriers and other underlying factors. In this study, achievable potential is representative of new DER potential.

DER resources reduce the demand for energy and peak load from customers. In turn, utilities are able to avoid or defer costs associated with installing new generation capacity, transmission upgrades, and avoid procuring energy from generation units on the margin. This study examines three distinct types of benefits: avoided capacity costs, avoided generation costs, and avoided carbon costs.

In this analysis, three scenarios of avoided costs are estimated to represent low, medium and high scenarios:

- The low scenario is reflective of a generation portfolio intended to reflect PRPA's existing resource mix with minimal changes. Under this scenario, the next planned asset is expected to be an aeroderivative unit.
- The medium scenario is reflective of a scenario intended to reflect PRPA's resource mix assuming coal resources are retired by 2030 and replaced with a mix of renewable resources and battery storage.
- The high scenario is reflective of a scenario intended to reflect PRPA's resource mix assuming coal resources are retired by 2030 and replaced with a mix of renewable resources and a high penetration of battery storage.

While summary results from all three avoided cost scenarios are included in this report, the medium avoided cost scenario is presented in more detail.

Energy Efficiency

Over fifty energy efficiency measures were identified and evaluated for all applicable residential and commercial & industrial customer types. Figure ES-1-3 illustrates the technical, economic, and achievable potential forecasted to 2040 for the medium avoided cost case.

¹ New incremental energy savings are savings added in a given year and does not include prior accumulated savings or reductions from prior year savings lost at end of life.

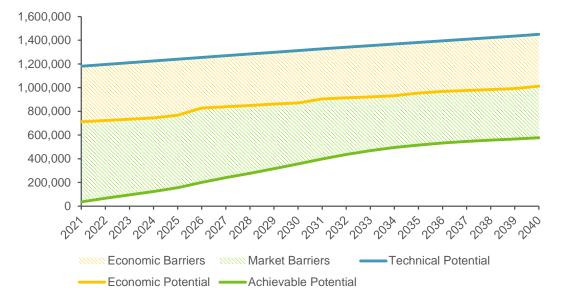


Figure ES-1-3. Technical, Economic, and Achievable Potential for Energy Efficiency Measures, MWh, Medium Avoided Cost Scenario

This study finds that about 40% of the technical potential is achievable by 2040 for the medium avoided cost scenario. Of the achievable EE potential, one of the largest potential end-use savings category is lighting which accounts for about one-third of the projected achievable potential in 2030, given the ease of retrofitting, relatively low cost, quick payback and high consumer awareness.

The multi-year cumulative cost of the EE achievable potential including the installation cost, the utility incentive, and the utility program administration cost is shown in Table ES-1. To achieve the energy efficiency savings presented, \$139.8 million would be spent by PRPA through 2030.

Table ES-1. Multi-Year Cumulative Energy Efficiency Costs, Medium Avoided Cost Scenario

Multi-Year Cumulative Costs (\$000s)	2021-2025	2026-2030	2031-2035	2036-2040
Total 5-Year Costs (\$000s)	\$60,030	\$114,100	\$130,201	\$123,906
Participant Cost	\$11,824	\$22,474	\$25,646	\$24,406
Utility Incentives	\$35,472	\$67,423	\$76,937	\$73,217
Utility Administrative Costs	\$12,734	\$24,203	\$27,618	\$26,283
Utility Cost Total	\$48,206	\$91,626	\$104,555	\$99,501
Average Utility Cost, per MWh*	\$308	\$337	\$297	\$269

*Average cost for the first year of installed measures.

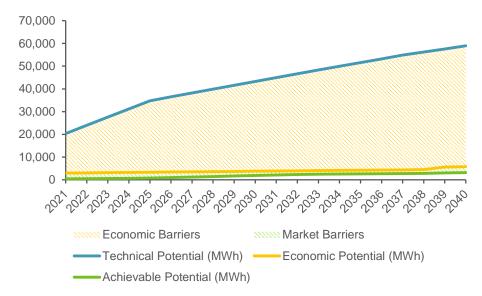
From 2021 through 2025 the average annual utility cost (utility incentive and utility administrative cost) for the first year of installed EE measures is expected to be about \$9.6 million to achieve an average 31,330 MWh incremental annual energy savings, or average first year energy savings of \$308/MWh (or a levelized first year cost of \$32.8/MWh based on 13 year measure life and 5% discount rate).

Demand Response

Fifteen measures were evaluated for residential, commercial, and industrial customers including programmable communicating thermostats, direct load controllers for HVAC and water heaters, residential batteries, plug-in electric vehicles, commercial lighting control, commercial-scale batteries, and distribution level system voltage reduction. The deferral capability of demand response measures (measured in kilowatts) in combination with assumptions surrounding the duration of events and an event limit per year were used to estimate the kilowatt-hours deferred. The deferral capacity (in kW) is the amount of peak load capacity that is shifted or eliminated from peak hours to off-peak hours. The deferred energy (in kWh) is a measure of the amount of energy that is shifted or eliminated from peak hours to off-peak hours.

Figure ES-1-4 and Figure ES-1-5 illustrate the technical, economic, and achievable potential of deferred energy and peak load for demand response measures forecasted to 2040 for the medium avoided cost scenario.

Figure ES-1-4. Technical, Economic, and Achievable Potential for Demand Response Measures, Deferred MWh, Medium Avoided Cost Scenario



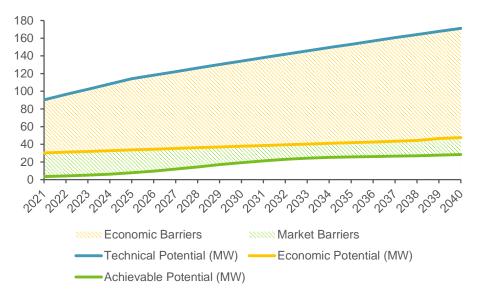


Figure ES-1-5. Technical, Economic, and Achievable Potential for Demand Response Measures, Deferred MW, Medium Avoided Cost Scenario

This study finds that about 1,900 MWh of deferred peak energy and 19 MW of deferred peak load is achievable by 2030 for the medium avoided cost scenario. This amount of deferred peak load is 3.0% of the summer peak load in 2030. Of the achievable DR potential, the largest potential end-use savings category is the HVAC control, about two-thirds of the projected achievable potential in 2030.

The multi-year cumulative cost of the demand response achievable potential including the installation cost, the utility incentive, and the utility program administration cost is shown in Table ES-2. In order to achieve this potential, PRPA would have to spend \$11.8 million by 2030 for the medium avoided cost scenario.

Multi-Year Cumulative Costs (\$000s)	2021-2025	2026-2030	2031-2035	2036-2040
HVAC	\$3,839	\$7,717	\$7,054	\$8,252
Water Heating	\$289	\$1,567	\$1,983	\$2,353
Batteries	\$0	\$0	\$0	\$336
Industrial Processes	\$194	\$1,056	\$1,417	\$1,705
Lighting	\$0	\$0	\$0	\$0
Refrigeration	\$0	\$0	\$0	\$0
Voltage Reduction	\$2,280	\$0	\$0	\$0
Total 5-Year Costs (\$000s)	\$6,602	\$10,339	\$10,453	\$12,646
Participant Costs	\$790	\$2,035	\$2,058	\$2,489
Utility Incentives	\$4,649	\$6,106	\$6,173	\$7,468
Utility Administrative Costs	\$1,164	\$2,198	\$2,222	\$2,689

 Table ES-2. Multi-Year Cumulative Demand Response Costs, Medium Avoided

 Cost Scenario

Multi-Year Cumulative Costs (\$000s)	2021-2025	2026-2030	2031-2035	2036-2040
Utility Cost Total	\$3,471	\$8,304	\$8,395	\$10,157

From 2021 through 2025 the average annual utility cost (utility incentive and utility administrative cost) for the first year of installed DR measures is expected to be about \$1.16 million to achieve an average 1.6 MW of incremental annual deferred load, or \$840/kW.

Distributed Solar PV Potential

This study evaluated distributed roof mounted solar PV systems installed on residential and commercial & industrial roof tops. Based on satellite photography, geospatial data, and digital zoning data, potentially available roof space was estimated. Solar PV on parking lots was deemed to be impractical because it would require costly site-specific mounting structures to be installed and would limit the potential for repurposing into commercial businesses or other type of development. As of 2021, this study found that there is sufficient rooftop area for approximately 1,161 MWac² of roof mounted solar PV capacity.

The installed costs for distributed solar PV were based on actual all-in capital costs for distributed solar PV systems that Fort Collins customers built from 2013 through 2018. Two avoided cost scenarios were considered: a low case reflective of constructing a natural gas aeroderivative combustion turbine and a medium/high case reflective of the retirement of coal/fossil resources, and replacement by utility-scale solar generation. For all avoided cost scenarios, the TRC test shows no economically viable roof mounted distributed solar PV capacity across customer segments. Since no economic potential was found during the study period, there is no achievable potential during the study period. It is important to note that the TRC test evaluates the benefits from a full societal perspective including the utility and participant. Participants may find distributed solar systems cost effective by avoiding retail electricity rates, though that is not captured in a TRC test.

Combined Heat and Power

Cogeneration or Combined Heat and Power (CHP) facilities generate both electricity and thermal energy from a single source of energy. In a CHP facility, waste heat generated from the prime mover (e.g. steam boiler) is used to generate steam and hot water for heating applications, or using an absorption chiller to generate chilled water for cooling applications. CHP installations are economically feasible under certain operating and financial conditions. However, PRPA's board recently passed a resource diversification policy³, which established a goal of a 100% non-carbon energy mix by 2030. Furthermore, three of PRPA's four owner communities have also adopted goals to achieve a 100% renewable mix by 2030. CHP facilities fueled by natural gas would not align with this policy. In conformance with this policy, and due to the challenges of

² MWac is capacity on alternating current basis, or the net output basis.

³ <u>https://www.prpa.org/news/platte-river-board-passes-energy-policy/</u> - Platte River board passes energy policy, Dec 2018

acquiring relevant data from PRPA's customers, this study finds no potential for CHP. It is recommended that PRPA continue to monitor changes in biomass and CHP that could increase availability of biomass or reduce its costs.

Concluding Remarks

By 2030, it is expected that PRPA's DER plan includes a mix of new energy efficiency and demand response measures. Under the medium avoided cost scenario, the evaluated energy efficiency measures could reduce PRPA's hourly load by about 50 MW, and reduce the annual base load customer consumption by nearly 10%. Evaluated demand response measures are anticipated to provide the capability to defer 20 MW of electricity during the peak load. For PRPA to achieve the DER savings assessed in this study, \$168 million in costs would be incurred by 2030 to account for utility incentives, installation costs, and program administration costs. An overview of the estimated potential of energy savings and peak load reduction is shown in the tables below.

Table ES-3. Energy Savings Results Compared to Base Load Forecast, MWh, Medium Avoided Cost Scenario

	2021	2025	2030	2035	2040
Base Load	3,246,452	3,276,068	3,329,157	3,424,440	3,587,996
Energy Efficiency	36,385	155,883	356,306	515,652	577,656
% of Base Load	1.1%	4.8%	10.7%	15.1%	16.1%
Demand Response Deferral	463	823	1,925	2,661	3,206
% of Base Load	0.0%	0.0%	0.1%	0.1%	0.1%
Distributed Solar	0	0	0	0	0
% of Base Load	0.0%	0.0%	0.0%	0.0%	0.0%

Table ES-4. Load Reduction Results Compared to Peak Hourly Load Forecast, MW, Medium Avoided Cost Scenario

	2021	2025	2030	2035	2040
Peak Hourly Load	673	679	691	710	744
Maximum Hourly Energy Efficiency Savings		26.2	69.3	105	119
% of Peak Load	1.1%	3.9%	10.0%	14.8%	16.0%
Maximum Hourly Demand Response Deferral	3.4	7.7	19.2	25.5	28.1
% of Peak Load	0.6%	1.2%	3.0%	3.9%	4.1%
Maximum Hourly Distributed Solar Savings	0	0	0	0	0
% of Peak Load	0.0%	0.0%	0.0%	0.0%	0.0%



1 Introduction

Platte River Power Authority ("PRPA") retained HDR Inc. ("HDR") to develop a Distributed Energy Resources ("DER") potential projection for PRPA's service territory. This study provides input to an Integrated Resource Plan (IRP) that PRPA is currently developing for 2020. This DER potential study provides a transparent and consensusbased estimate of the DER potential for the following resources: energy efficiency ("EE"), demand response ("DR"), distributed solar photovoltaic ("PV"), battery storage, and combined heat and power ("CHP") growth in the residential, commercial, and industrial customer sectors. The DER potential of each resource has been evaluated for costeffectiveness and achievable potential.

HDR has leveraged public information to the extent it is practical and relevant for local conditions and collected primary data to fill gaps that are critical to the reliability of study outcomes. A significant source of local information was from the City of Fort Collins Utilities detailed customer segment data (i.e. City of Fort Collin's BERTHA database). During this study, HDR and PRPA valued the cooperation and input of the utilities staff from the City of Fort Collins, City of Longmont, and City of Loveland.

We have documented the assumptions, methods used, and results in the following sections of this report.

- Section 2 of this report describes the main sources of information and high-level assumptions;
- Section 3 describes the approach to establishing a base case load forecast and • customer segmentations assumptions;
- The DER estimates reflect a range of achievable energy savings and deferred • energy/capacity potential based on three supply-side avoided cost scenarios. Sections 4, 5 and 6 explain the resource estimation approach, the main avoided cost assumptions, and the estimated technical, economic, and achievable potential for energy efficiency resources, demand response resources, and distributed solar resources, respectively;
- Section 7 describes the limited potential of combined heat and power resources; ٠
- Each energy efficiency, demand response, and distributed generation resource . influences PRPA's total hourly load shape, daily. Section 8 shows the impact of these DER estimates to PRPA's forecasted hourly load shape based on the active DER measures throughout the year;
- Section 9 summarizes the study and highlights the main findings; and ٠
- Section 10 provides references to the public information used to define the DER • measures in this study.

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2 Basis of Evaluation

This study uses primary information from various sources including aggregated PRPA customer load data, aggregated customer load data from the member cities of Fort Collins, Longmont, Loveland, and Estes Park, historical PRPA and member city DER program experience, and prior PRPA DER studies. Where the primary sources are not able to inform assumptions or inputs, secondary information from publicly available demand-side management studies, energy efficiency studies, and other reports such as national and regional surveys are leveraged.

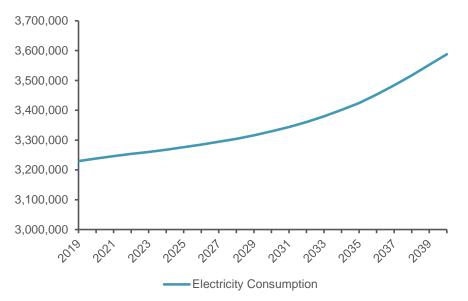
The basis of evaluation is a framework and supporting executable model that incorporates a PRPA baseline electricity load and customer forecast and characterizes the potential for distributed energy resources in comparison against several avoided cost scenarios. The baseline load forecast from 2019 through 2040 is based on the aggregated PRPA and member city customer load data and regional growth forecasts as described in more detail in section 3. The evaluation of distributed energy resource potential is split amongst energy efficiency resources (section 4), and demand response resources (section 5) including battery storage resources, distributed rooftop solar PV (section 6), and combined heat and power resources (section 7). The distributed energy resources estimates are based on several foundational principles:

- Resources are based on existing and proven technology;
- A 20 year study period starting in 2021 and ending in 2040;
- Naturally occurring conservation or energy efficiency (i.e., efficiency that is driven by codes, standards or economic decisions made by customers outside of PRPA DER programs) is already captured by the base case load forecast (i.e. such energy is outside the results of this study);
- The list of DER measures evaluated in this study are not exhaustive and, therefore, the possibility for additional energy and/or capacity savings from measures not identified is present. HDR chose to include measures within this evaluation that were deemed to have the best potential for savings based on our industry experience and judgment; and
- The approach to determine achievable potential from DER included an assessment of overall technical potential of applicable customers, an assessment of economic potential via comparison against avoided costs and a total resource cost (TRC) test (based on incremental DER costs plus administration costs), and an estimate of achievable potential considering market adoption barriers and maximum participation rates.

3 Base Case Forecast

This section describes the process of developing the segmented end-use base case forecast. Each customer segment examined is described and the energy consumption pattern is identified. PRPA provided an annual non-segmented wholesale sales forecast through 2040, shown in the figure below.





Utilizing historical retail sales data, the forecast was segmented by city and customer class (Residential and Commercial & Industrial). Data provided by Fort Collins was utilized to further segment the customer classes to a lower level of granularity. 53 subcategories were established from Fort Collins' BERTHA database, resulting in 12 residential subcategories and 41 Commercial & Industrial subcategories. These subcategories were mapped to building classifications identified in the Energy Information Administration's (EIA) Residential Energy Consumption Survey (RECS) and the Commercial Building Energy Consumption Survey (CBECS). The most current CBECS was published in 2012 and the RECS has data available from 2015. These surveys provided electricity end use consumption for 10 end use categories. Given the naturally occurring energy efficiency embedded in the annual forecast provided, the EIA's 2018 AEO forecast of end use consumption was used to forecast changes in end use consumption by subcategory.

PRPA provides electricity to four cities: Fort Collins, Longmont, Loveland and Estes Park. Over time, the share of energy each municipality receives has remained fairly constant. As a result, it was assumed that the average electricity split for each of the cities over the last five years would be representative of the expected future energy distribution.

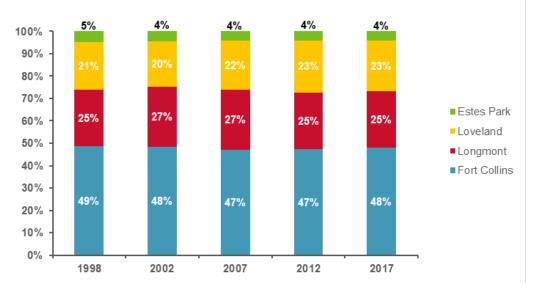
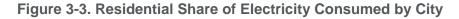
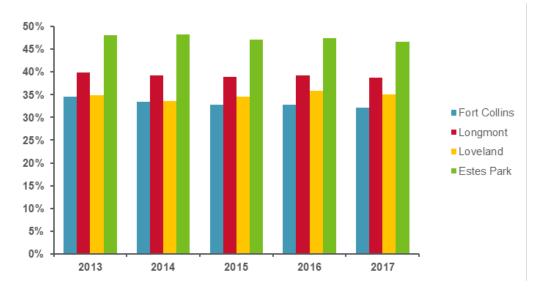


Figure 3-2. Share of Electricity Consumed by City

Additionally, the residential share in each city has remained relatively constant over the past five years. It is assumed the five year average is indicative of the future share of residential energy.





The overall residential and commercial &industrial energy consumption for PRPA was constructed by applying the distribution of energy to each city and then applying each cities' share of energy by customer class. These values are then aggregated to create a total estimate encompassing PRPA's service region for both customer classes.

3.1 Customer Base Segmentation

The base forecast was initially split to two customer classes: Residential and Commercial & Industrial. These customer classes are further disaggregated into subcategories based on Fort Collins' BERTHA database. This section describes the subcategories used. It is assumed that the customer base in Fort Collins is representative of the entire PRPA service region.

3.1.1 Residential Customers

Historically, residential customers represent around 88% of PRPA's customers, and have consumed roughly 35% of the total retail electricity sold by PRPA. Residential customers are split between single-family and multi-family units. The energy consumption for both subcategories is shown below.

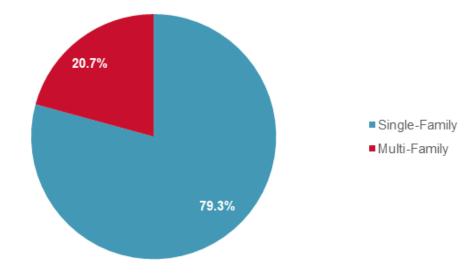


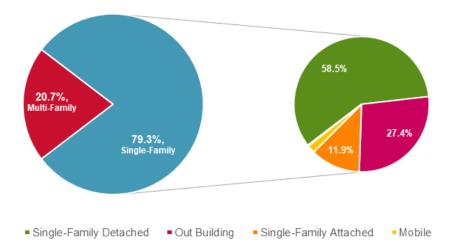
Figure 3-4. Share of Residential Subcategory Energy Consumption, 2017

Single-Family

Single-family customers are comprised of several BERTHA categories including Single-Family Attached, Single-Family Detached, Mobile, Out Buildings, Ag, and Residential. In Fort Collins, these categories comprise nearly three-quarters of the residential premises. Extrapolated to the entire PRPA service region, this translates to 101,369 customers as of 2017. On average, single-family customers use over 2,800 more kWh per customer per year than multi-family customers. Detached homes represent nearly 59% of total energy consumption in the single-family subcategory.



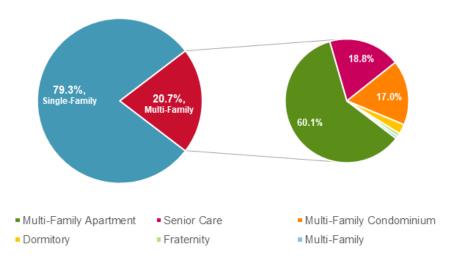
Figure 3-5. Energy Consumption Share by BERTHA Categories, Single-Family Residential, 2017



Multi-Family

Multi-family customers are comprised of the following BERTHA categories: Dormitories, Fraternities, Multi-Family, Multi-Family Apartment, Multi-Family Condominium, and Senior Care. Multi-family dwellings represent over one-quarter of premises in Fort Collins. Assuming Fort Collins is representative of PRPA's service area, the multi-family category contains 38,847 customers. The energy consumption in this subcategory is predominantly from apartment dwellings, senior care, and condominiums.

Figure 3-6. Energy Consumption Share by BERTHA Categories, Multi-Family Residential, 2017



3.1.2 Commercial & Industrial Customers

Commercial & Industrial customers represent only roughly 12% of PRPA customers, but are responsible for nearly two-thirds of total electricity consumption. Customers are

classified in one of 17 subcategories based on Fort Collins' BERTHA classifications as shown in the figure and table below.

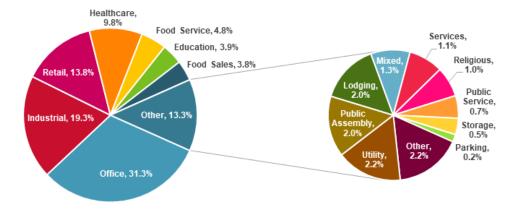


Figure 3-7. Commercial & Industrial BERTHA Energy Consumption Share by Subcategory, 2017

Table 3-1: Share of Energy by Commercial & Industrial Customer Sectors

Category	Description	Share of Energy
Office	Includes tech buildings, offices, and financial institutions.	31.3%
Industrial	Includes industrial buildings such as manufacturing. The BERTHA database does not offer further detail on the industries that contribute to the electricity consumption.	19.3%
Retail	Includes car dealerships, dispensaries, and malls.	13.8%
Healthcare	Includes inpatient and outpatient facilities in addition to veterinarians	9.8%
Food Service	Includes restaurants, bars, and fast food establishments.	4.8%
Education	Includes primary, secondary, post-secondary institutions and day care.	3.9%
Food Sales	Includes convenience stores, gas stations, and supermarkets.	3.8%
Other	Includes buildings which end use could not be clearly defined in BERTHA.	2.2%
Utility	No additional detail available.	2.2%
Public Assembly	Includes gyms, clubhouses, and community centers.	2.0%
Lodging	Includes hotels, motels, and boarding facilities.	2.0%
Mixed	No additional detail available.	1.3%
Services	Includes auto repair shops, car washes, personal and other services.	1.1%
Religious	No additional detail available.	1.0%
Public Service	Includes postal offices, fire halls and libraries.	0.7%
Storage	Includes warehouses and distribution centers.	0.5%

3.2 Customer Base End Use Identification

The subcategories of customers identified above were further examined to determine end use consumption. The EIA's Residential Energy Consumption Survey (RECS) and Commercial Buildings Energy Consumption Survey (CBECS) were used to establish baseline end use consumption for 2012 and 2015 respectively. Survey micro data was used to create end use consumption estimates representative of the Mountain Region, an area encompassing Idaho, Montana, Wyoming, Nevada, Utah, Colorado, Arizona and New Mexico. This was used to proxy the end use consumption in Colorado due to the absence of more local data. National forecast trends for end use consumption provided in the Annual Energy Outlook 2018 were used to forecast the regional end use consumption estimates over time. The profiles of each subcategory previously identified are examined in this section.

3.2.1 Residential Customers

Residential customers are estimated to consume more than one-quarter of electricity on cooling, the largest amount of any end use. Other major end uses are lighting, water heating and heating, which combined account for another quarter of electricity consumption by end use. Other end uses examined include ventilation, cooking, refrigeration, and miscellaneous. The miscellaneous is a catch-all category that includes appliances, plug loads, HVAC auxiliary units. The differences between single-family and multi-family end use consumption is highlighted below. The values shown in the figure below are based on the information from the 2015 RECS survey. These values are forecast to change marginally over time due to efficiency improvements and higher penetration of energy efficient equipment.

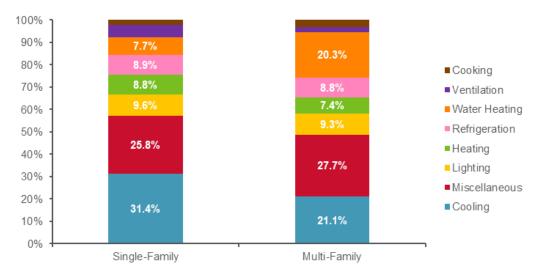


Figure 3-8. Share of Consumption by Residential End Use, 2017

Single-Family

Single-family units are estimated to consume nearly one-third of electricity for cooling, followed by a quarter on miscellaneous activities. Lighting, refrigeration and heating correspond to 27% of electricity consumption, with each end use making up around a

third of the combined total. Ventilation and cooking remain as the smallest end use categories, combining for less than 10% of total electricity consumption.

Multi-Family

Multi-family units are estimated to consume over one-quarter of electricity for miscellaneous activities, followed closely by cooling and water heating. Lighting, refrigeration and heating mirror similar proportions to single-family units, while cooking and ventilation are the end uses consuming the least energy.

Table 3-2. Annual Average Residential Electricity Consumption per Customer byEnd Use in 2017, kWh

End Use	Single-Family	Multi-Family
Cooling	2,802	1,283
Miscellaneous	2,298	1,689
Lighting	857	568
Refrigeration	795	534
Heating	784	449
Water Heating	687	1,238
Ventilation	514	138
Cooking	186	195
Total Electricity Consumption	8,924	6,095

3.2.2 Commercial & Industrial Customers

Commercial & Industrial consumption is disaggregated into 10 end uses. These end uses include heating, cooling, ventilation, water heating, lighting, cooking, refrigeration, office equipment, computing, and miscellaneous. Building classifications from BERTHA were matched to one of 19 building classifications in the EIA's 2012 CBECS to generate static end use estimates for 2012. The Annual Energy Outlook 2018 (AEO 2018) was used to capture forecasted trends in end uses over time. These trends are applied to the static 2012 end use shares to estimate actual end uses for each given year. The end uses are then aggregated into the 17 subcategories presented in the Customer Base Segmentation. End uses vary drastically across different building types and are presented briefly below for each subcategory. An aggregate electricity consumption across all Commercial & Industrial subcategories is shown below. All results presented are reflective of end use estimates for 2017.



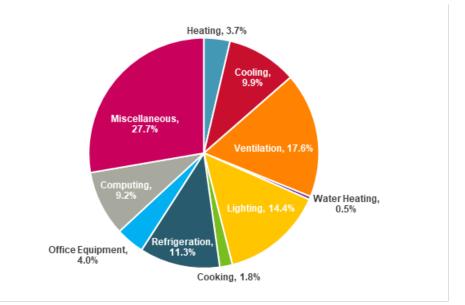
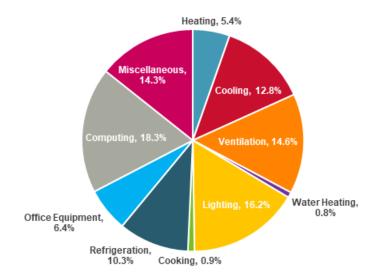


Figure 3-9. End Use Consumption Shares: Commercial & Industrial, 2017

Education

End uses in education are disaggregated across several categories, with six individual end uses exceeding 10% of total electricity consumption. Computing is the highest end use, and lighting and ventilation are the second and third highest end uses. The most inconsequential end uses for buildings classified in this subcategory are cooking and water heating.

Figure 3-10. End Use Consumption Shares: Education, 2017



Food Sales

Electricity usage in food sales is primarily consumed for refrigeration with no other end use having a share greater than 7%. Lighting and ventilation are the next largest end uses in the consumption of electricity.

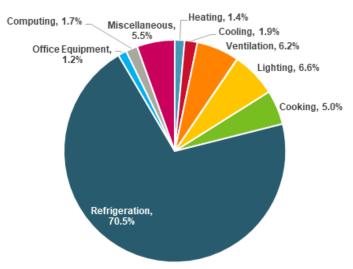


Figure 3-11. End Use Consumption Shares: Food Sales, 2017

Food Service

Food service also has refrigeration as the primary end use consumption of electricity. Combined with electricity used for cooking, the two end uses account for over half of all electricity consumed in the food service sector. Ventilation and cooling represent the next two largest end uses.

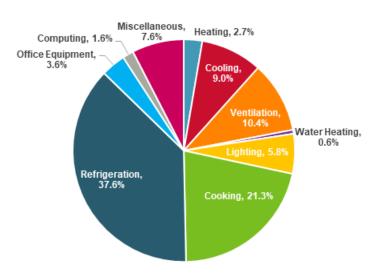
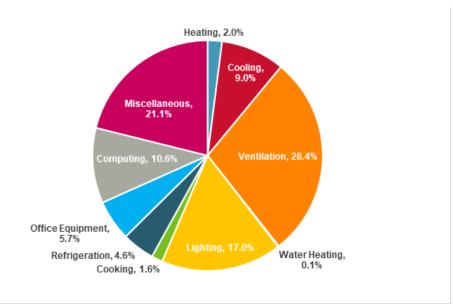


Figure 3-12. End Use Consumption Shares: Food Service, 2017

Healthcare

Health care expends the most electricity on ventilation, followed by miscellaneous uses. Lighting and computing also represent a significant amount of electricity usage, accounting for more than one-quarter of all electricity usage.

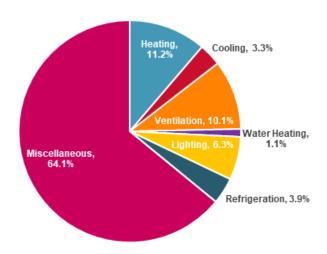
Figure 3-13. End Use Consumption Shares: Healthcare, 2017



Industrial

A vast majority of industrial energy consumption is spent on manufacturing processes, which contribute to the miscellaneous category. As a result, the miscellaneous category captures a majority of total electricity consumption in the industrial sector. Heating and ventilation are the next two largest end uses, accounting for over 20% of electricity use.

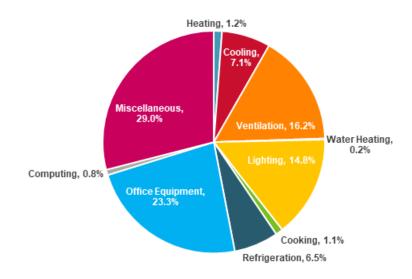
Figure 3-14. End Use Consumption Shares: Industrial, 2017



Lodging

Miscellaneous and office equipment are the two largest end uses for lodging, and contribute to over half of all electricity use. Ventilation and lighting are also categories where significant electricity is consumed.

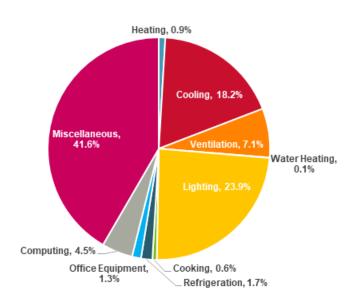
Figure 3-15. End Use Consumption Shares: Lodging, 2017



Mixed

Given the mix of buildings classified in this subcategory, the miscellaneous end use captures a significant amount of electricity consumption. Lighting is the second most electricity-intensive end use, accounting for nearly one-quarter of all electricity consumption. Cooling accounts for nearly another 20%.

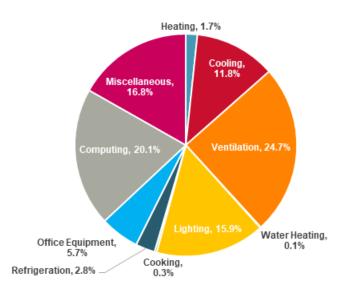
Figure 3-16. End Use Consumption Shares: Mixed, 2017



Office

The two largest end use categories for offices are ventilation and computing. Cooling, lighting, and miscellaneous are three other categories that contribute to significant electricity consumption.

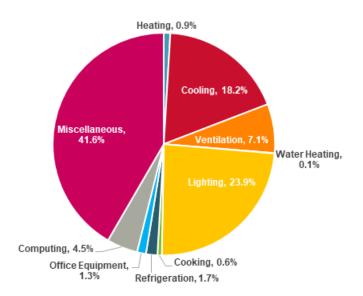
Figure 3-17. End Use Consumption Shares: Office, 2017



Parking

Parking does not have a clear match to a defined building classification in the CBECS, and as a result, it was matched to an "Other" classification in the CBECS. As a result, the end use consumption may not be an exact match of parking facilities. However, given the small electricity profile of the parking subcategory, the impact to these categories is minimal.

Figure 3-18. End Use Consumption Shares: Parking, 2017



Public Assembly

The public assembly subcategory expends the most electricity on cooling, accounting for 37% of total electricity consumption. Miscellaneous, lighting and refrigeration are the next largest end uses.

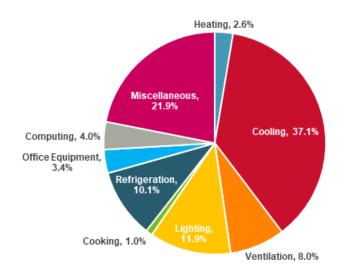
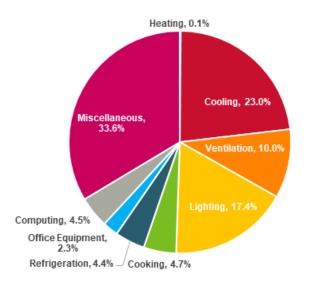


Figure 3-19. End Use Consumption Shares: Public Assembly, 2017

Public Service

Roughly one-third of electricity consumed in public service is attributed to miscellaneous end uses. Cooling, lighting and ventilation represent the next largest end use categories which combined for roughly 50% of all electricity consumed.

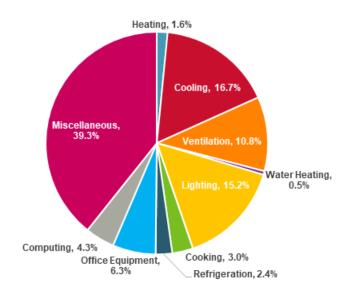
Figure 3-20. End Use Consumption Shares: Public Service, 2017



Religious

The religious subcategory also has a high percentage of electricity consumption in the miscellaneous bucket. The three other large end use categories are cooling, lighting and ventilation.

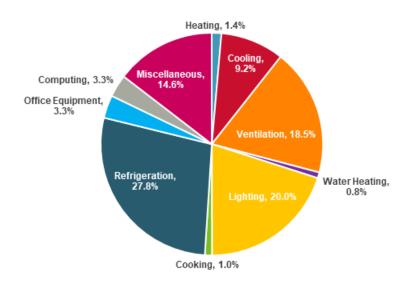
Figure 3-21. End Use Consumption Shares: Religious, 2017



Retail

Retail uses high levels of electricity consumption for refrigeration, lighting, and ventilation. These categories combine for nearly two-thirds of all electricity consumption. Miscellaneous is the only other category exceeding 10% of electricity consumption.

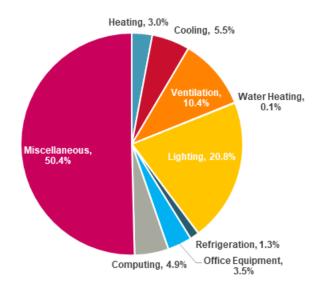
Figure 3-22. End Use Consumption Shares: Retail, 2017



Services

Nearly half of the electricity consumption for services is attributed to miscellaneous end uses. Lighting and ventilation are other significant end uses which account for 30% of electricity consumption.

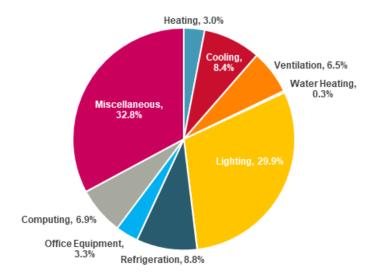




Storage

Two-thirds of storage electricity consumption is attributed to miscellaneous end uses and lighting. The remaining end uses each utilize less than 10% of total electricity consumed for storage.

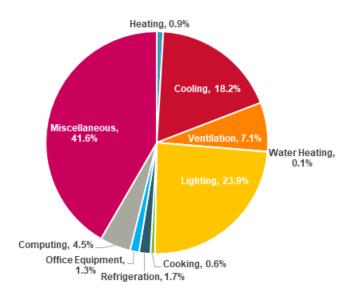
Figure 3-24. End Use Consumption Shares: Storage, 2017



Utility

The utility subcategory did not have a comparable match in the CBECS survey. As a result, it was classified as "Other" and may contain an end use profile that is not directly representative of the true end use consumption. However, only 0.3% of all electricity consumed in the Commercial & Industrial category is attributable to utilities.

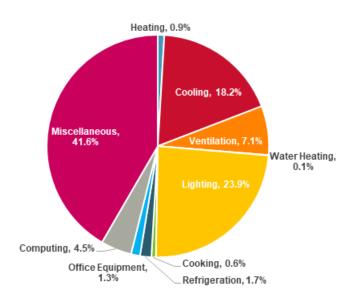
Figure 3-25. End Use Consumption Shares: Utility, 2017



Other

The other subcategory contains buildings that could not be classified in one of the 16 subcategories previously described. These buildings are also assumed to be matched to the "Other" classification in the CBECS. Given the classification of these buildings are unknown, additional accuracy for this category is not attainable.

Figure 3-26. End Use Consumption Shares: Other, 2017



3.3 Overview of Existing DER Programs

According to program information provided by PRPA, PRPA had 12 actively funded DER programs common across the utility at the end of 2017. There are additional city-specific programs that are tracked by each of the four city utilities. There are also 5 programs that are not actively funded, but still provide savings due to the remaining lifetime of previously installed EE measures.

The common DER programs with the highest reported energy savings are Efficiency Works, Business Rebates; Building Tune-Up; Efficiency Works, Consumer Products; Efficiency Works, Homes Rebates and Audits; and Midstream Lighting.

Efficiency Works, Business Rebates – This program targets commercial and industrial businesses across all municipalities and incentivizes exterior and interior lighting replacement, cooler/freezer gasket replacement, and other miscellaneous replacements. PRPA tracks the energy savings on a project specific basis in a spreadsheet. Some of the previous commercial and industrial programs (such as LightenUp and Energy Efficiency Program) have been rolled up into the Efficiency Works Business program. As of 2017, across all four cities, the Efficiency Works Business program was estimated at 152,000 MWh of cumulative energy savings.

Building Tune-Up – The Building Tune-Up program is designed to achieve costeffective electricity, natural gas and water savings in commercial and industrial facilities through retro-commissioning (RCx). Targeted improvements are the implementation of low- or no-cost measures. In 2017, this program was estimated at about 7,200 MWh of cumulative energy savings.

Efficiency Works, Consumer Products – This program is a residential rebate-based program that provides incentives for consumers to purchase devices and appliances that contribute to energy efficiency by replacing a less efficient device with a new, more efficient device. The largest contributors to the Consumer Products programs has been the midstream lighting rebate program in which rebates are directed to lighting retailer to sell qualifying efficient consumer lighting at reduced pricing, and the Cooling Rebate Program, which provided rebates for high-efficiency air conditioners (2002-2006). In 2017, the Consumer Products programs were estimated at about 9,100 MWh of cumulative energy savings.

Efficiency Works, Homes Rebates and Audits – This program is a residential rebatebased program that provides energy assessments and rebates for efficiency upgrades in homes. PRPA estimated that at the end of 2017 approximately 1,900 MWh of savings (since PRPA began administering the program across the four cities in late 2014).

A recently developed demand response pilot that became operational in 2017 is one of PRPA's first efforts in a direct load control program. It was developed as a pilot to explore how DR could be operated by PRPA to provide maximum benefits to the overall system (integrated wholesale and retail levels). The pilot made use of existing DR resources previously employed by Longmont and Fort Collins: Longmont's distribution system voltage reduction and Fort Collins's direct load control applied to participating customers' air conditioners and electric water heaters. This program, subject to the power system operator needs, is in contrast to the Residential and Small Commercial Peak Partners Program, which is activated by IntelliSOURCE software during peak load

times and has been place since 2014. The peak partners program is tied to load reduction of thermostats and electric water heaters. Although these two programs are not currently within the top energy saving programs, they are important time-based load reduction programs in PRPA's portfolio and have a potential for contributing to future energy savings and load reduction. In addition, PRPA has recently initiated an EV charging study that provides rebates for a limited number of Wi-Fi enabled chargers. In this pilot PRPA hopes to gain a better understanding of how and when people charge EVs in their homes, as well as how EV charging can be employed as a flexible load.

Within the common programs, PRPA reported a cumulative annual savings of 196,137 MWh and a cumulative 31.4 MW demand load reduction in from 2002 through 2017 in the EE programs common across PRPA. The active annual savings at the end of 2017 (i.e. from DER measures that have not expired) is approximately 170,000 MWh, or 5.4% of current customer sales. The active demand reduction at the end of 2017 (i.e. from active DER measures that have not expired) is approximately 30 MW, or about 4.5% of current summer peak load.

For the common programs in 2017, PRPA reported 25,943 MWh of new incremental energy savings⁴ and 4.06 MW of new incremental demand reduction. New incremental energy savings have generally doubled over the last 10 years. Figure 3-27 and Figure 3-28 show the new incremental energy savings and demand reduction from 2002 through 2017.

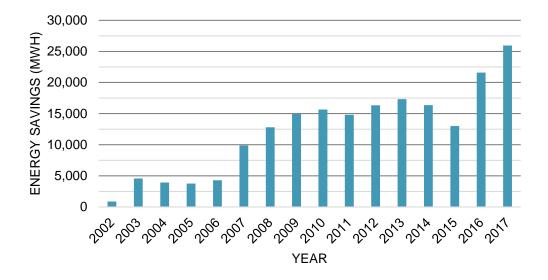


Figure 3-27. PRPA DER Programs New Incremental Energy Savings, MWh

⁴ New incremental energy savings are savings added in a given year and does not include prior accumulated savings or reductions from prior year savings lost at end of life.

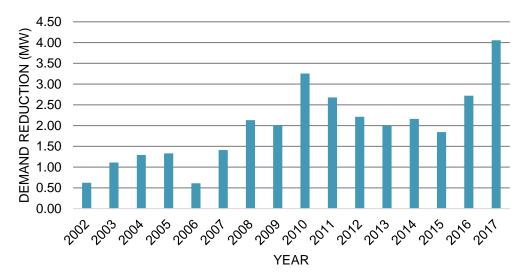
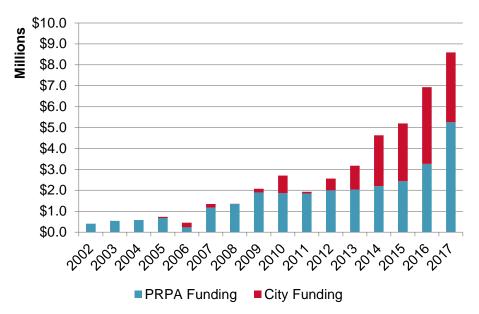


Figure 3-28. PRPA DER Programs New Incremental Demand Reduction, MW

PRPA and the member cities have funded DER programs since 2002 as shown in the following figure. According to PRPA, the total utility funding for 2019 and 2020 is expected to be about \$14.1 million to accomplish planned new incremental energy savings of 34,000 MWh, or a first year measure savings cost of about \$415/MWh (or a levelized cost of \$44.2/MWh based on 13 year measure life and 5% discount rate).

Figure 3-29. PRPA DER Programs Annual Funding

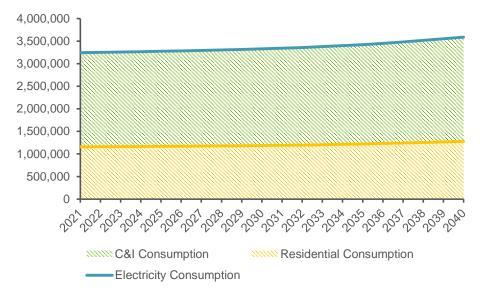


3.4 Establishment of Base Case Load Forecast

The load forecast was constructed from a top-down approach. PRPA provided an annual forecast through 2040. The first step to disaggregating the forecast was to divide the load between Residential and Commercial & Industrial customers. The share of each city's

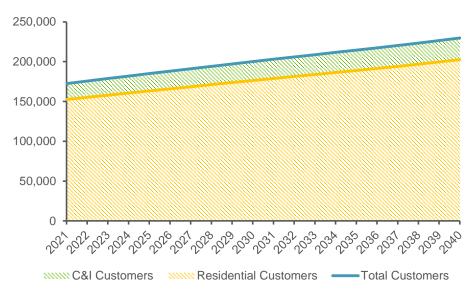
load and customer split over the last five years was applied to the annual forecast to calculate the expected electricity usage by customer class.





Next, the share of electricity was calculated for each subcategory based on Fort Collins' BERTHA data. The share of electricity, shown in Figure 3-2, was then applied to the electricity forecast to further disaggregate the load. Applying the end use breakouts shown in Section 3.2, the forecast is then split by end use for each subcategory.





Over time, annual load is expected to grow an average of 0.63% per year. Customer growth within the PRPA service area is expected to grow faster than the load. On average, residential customers are anticipated to grow on average 1.59% per year, and C&I customers are anticipated to increase on average by 1.46% per year. Normalizing

this load and customer growth to regional economic growth forecasts, we find that electricity consumption per household and per job is reduced over time.

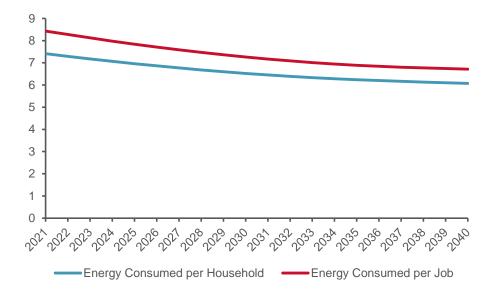


Figure 3-32. Electricity Consumption per Household, Electricity Consumption per Job over Time, MWh

The decline in electricity consumption can be attributed to natural energy efficiency factors, which are embedded in the base load forecast. Natural energy efficiency describes any efficiency gains that are not attributed to specific utility programs. Three main factors are expected to drive natural energy efficiency savings: building energy codes for new construction, increasing efficiency standards for consumer appliances, and the replacement of aging appliances.

According to Colorado Department of Local Affairs⁵, Larimer County, Loveland, and Longmont have adopted the 2015 IECC code for new construction. Fort Collins has recently adopted the 2018 IECC code for new construction⁶. New construction in the PRPA service area will meet at least 2015 standards (across the county and cities) and will be more energy efficient than the existing stock.

In addition, the existing stock of households have appliances that are subject to reach the end of their useful life and will need to be replaced. Newer appliances reduce the electricity consumed. Natural energy efficiency reduces the growth in the base load, and results in a decline in per capita energy consumption.

⁵ Colorado Department of Local Affairs. <u>https://www.colorado.gov/dola/colorado-energy-codes-0</u>

⁶ Codes || City of Fort Collins. https://www.fcgov.com/building/codes

4 Energy Efficiency Potential

The following section describes the methodology used to estimate technical, economic, and achievable potential for identified energy efficiency measures. Over fifty measures were identified and evaluated for all applicable categories described in Section 3.1. Each individual measure is defined by the baseline (what the measure compares against), incremental energy savings (compared to the baseline), a useful life estimate for each measure and an incremental cost (compared to the baseline) for each measure. Measures are recorded across different baselines, and are standardized to represent one household or customer. For example, the savings and cost for a smart thermostat installation are reported per thermostat, while attic insulation energy savings is evaluated per square foot. These measures are converted to savings per household for residential customers. Conversions were performed through estimates derived from the Residential Energy Consumption Survey (RECS), the Commercial Buildings Energy Consumption Survey (CBECS), City of Fort Collins customer data, PRPA experience and other distributed energy resources reports.

4.1 Energy Efficiency Measures and Assumptions

For each end-use category at least one energy efficiency measure was defined for each residential customer segment. The list of residential measures is shown in the table below. The measures included in this study are those currently available in in the market (i.e. future efficiency technologies that may be developed are not included). Further details for the EE measures are included in Appendix A.

Table 4-1. Residential Energy Efficiency Measures

EE Measure Name	Customer Segment
Heating	
Smart Thermostat installation - Electric Heating*	all residential
Smart Thermostat installation - Gas Heating*	all residential
Programmable Thermostat installation - Heating	all residential
Weatherization: Air Sealing	all residential
Weatherization: Insulation	all residential
High Efficiency Windows	all residential
Installation of ENERGY STAR® storm windows/doors	all residential
Install Heat Recovery Ventilation	all residential
Cooling	
Central Air Conditioner upgrade	all residential
Smart Thermostat installation – Cooling*	all residential
High efficiency air handler/rooftop units	Multi-family
Ventilation	
Electrically Commutated Furnace Blower Motor	all residential

EE Measure Name	Customer Segment						
Water Heating							
Heat-Pump Electric storage water heater	all residential						
Lighting							
LED Upgrade (interior)	all residential						
LED Upgrade (exterior)	single family						
Refrigeration							
ENERGY STAR® freezer	all residential						
ENERGY STAR® refrigerator	all residential						
Refrigerator Recycling	all residential						
Miscellaneous							
ENERGY STAR® pool pumps	all residential						
ENERGY STAR® dishwasher	all residential						
ENERGY STAR® clothes washer	all residential						
ENERGY STAR® clothes dryer	all residential						
ENERGY STAR® electronics (advanced power strip)	all residential						
Faucet Aerators	all residential						
Low Flow Showerheads	all residential						

*A smart thermostat is one physical device, but impacts both heating and cooling. Therefore, the smart thermostat measures are broken down by end-use and customer heating type. During total resource cost test, the measures were appropriately combined to evaluate the economic viability as a whole.

For each end-use category at least one energy efficiency measure was defined for each commercial & industrial customer segment. The list of commercial & industrial measures is shown in the table below.

Table 4-2. Commercial & Industrial Energy Efficiency Measures

EE Measure Name	Customer Segment					
Heating						
Smart Thermostat installation – Heating*	All Commercial Categories					
Cooling						
Air-cooled Chiller upgrade	All Commercial Categories					
Water-cooled Chiller upgrade	Healthcare, Industrial, and Office Categories					
Evaporative pre-cooling installation on air-cooled condenser	Retail, Education, Healthcare, Industrial, Office, and Utility					
High efficiency air handler/rooftop units	All Commercial Categories					
Advanced RTU Controller (ARC) retrofit	All Commercial Categories					
Smart Thermostat installation – Cooling*	All Commercial Categories					

EE Measure Name	Customer Segment		
Ventilation			
Electrically Commutated Motor-Variable Air Volume	All Commercial Categories		
NEMA Super Premium Motors	Education, Healthcare, Industrial, Office, Utility		
Lighting			
LED Screw-in Upgrade from CFL (interior)	All Commercial & Industrial Categories		
LED Linear Upgrade from T8/T12 (interior)	All Commercial & Industrial Categories		
LED High-bay Fixtures (interior)	Industrial		
LED Upgrade (exterior)	All Commercial Categories		
LED Screw-in Upgrade (exterior)	Industrial		
LED Area Lighting Upgrade (exterior)	Industrial		
LED Linear Lighting Upgrade (exterior)	Industrial		
Smart Lighting controllers / Occupancy sensors	All Commercial Categories		
Smart Lighting controllers / Daylight sensors	All Commercial Categories		
Cooking			
Electric Combination Ovens	Food Sales, Food Service, and Healthcare Categories		
Electric exhaust hood	Food Sales, Food Service, and Healthcare Categories		
Refrigeration			
Refrigerator Floating-Head Pressure Controls	Food Sales and Food Service Categories		
Refrigerator/Freezer gaskets	Food Sales and Food Service Categories		
Office Equipment and Computir	ng		
Advanced power strips	All Commercial & Industrial Categories		
Miscellaneous			
Energy Assessment Retro-commissioning	All Commercial & Industrial Categories		
Energy Management System with Data Analysis	All Commercial & Industrial Categories		

*A smart thermostat is one physical device, but impacts both heating and cooling. Therefore, the smart thermostat measures are broken down by end-use and customer heating type. During total resource cost test, the measures were appropriately combined to evaluate the economic viability as a whole.

Additional assumptions included in the energy efficiency analysis are shown in Table 4-3. These general assumptions include the discount rate and decomposition rates. The discount rate is used to represent the time value of money, and converts future costs and

benefits to equivalent present value terms used in the determination of economic potential.

Decomposition rates are adjustments made to the stock of existing customers to reflect changes to the count of customers as a result of demolition, vacancy, or other reasons not associated with new construction. Based on the projection of PRPA's customer base, decomposition rates adjust the split between new and existing customers.

Table 4-3. General Assumptions

Variable	Unit	Value	Source
Discount Rate	%	5%	PRPA Assumption
Single Family Household Decomposition Rate	%	0.3%	EIA National Energy Modeling System, Residential Demand Module.
Multi-Family Household Decomposition Rate	%	0.5%	EIA National Energy Modeling System, Residential Demand Module.
Commercial Decomposition Rate	%	2.81%	Bureau of Labor Statistics, Business Employment Dynamics, 5 year average for establishment deaths in Colorado.

4.2 Technical Potential

The technical potential is the maximum possible savings available ignoring any economic or market barriers. Technical potential is representative of a theoretical maximum savings that could be achieved for all measures examined. In order to estimate the technical potential, specific factors were developed for each energy efficiency measure, unique to each customer segment. These factors were primarily derived from the RECS and CBECS surveys, though local input from PRPA was used where applicable. The five factors generated were:

- **Technology Factor** represents the percentage of the population that has the technology (e.g. percentage of households with a thermostat);
- Electrical Factor represents the percentage of the population that uses electricity for an end use, conditional on having that technology (e.g. percentage of households with a thermostat that are heated by electricity);
- **Saturation Factor** is the multiplication of the technology and electrical factor. It represents the percentage of the total population that is the target market for the energy efficiency measure;
- **Remaining Factor** represents the percentage of the population that has not yet adopted energy efficiency measures (e.g. percentage of households that have not yet adopted an energy efficient thermostat); and
- Applicability Factor represents the percentage of qualifying households able to adopt the measure. The applicability factor is assumed to be 100% for all EE measures except in instances where two measures cannot be simultaneously installed. For instance, residential customers are assumed to install either smart thermostats or programmable thermostats, but both cannot be installed and realize the sum of annual energy savings from the two measures.

To assess technical potential for each measure, the aforementioned assumptions or factors are applied to PRPA's customer base. Forecasting PRPA's future customers was performed by looking at historical trends between population and customers. Larimer County's historical population and jobs were compared against PRPA's historical customers to derive a long run relationship in growth between the two. These trends were applied to the economic forecast for Larimer County, which contained population and employment values, to estimate the total number of residential and commercial & industrial customers.⁷ Customers were split to segments based on Fort Collins customer split from 2017. Customers were categorized as either new or existing in the forecast. All new construction becomes part of the existing stock is removed. New households are given different factors than existing households to capture technological advancements or changes since the existing stock was constructed.

According to the Building Codes Assistance Project⁸, Colorado does not have a statewide building code. Instead, Colorado is a home rule state whereby the relevant jurisdictions have adopted specific energy codes.

Since most of the households within the PRPA customer base have adopted at least a 2015 code standard so that new construction will meet at least 2015 standards (across the county and cities), we assume that there will not be a significant amount of building envelope energy efficiency that can be gained from new construction. Therefore, the remaining factor (defined above) for residential new construction building improvements will be assumed to be zero (or minimal).

Regarding appliances, some defined efficiency measures replace existing appliances with ENERGY STAR® rated appliances, but those ENERGY STAR® appliances may not be required by the building code standards (e.g. washers, dryers, refrigerators) and will remain potential for incentivizing energy efficiency for new construction. Therefore, for most appliance-related measures, the new construction remaining factor will be the same as that of the existing building stock.

For each measure, technical potential was calculated using the formula shown below.

Figure 4-1. Technical Potential Calculation Diagram



The technical potential represents the energy savings that could be achieved immediately for all existing stock and any energy savings from immediately replacing or reinstalling measures at the end of the measure's useful life. New stock is assumed to achieve the technical potential once construction has been completed. These

⁷ Three of the four communities in PRPA service area fall in Larimer County and combined for nearly three-quarters of the entire county's population. Longmont is located in Boulder County, though it represents only a small portion of Boulder County's population. Larimer County was determined to be better representative of the PRPA customer base and was selected to represent the entire service area.

⁸ Building Codes Assistance Project. State Code Status: Colorado. <u>http://bcapcodes.org/code-status/state/colorado/</u>

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assumptions allow for the derivation of the maximum possible potential in any given year, regardless of any economic or market barriers.

The cumulative energy savings are shown below by end use. Lighting measures and commercial energy assessment retro-commissioning and commercial energy management systems (both included in the miscellaneous category) represent some of the largest opportunities for technical potential. Together, these three measures account for 64% percent of the technical potential in 2040.

Table 4-4. Technical Potential Energy Efficiency Savings by End Use, MWh

			• •	-	
Technical Potential	2021	2025	2030	2035	2040
Heating	29,905	32,310	35,437	38,592	42,105
Cooling	178,715	192,422	209,184	224,819	240,042
Ventilation	33,929	33,102	32,209	31,425	30,744
Water Heating	16,009	17,151	18,531	19,851	21,281
Lighting	437,265	435,517	435,002	435,191	436,379
Cooking	33,850	36,496	39,741	42,749	45,594
Office Equipment & Computing	4,396	4,740	5,161	5,552	5,921
Refrigeration	83,923	89,596	96,546	102,993	109,144
Miscellaneous	363,277	398,594	441,360	480,959	518,920
Total Technical Potential	1,181,269	1,239,928	1,313,173	1,382,130	1,450,130
% of Base Load Forecast	36%	38%	39%	40%	40%
Base Load Forecast	3,246,452	3,276,068	3,329,157	3,424,440	3,587,996

The figure below displays the distribution of technical potential by end use.

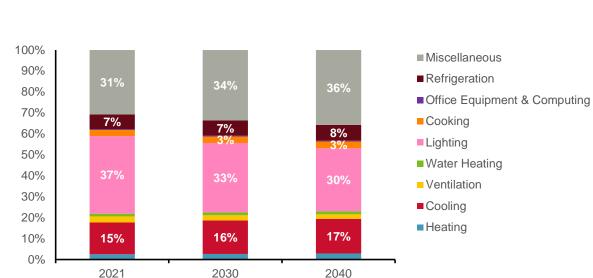


Figure 4-2. Technical Potential Energy Efficiency Savings by End Use

Over the study period, the technical potential does not grow significantly. As modeled, the base load forecast growth exceeds the growth of technical potential. This lower growth for technical potential is because it is assumed that new construction will be more energy efficient than the existing stock, and, therefore, some efficiency measures will not apply. The technical potential only considers current existing energy efficiency technologies and does not speculate on potential of future technologies.

4.3 Economic Potential

The economic potential is a subset of technical potential which reflects only the energy savings that are economically viable. Economic viability is defined as a set of EE measures that generate benefits which exceed the costs over the life of the measures while accounting for the time value of money. In other words, the energy savings from a set of EE measures that cost less to administer, install, and operate over the measures' life compared to an alternative generation resource will be determined to be economically viable.

4.3.1 Economic Benefits

Energy efficiency measures reduces the demand for energy from customers. In turn, utilities are able to avoid or defer costs associated with installing new generation capacity, transmission upgrades, and avoid procuring energy from generation units on the margin. This study examines three distinct types of benefits: avoided capacity costs, avoided generation costs, and avoided carbon costs. The avoided capacity costs capture the levelized fixed costs of installing a new generation unit. The avoided generation costs capture the levelized variable costs of generating or procuring energy. The avoided carbon costs capture the benefits of avoiding regulatory costs of carbon emissions from the generation of electricity. Forecasted avoided carbon costs were gathered from PRPA's 2018 Q4 Power Supply Plan (PSP) data.

In this analysis, three scenarios of avoided costs are estimated to represent low, medium and high scenarios.

- The low scenario is intended to reflect PRPA's resource mix with minimal changes. In this case, EE avoids capacity costs tied to the cost of constructing an aeroderivative (AERO) combustion turbine generation asset. An AERO power plant is assumed to provide the necessary electric capacity as the customer load grows. In this scenario, EE is assumed to avoid energy costs determined by forecasted energy market prices for the region.
- 2. The medium scenario is intended to reflect PRPA's resource mix assuming coal/fossil resources are retired by 2030 and replaced with a mix of renewable resources and battery storage. In this case, EE avoids capacity costs tied to the cost of constructing batteries. The storage is assumed to provide the necessary electric capacity as existing generators are retired and the customer load grows. In this scenario, EE is assumed to avoid energy costs determined by forecasted energy market prices for the region.
- 3. The high scenario is intended to reflect PRPA's resource mix assuming coal resources are retired by 2030 and replaced with a mix of renewable resources and a high penetration of battery storage. In this case, EE avoided capacity costs determined by lithium ion batteries. Avoided energy costs are based a mix of wind and solar costs.

Scenario	Avoided Cost (\$/MWh)	Notes
Low	\$59.38	Base case, avoided capacity from a 83MW aeroderivative engine (LM6000) power plant and avoided generation from energy market rates, blended cost on energy basis
Medium	\$67.47	Avoided capacity from battery storage and avoided generation from a blend of wind and solar power plants; blended cost on energy basis
High	\$76.62	This scenario reflects a blend of wind and solar power plants for avoided generation and battery storage for avoided capacity, blended cost on energy basis

Table 4-5. Avoided Cost Scenario Assumptions for Energy Efficiency

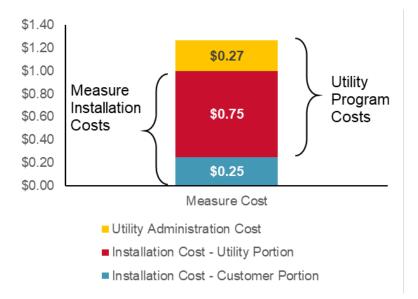
For these three scenarios, the avoided costs are capturing the benefits of delaying or not installing additional generation infrastructure (avoided capacity costs) and the benefits of not producing carbon from gas-fired units (avoided carbon costs). Based on current market conditions, estimates were gathered for the cost of generation for the different cases. The cost of carbon was gathered from PRPA's 2018 Q4 PSP data. The avoided capacity costs are assumed to begin accruing immediately, and the avoided carbon costs will begin accruing in 2025.

4.3.2 Economic Costs

Implementing energy efficiency measures results in costs borne by either the customer or the utility (or both). These costs include installation and technology costs, ongoing operations and maintenance costs, and program and administrative costs. This study utilizes the incremental cost of implementing energy efficiency measures. The incremental cost captures the cost of installing an energy efficient measure above and beyond the cost of installing a baseline measure (i.e., a less efficient or non-energy efficient measure). The evaluated costs are designed to capture the societal cost incurred, whether borne by the utility or participants, and as a result, excludes any transfers between the utility and participant (program incentives). Incremental installation costs were derived from publicly available sources.

In addition to a measure's installation cost, the total implementation cost also includes administrative costs that are borne by the utility. Program incentives make up the other portion of costs borne by the utility and PRPA has historically targeted incentivizing 50% of the measure installation cost. Based on PRPA's historical DER program funding, administrative costs were designated in this study as 35% of total utility costs (or an additional 27% above the measure installation cost). Furthermore, based on PRPA guidance, this study enlarges the utility program incentives to 75% of a measure's installation cost. The higher utility incentive share is designed to expand customer participation in EE programs beyond existing levels, to reach the achievable potential shown in the study. See below for a table showing the costs that make up the total EE measure implementation cost of a representative measure.

Figure 4-3. EE Measure Implementation Cost



Note: The above costs are representative of a measure installation cost of one dollar.

Each measure's implementation costs were levelized and ranked to develop a cost curve. The cost curve below indicates the amount of technical potential attainable in MWh at any given avoided cost (\$/MWh). The low, medium, and high avoided costs for this study are benchmarked on the graph as a reference.

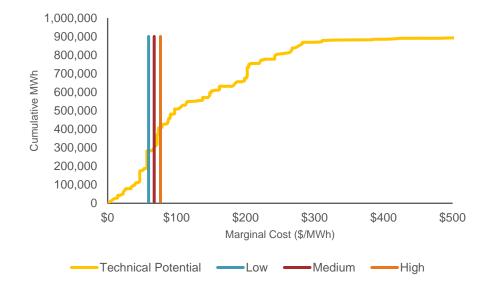


Figure 4-4. Cost Curve of EE Measures Examined, 2019

4.3.3 Portfolio Development

An energy efficiency portfolio is defined as a series of energy efficiency measures that are bundled together and evaluated as a combined package. The benefit to evaluating on a portfolio basis instead of a measure by measure basis is that the average cost of the portfolio is compared against the avoided cost. More expensive measures can be included in a portfolio because they are offset by the lower cost measures. Therefore, a portfolio can realize more cost-effective savings than when comparing costs on a measure by measure basis.

Table 4-6 shows the results of EE portfolio development in five metrics: the levelized marginal cost, the levelized average cost, the levelized first year cost, the avoided cost, and the benefit-cost ratio. The levelized marginal cost represents the cost of the most expensive measure included in the portfolio. The levelized average cost represents the utility portion⁹ of the average cost per MWh (on a net present value basis) for all measures included in a portfolio from 2021 through 2033 (a 13-year lifecycle¹⁰). For comparison, the levelized first year cost is also shown in the table. The levelized first year cost is the utility portion of only the first year costs and savings levelized over a 13-year lifecycle. Over time, the average cost per MWh will rise as more expensive measures are installed, which results in the levelized average cost being greater than the levelized first year cost. Further discussion on installation of measures is found in Section 4.4.

The levelized average portfolio cost is compared to the avoided costs (described in section 4.3.1) to determine the resulting benefit-cost ratio for each portfolio. Portfolios were developed to ensure the benefit-cost ratio would have a value greater than 1,

⁹ The utility portion includes the utility program costs, i.e., the utility administrative costs and the utility incentive portion of the measure costs.

¹⁰ The 13-year lifecycle represents the average measure life of the EE measures considered in this study.

meaning for every dollar invested in EE measures, at least one dollar in benefits would be realized.

Table 4-6. Marginal and Average Cost of EE Portfolios

	Low	Medium	High
Levelized Marginal Cost (\$/MWh)	\$75.00	\$103.50	\$131.00
Levelized Average Cost (\$/MWh)	\$54.69	\$67.68	\$76.44
Levelized First Year Cost (\$/MWh)	\$31.50	\$36.60	\$44.95
Avoided Cost (\$/MWh)	\$59.38	\$67.47	\$76.62
Benefit-Cost Ratio	1.09	1.00	1.00

4.3.4 Total Resource Cost Test

The benefits and costs of each measure are compared through a total resource cost ("TRC") test, which calculates a benefit-cost ratio (present value of discounted benefits / present value of discounted costs). The TRC test evaluates whether an alternative (i.e. a portfolio of energy efficient measures) is more cost effective than the baseline (i.e. baseline measures).

In this analysis, the cost curve was used to construct portfolios containing energy efficiency measures for each scenario. In cases where the total resource cost test is greater than 1 (i.e., discounted benefits exceed costs) the portfolio is determined to be economically viable. It is important to note that the TRC test is designed for evaluating cost effectiveness from a societal perspective (utility and participants), regardless of how costs or benefits are distributed.

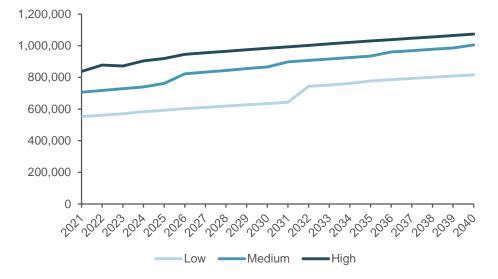
4.3.5 Economic Potential Results

The economic potential was calculated for each of the scenarios described in section 4.3.1. Scenarios with higher avoided costs will have larger economic potential, as seen in Figure 4-5. Several discontinuities can be seen over time in each scenario. These occur when the total resource cost (TRC) for a more expansive portfolio reaches or exceeds a value of 1 only after 2021. Portfolios can produce a different TRC value over time due to either a change in benefits or a change in costs in measures that are contained within a portfolio. In each year, the total resource cost test evaluates the benefits and costs over the portfolio life. For example, a portfolio evaluated in 2021 with a life of 10 years will capture all costs and benefits between 2021 and 2030. However, the same portfolio evaluated in 2030 will capture all costs and benefits between 2030 and 2039. Over time, the avoided carbon costs are projected to increase, resulting in larger benefits in future years. In addition, the cost of some energy efficiency measures are also projected to decrease over time. As technologies become more prevalent, the installation cost is expected to decrease. Price trends were generated from the EIA's Updated Buildings Sector Appliance and Equipment Costs and Efficiency Report¹¹ for applicable measures and these trends were applied to the estimated 2017 incremental costs to forecast future costs. As a result, increasing benefits and decreasing costs allow the TRC value for

¹¹ Energy Information Administration. "Updated Buildings Sector Appliance and Equipment Costs and Efficiency," June 2018. https://www.eia.gov/analysis/studies/buildings/equipcosts/.

portfolios to increase over time and incorporate additional energy efficiency measures later in the study period.





Similar to the technical potential, when a more expansive portfolio becomes economically viable, it is assumed that all existing customers immediately adopt the marginal, or highest cost, measure(s) and new customers will adopt the measure(s) once construction is completed. All customers will replace measures immediately following the end of a measure's useful life, to once again represent a theoretical level of potential that is economically viable. Table 4-7 displays the economic potential for the medium avoided cost case.

Economic Potential	2021	2025	2030	2035	2040
Heating	16,564	17,345	18,291	19,183	20,113
Cooling	114,141	122,979	133,803	143,867	153,525
Ventilation	15,850	15,268	14,677	14,189	13,799
Water Heating	0	0	0	0	0
Lighting	148,100	155,813	199,698	229,053	234,473
Cooking	23,358	25,183	27,423	29,498	31,461
Office Equipment & Computing	0	0	0	0	0
Refrigeration	78,698	83,998	90,497	96,514	102,198
Miscellaneous	315,003	346,867	387,212	422,947	456,739
Total Economic Potential	711,714	767,452	871,600	955,252	1,012,309
% of Base Load Forecast	22%	23%	26%	28%	28%
Base Load Forecast	3,246,452	3,276,068	3,329,157	3,424,440	3,587,996

Table 4-7. Economic Potential Energy Efficiency Savings by End Use, MWh,Medium Avoided Cost Scenario

The figure below displays the distribution of economic potential by end use. By 2040, the miscellaneous category contains almost half of the economic potential, and lighting accounts for one-fifth of all economic potential.

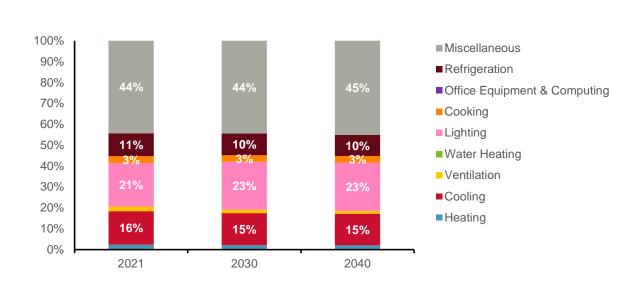


Figure 4-6. Economic Potential Energy Efficiency Savings by End Use, Medium Avoided Cost Scenario

4.4 Achievable Potential

The achievable potential is defined as a realistic implementation of energy efficiency measures, factoring in market barriers and other underlying factors. In this study, achievable potential is representative of new energy efficiency potential. The achievable potential estimates the existing enrollment in programs in any given year. First, the eligible customers are calculated by applying the saturation, remaining and applicability factors to the population forecast for each customer segment for measures that are economically viable.

Total cumulative customers are estimated as a function of eligible customers, ramp rates, and a measure's useful life. Two sets of ramp rates are used in this analysis: base ramp rates and renewal ramp rates. Base ramp rates are used to capture the rate at which eligible customers install energy efficient measures, while renewal ramp rates are used to capture the rate at which existing customers reinstall measures after the measure life expires.

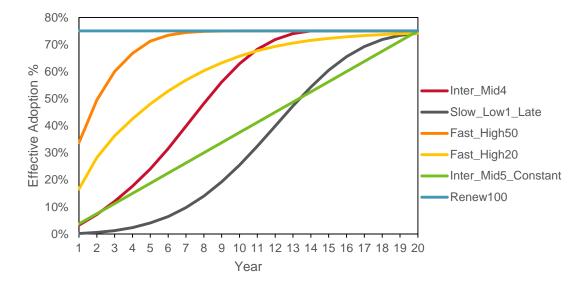
Ramp rate assumptions are based on evidence found in existing studies and shown in Figure 4-7.¹² These are applied to the eligible customers to estimate the number of new installations in a given year. The ramp rates are applied independently for each energy efficiency measure to reflect the varying degrees of penetration and maturity. The new

¹² Northwest Power and Conservation Council, "Seventh Power Plan," February 2016. https://www.nwcouncil.org/reports/seventh-power-plan

installations are estimated as difference between the current year and previous year. New participants no longer realize achievable potential savings after the end of the useful life of the measure. At this point, the renewal ramp rates are applied to allow participants to reinstall the measure and generate achievable potential savings. These ramp rates are generally more aggressive than the base ramp rates to reflect the assumption that customers are more likely to replace energy efficiency measures after burnout than initially installing a new energy efficiency measure. After savings expires from new participants, additional savings are not recognized until reinstallation occurs. In

some measures, such as lighting and thermostats, it is assumed that all customers immediately reinstall an efficiency measure after burnout.

Figure 4-7. Customer Adoption Ramp Rates Used for Achievable Potential



Based on the literature, programs are unable to capture full penetration for measures. Reasons such as budget constraints, customer awareness, and other less quantifiable factors prevent programs from achieving 100% implementation. Several studies estimate that maximum penetration energy efficiency programs can achieve is between 60% and 80%, contingent on the incentives offered. In this analysis, it is assumed the maximum cumulative achievable potential in any given energy efficiency measure is 75%, and the utility incentive offered is 75% of incremental program cost.

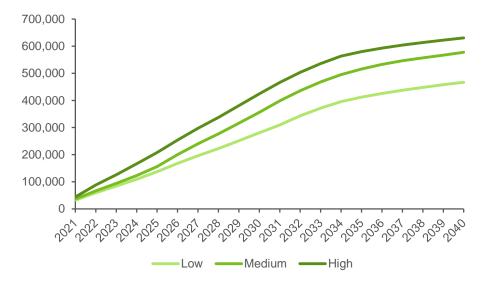
In any given year, the cumulative total of customers is equal to the number of new installations, existing installations, plus any renewal installations less any expiring customer installations. The cumulative achievable potential savings are then calculated by the multiplying the savings per customer by the cumulative number of customers in any given year.





The cumulative achievable potential results for energy efficiency are shown below for the three avoided cost scenarios. Cumulative achievable potential is the accumulation of energy efficiency measures activating in 2021; all following years include the energy efficiency from active EE measures. Achievable potential ranges between 466,685 MWh and 630,683 MWh by 2040.

Figure 4-9. Cumulative Achievable Potential for Energy Efficiency Measures, MWh



The achievable potential is broken out by end use in the table shown below. Lighting efficiency measures are expected to account for the majority of the immediate achievable potential given the ease of retrofitting, relatively low cost, quick payback and high consumer awareness. Over the study period, savings in other categories is expected to ramp up, though lighting still continues to represent a significant portion of all achievable potential. The results shown in Table 4-8 are based on the achievable potential from the medium avoided cost scenario.

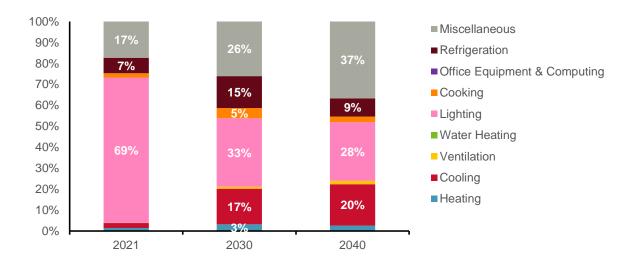
Table 4-8. Achievable Potential Energy Efficiency Savings by End Use, MWh,	į
Medium Avoided Cost Scenario	

Achievable Potential	2021	2025	2030	2035	2040
Heating	534	4,175	11,512	14,398	15,145
Cooling	873	12,508	60,566	100,659	114,240
Ventilation	28	565	3,371	7,638	8,992
Water Heating	0	0	0	0	0
Lighting	25,214	72,884	116,404	146,510	162,148
Cooking	753	6,062	17,260	19,080	15,297

Office Equipment & Computing	0	0	0	0	0
Refrigeration	2,687	20,543	54,266	63,884	50,192
Miscellaneous	6,296	39,146	92,927	163,482	211,641
Total Achievable Potential	36,385	155,883	356,306	515,652	577,656
% of Base Load Forecast	1.1%	4.8%	10.7%	15.1%	16.1%
Base Load Forecast	3,246,452	3,276,068	3,329,157	3,424,440	3,587,996

The figure below displays the achievable potential by end use. Lighting accounts for the majority of achievable potential in the first few years, though its share of potential decreases as measures associated with other end uses become more prevalent.





The incremental achievable potential, the new energy savings added in a given year from newly installed EE measures, is broken out by end use in the table shown below. An important trend to note about the incremental savings is that some of the end use savings is not a smooth trend during the analysis period. For example, the incremental savings for lighting end use category starts high in 2021, trends down by 2025, and then increases again in 2030. Part of the uneven savings is that as customers adopt lighting measures in a given year there are less remaining eligible customers for the following years (see the ramp rates in Figure 4-7). Another reason for the uneven savings is that by 2030 additional lighting measures become economically viable and, therefore, additional energy savings accumulates and the downward trend reverses for a time until the number of remaining eligible customers again decreases by 2040.

Table 4-9. Incremental Achievable Potential Energy Efficiency Savings by End	
Use, MWh, Medium Avoided Cost Scenario	

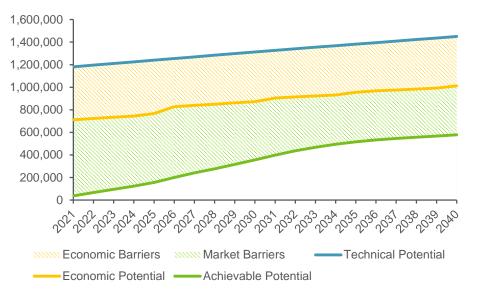
Achievable Potential	2021	2025	2030	2035	2040
Heating	534	1,147	1,884	1,502	1,915
Cooling	873	5,001	11,881	6,667	3,731
Ventilation	28	231	796	718	116
Water Heating	0	0	0	0	0
Lighting	25,214	9,604	21,552	27,907	22,078
Cooking	753	1,696	2,113	740	1,744
Office Equipment & Computing	0	0	0	0	0
Refrigeration	2,687	5,857	7,200	1,635	3,023
Miscellaneous	6,296	10,037	22,224	36,257	43,475
Total Incremental Achievable Potential	36,385	33,573	67,649	75,426	76,082
% of Base Load Forecast	1.1%	1.0%	2.0%	2.2%	2.1%
Base Load Forecast	3,246,452	3,276,068	3,329,157	3,424,440	3,587,996

Further examples of uneven achievable energy savings can be found within the results of this study due to modeling limitations. Because the measures in this study are either economically viable or not economically viable on an annual basis, the estimated savings from one year to the next can increase or decrease significantly. Another modeling limitation is that all installations from a specific measure were assumed to have equal measure life and, therefore, all energy savings from the first year would become retired savings all in the same year. Adoption ramp rate and life of a measure will vary in real life and, therefore, PRPA would likely observe smoother trends in achievable potential energy savings compared to the results of this study.

4.5 Energy Efficiency Potential Summary

Figure 4-11 illustrates the technical, economic, and achievable potential forecasted to 2040 for the medium avoided cost case. The total resource cost test eliminates any technical potential which is not economically viable, shown through the area labeled "Economic Barriers". Market barriers, such as marketing, awareness, and customer behavior prevent the economic potential from being realized. The achievable potential is a subset of the economic potential, capturing customers that are anticipated to implement energy efficiency measures.

Figure 4-11. Technical, Economic, and Achievable Potential for Energy Efficiency Measures, MWh, Medium Avoided Cost Scenario



We find that 40% of the technical potential is achievable by 2040 for the medium avoided cost scenario. Of the achievable EE potential, the most significant end use energy savings from 2021 through 2030 are the LED lighting measures as shown in Figure 4-12. Beyond 2030, energy assessment retrocommissioning and energy management system measures represent the majority of achievable potential. Starting in 2021 most of the measures in the lighting category are economical and are modeled with a fast adoption ramp rate. The second most significant amount of energy savings is in the miscellaneous category, which comprises mostly of installing residential ENERGY STAR® appliances and commercial & industrial retro-commissioning and energy management systems. Overall, the estimated EE energy savings is about 14% residential and 86% commercial & industrial.

Figure 4-12. Achievable Potential Breakdown by End-Use Category, MWh, Medium Avoided Cost Scenario

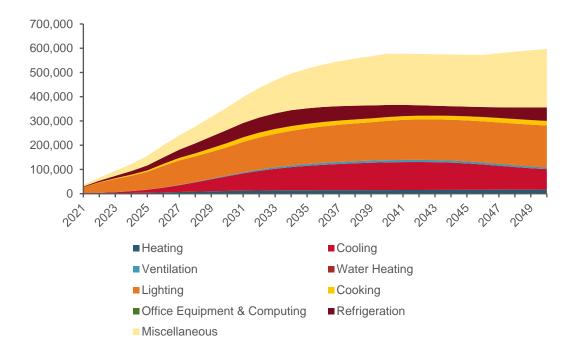


Table 4-10. Energy Efficiency Savings Summary, Medium Avoided Cost Scenario

	Technica	l Potential	Economic Potential			Acł	nievable Pote	ntial
Year	MWh	% of Load Forecast	MWh	% of Load Forecast	% of Technical Potential	MWh	% of Load Forecast	% of Technical Potential
2021	1,181,269	36.4%	711,714	21.9%	60.2%	36,385	1.1%	3.1%
2025	1,239,928	37.8%	767,452	23.4%	61.9%	155,883	4.8%	12.6%
2030	1,313,173	39.4%	871,600	26.2%	66.4%	356,306	10.7%	27.1%
2035	1,382,130	40.4%	955,252	27.9%	69.1%	515,652	15.1%	37.3%
2040	1,450,130	40.4%	1,012,309	28.2%	69.8%	577,656	16.1%	39.8%

The multi-year cumulative cost of the EE achievable potential including the installation cost, the utility incentive, and the utility program administration cost is shown in Table 4-11. To achieve the energy efficiency savings presented, \$139.8 million would be spent by PRPA through 2030, and an additional \$204.1 million will have to be spent between 2031 and 2040 for the medium avoided cost scenario. Costs fluctuate between five year increments due to the timing of when measures become economically viable, the adoption ramp rates used to estimate achievable potential, and the timing of opportunities for customers to renew measures after exceeding the useful life.

From 2021 through 2025 the average annual utility cost (utility incentive and utility administrative cost) for the first year of installed measures is expected to be about \$9.6 million to achieve an average 31,330 MWh incremental annual energy savings, or \$308/MWh (or a levelized first year cost of \$32.8/MWh based on 13 year measure life and 5% discount rate). In comparison to PRPA's current 2020 budget (described in section 3.3, PRPA is expecting to spend of \$14.1 million in 2020 on DER programs to save 34,000 MWh, or \$415/MWh (or a levelized cost of \$44.2/MWh based on 13 year measure life and 5% discount rate). While PRPA's budget plan is higher than the savings and costs observed in the modeled EE estimates, it is important to note that the EE results described in this report are based on a least cost portfolio and do not include EE savings that result in a portfolio that has a levelized average utility cost above the avoided cost. In other words, only least cost EE savings are accumulated to achieve a given portfolio savings. This contrasts with PRPA and its owner communities' existing EE programs which were designed with goals in addition to cost effectiveness, including customer service and equity among communities and customer classes. The resulting energy savings estimates from 2021 through 2025 present PRPA with a goal to strive towards for their DER programs.

Scenario						
Multi-Year Cumulative Costs (\$000s)	2021-2025	2026-2030	2031-2035	2036-2040		
Heating	\$4,447	\$7,907	\$7,684	\$8,529		
Cooling	\$8,329	\$31,043	\$29,110	\$15,671		
Ventilation	\$374	\$2,014	\$3,376	\$1,475		
Water Heating	\$0	\$0	\$0	\$0		
Lighting	\$24,262	\$28,058	\$38,119	\$37,392		
Cooking	\$1,056	\$1,950	\$959	\$989		
Office Equipment & Computing	\$0	\$0	\$0	\$0		
Refrigeration	\$11,705	\$21,441	\$9,348	\$5,337		
Miscellaneous	\$9,858	\$21,686	\$41,603	\$54,513		
Total 5-Year Costs (\$000s)	\$60,030	\$114,100	\$130,201	\$123,906		
Participant Cost	\$11,824	\$22,474	\$25,646	\$24,406		
Utility Incentives	\$35,472	\$67,423	\$76,937	\$73,217		
Utility Administrative Costs	\$12,734	\$24,203	\$27,618	\$26,283		
Utility Cost Total	\$48,206	\$91,626	\$104,555	\$99,501		

Table 4-11. Multi-year Cumulative Energy Efficiency Costs, Medium Avoided Cost
Scenario

*Average cost for the first year of installed measures.

\$308

\$337

Average Utility Cost, per MWh*

\$269

\$297

5 Demand Response Potential

This section covers demand response and battery energy storage and describes the methodology used to estimate technical, economic, and achievable potential for identified demand response measures. Research was performed to identify fifteen measures which were evaluated for residential, commercial, and industrial customers. For each measure, assumptions were developed for the energy offset, useful life and incremental cost. The deferral capability of demand response measures (measured in kilowatts) in combination with assumptions surrounding the duration of events and an event limit per year were used to estimate the kilowatt-hours deferred. The deferral capacity (in kW) is the amount of peak load capacity that is shifted or eliminated from peak hours to off-peak hours. The deferred energy (in kWh) is a measure of the amount of energy that is shifted or eliminated from peak hours to off-peak hours. Additional assumptions were made to determine if any of the measures eliminated energy consumption instead of just deferring it. For the majority of measures, it was assumed that the energy consumption would be deferred and not be eliminated.¹³ Supporting information was derived from the Residential Energy Consumption Survey (RECS), the Commercial Buildings Energy Consumption Survey (CBECS), PRPA pilot programs and other distributed energy resources reports.

5.1 Demand Response Assumptions

The various demand response measures as well as the respective assumptions for evaluation are listed below. Further details for the DR measures are included in Appendix B.

DR Measure Name	Customer Segment	Average Event Duration (hours)	Estimated Events per Year
	Residential		
HVAC Programmable Communicating Thermostat (PCTs)	All Residential	3	24
HVAC DLC	All Residential	3	24
Water Heater DLC	All Residential	3	48
Battery and Plug-in Hybrid Vehicles DLC - Charging Interruption during peak hours	All Residential	4	260
BESS (5kW) Automated Demand Response	Single Family	4	260
BESS (5 -10 kW) Automated Demand Response	Multi-Family	4	260

Table 5-1. Demand Response Measures

¹³ For example, direct load control on an air conditioner might defer peak load and energy usage until a later time because such customer intends to meet their cooling needs eventually. However, a commercial lighting dimming control defers and eliminates peak load and energy usage because such customer's illumination needs are still met during such control.

DR Measure Name	Customer Segment	Average Event Duration (hours)	Estimated Events per Year				
Cor	mmercial / Industrial						
HVAC Automated Demand Response	Commercial / Industrial	3	24				
HVAC DLC and PCTs	Commercial / Industrial	3	24				
50kW BESS Automated Demand Response	Commercial / Industrial	2	260				
150kW BESS Automated Demand Response	Commercial / Industrial	2	260				
Industrial Process - Automated Demand Response	Industrial	3	48				
Industrial Process - Manual Demand Response	Industrial	3	48				
Lighting - Luminaire, Zonal, and Standard Control Options	Commercial / Industrial	3	48				
Refrigerated Warehouse - Automated Demand Response	Industrial	3	48				
	Other						
Voltage Reduction	System	4	36				

In addition to the measures, general assumptions used in the demand response analysis are listed in Table 5-2.

Table 5-2. Gene	ral Assumptions
-----------------	-----------------

Variable	Unit	Value	Source
Discount Rate	%	5%	PRPA Assumption
Single Family Household Decomposition Rate	%	0.3%	EIA National Energy Modeling System, Residential Demand Module.
Multi-Family Household Decomposition Rate	%	0.5%	EIA National Energy Modeling System, Residential Demand Module.
Commercial Decomposition Rate	%	2.81%	Bureau of Labor Statistics, Business Employment Dynamics, 5 year average for establishment deaths in Colorado.

5.2 Battery Energy Storage

Battery Energy Storage Systems (BESS) offer customers the ability to minimize energy consumption from the electric utility during periods of peak electric rates and thereby offset the utility's load demand during such periods. Customers that install BESS can recharge the system during utility off-peak periods.

This study considered BESS for residential customers at 5kW capacity and multifamily residential at 10kW both with 4 hour storage capacity. Commercial & industrial customer BESS resources were sized at 50kW and 150kW both with 2 hour storage capacity.

Cost estimates for BESS used in this study were estimated based on data gathered from the 2025 California Demand Response Potential Study¹⁴ by the Lawrence Berkeley National Labs as well as vendor product information from Tesla.¹⁵ Energy and demand offset for each BESS and associated storage capacity was estimated assuming a certain number of events where PRPA discharges the BESS during that time period. A maximum of 260 events per year were assumed based on one event for each weekday (i.e. 5 days per week). Although the same TRC test approach was applied to BESS resources, retail customers may choose to install BESS resources outside of any utility funded programs. Such BESS resources installed outside of the PRPA programs are not included in the estimates in this study.

A 10 year useful life was assumed for BESS. During the useful life of the BESS systems, batteries are subject to a degradation in efficiency. It was assumed that the BESS round trip efficiency would degrade by 10% after the tenth year, a reduction from 90% to 80%. To maintain the same amount of discharge energy after degradation in efficiency, additional electricity is required to charge the battery.

Although BESS systems have been installed in the electricity market for both utility-scale and retail applications over the last 10 years, the specific charge/discharge practices and cost effectiveness depends on many factors including location, electricity rate structure and utility capability. Coupled with being a relatively new market entrant, there is uncertainty in the technical capability of BESS systems as a demand response resource. Given the above uncertainty, this study has considered a conservative estimate for BESS technical potential to be limited to a small fraction of new residential and commercial construction.

5.2.1 Electric Vehicles

Plugin Hybrid Electric Vehicles and Battery Electric Vehicles (together known as EV) were also considered for this study. Based on discussions with PRPA, the current 2019 estimate of EV is about 2,000 vehicles and this is projected to increase to between 20,000 and 40,000 vehicles by 2030. This trend is generally consistent with a study published by Xcel Energy¹⁶ for their service territory in Colorado. According to the Xcel Energy study, the average annual energy use per EV is about 2,663 kWh and the incremental monthly demand is estimated at 1.31 kW per EV (assuming level 2 charging station).

In general, EV owners are usually aware of any peak and off-peak time-of-use (TOU) electric rates and charge their vehicles accordingly. However, at this early stage in the EV market penetration there is uncertainty in how much TOU rates affect charging behavior. Additionally, there are very few charging stations at the workplaces, so most of the energy and demand associated with EV occurs during utility off-peak hours. As a

¹⁴ 2025 California Demand Response Potential Study – Charting California's Demand Response Future: Final Report on Phase 2 Results. LBNL-2001113. March 2017. <u>https://drrc.lbl.gov/publications/2025-california-demand-response</u>

¹⁵ <u>https://www.energysage.com/solar/solar-energy-storage/tesla-powerwall-home-battery/</u>

¹⁶ Xcel Energy. Electric Vehicle Charging Station – Pilot Evaluation Report. May 2015.

result, there may be limited opportunity to use demand response to curtail EV loads during peak periods. EVs were assumed to have a 10 year operating life and from a DR standpoint charging interruption events were assumed as a result of PRPA request. A maximum of 260 charge interruption events were assumed based on one event for each weekday (i.e. 5 days per week). Under the total resource cost test, the results showed that the EV measure was not an economically viable DR measure at this time. According to PRPA, they plan to further investigate the timing and other factors that impact EV charging in the near term to be better positioned to evaluate its cost effectiveness.

5.3 Technical Potential

The technical potential for demand response is defined identically to the definition provided in Section 4. Technical potential is a theoretical maximum possible energy able to be offset through demand response programs, ignoring any economic or market barriers. Estimating the technical potential required developing factors for each demand response measure. These factors were primarily derived from the RECS and CBECS surveys and PRPA pilot programs, where applicable. The five factors generated were:

- **Technology Factor** represents the percentage of the population that has the technology (e.g. percentage of households with a thermostat);
- Electrical Factor represents the percentage of the population that uses electricity for an end use, conditional on having that technology (e.g. percentage of households with a thermostat that are heated by electricity);
- Saturation Factor is the multiplication of the technology and electrical factor. It represents the percentage of the total population that is the target market for demand response measures;
- **Remaining Factor** represents the percentage of the population that has not yet adopted demand response measures (e.g. percentage of households that have not yet adopted a programmable communicating thermostat); and
- **Applicability Factor** represents the percentage of qualifying population able to adopt the measure. The applicability factor is assumed to be 100% for all measures except in instances where two measures cannot be simultaneously installed. For instance, households would not install both a programmable communicating thermostat and a direct load control HVAC system.

These factors are used to evaluate technical potential for each of new and existing customers to account for differences in building code between newly constructed units and older units part of the existing stock. However, unlike energy efficiency measures, it is not assumed that new customers have units built with demand response capable measures. In addition, the installed capacity is scaled to determine the avoided generation capacity due to limits on the duration of demand response events. For example, demand response measures totaling 1 MW of installed capacity with a three hour limit can only offer 500 kW of avoided generation capacity for six hours. The study assumes a six hour peak period and all installed capacity is scaled based on the ratio of event duration and peak period to determine the deferred generation capacity, as shown in the figure below. Figure 5-2 shows the calculation of deferred energy, based on the number of DR events called per year.

Figure 5-1. Deferred Generation Capacity for Demand Response Measures, MW

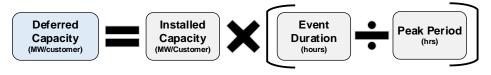


Figure 5-2: Deferred Energy for Demand Response Measures, MWh



Technical potential is calculated using the formula shown below. Unlike energy efficiency measures, demand response measures allow PRPA to shift electricity from peak hours to off-peak hours to avoid installing new generation units to augment capacity. The deferred energy from demand response measures is measured in both megawatts and megawatt-hours.

Figure 5-3. Technical Potential for Demand Response Measures, MW



Figure 5-4. Technical Potential for Demand Response Measures, MWh



The technical potential calculations assume that all existing stock immediately applies the measures and new stock will apply demand response measures once construction is completed. For all units, once a measure reaches the end of its useful life, it is assumed to be immediately replaced.

The cumulative demand response technical potential is shown below. Table 5-3 provides estimates of the theoretical maximum install capacity for demand response measures, while Table 5-4 measures the kilowatt-hours able to be deferred based on limitations to the frequency and duration of demand response events.

Batteries provide the greatest technical potential for demand response and represent about 90 percent of the total technical potential in deferred energy (MWh) and a third of potential when measured in MW of capacity deferred.

Table 5-3. Technical Potential for Demand Response Measures, Deferred MW

Technical Potential	2021	2025	2030	2035	2040
HVAC	49	53	58	62	67
Water Heating	4	4	5	6	7
Batteries	4	8	12	16	19
EVs	10	21	25	30	34
Industrial Processes	5	6	7	8	9
Lighting	16	20	24	28	32
Refrigeration	0	0	0	0	0
Voltage Reduction	3	3	3	3	3
Total Technical Potential	90	114	134	153	171
% of Peak Load	13%	17%	19%	22%	23%
Peak Load	673	679	691	710	744

Table 5-4. Technical Potential for Demand Response Measures, Deferred MWh

Technical Potential	2021	2025	2030	2035	2040
HVAC	3,533	3,813	4,152	4,475	4,820
Water Heating	508	624	765	901	1,048
Batteries	2,643	4,640	7,009	9,204	11,360
EVs	10,301	21,632	26,514	31,396	35,391
Industrial Processes	657	796	963	1,116	1,259
Lighting	2,291	2,828	3,463	4,040	4,571
Refrigeration	7	7	8	9	9
Voltage Reduction	424	427	434	447	468
Total Technical Potential	20,363	34,767	43,308	51,588	58,925
% of Base Load Forecast	0.6%	1.1%	1.3%	1.5%	1.6%
Base Load Forecast	3,246,452	3,276,068	3,329,157	3,424,440	3,587,996

5.4 Economic Potential

The economic potential for demand response is defined identically to the definition provided in Section 4.3. Benefits and costs are discounted and compared through a total resource cost (TRC) test. When the total resource benefit-cost ratio exceeds a value of one, this indicates a measure is economically viable as the discounted benefits outweigh the costs.

Three scenarios of avoided costs are estimated to represent low, medium and high scenarios. Each of these cases includes an avoided capacity cost and an avoided energy cost. The avoided energy cost, measured in \$/MWh, captures the variable costs associated with generating electricity including variable operations and maintenance

costs and fuel costs. The avoided capacity cost, measured in \$/kW-yr, captures the capital costs and fixed operations and maintenance costs.

- For the low case, the avoided cost is intended to reflect PRPA's resource mix with minimal changes. In this case, DR avoids capacity costs tied to the cost of constructing an aeroderivative (AERO) combustion turbine generation asset. An AERO power plant is assumed to provide the necessary electric capacity as the customer load grows. In this scenario, DR is assumed to avoid energy costs determined by forecasted energy market prices for the region.
- 2. The medium scenario is intended to reflect PRPA's resource mix assuming coal/fossil resources are retired by 2030 and replaced with a mix of renewable resources and battery storage. In this case, DR avoids capacity costs tied to the cost of constructing batteries. The storage is assumed to provide the necessary electric capacity as existing generators are retired and the customer load grows. In this scenario, DR is assumed to avoid energy costs based on solar and wind PPAs procured.
- 3. The high scenario is intended to reflect PRPA's resource mix assuming coal resources are retired by 2030 and replaced with a mix of renewable resources and battery storage. In this case, DR avoided capacity costs determined by lithium ion batteries. Avoided energy costs are based a mix of wind and solar PPAs. Appendix C contains more detail regarding the avoided cost assumptions.

Avoided Cost Scenario	Avoided Energy Cost (\$/kW-yr)	Avoided Capacity Cost (\$/MWh)
Low	\$37.77	\$113.60
Medium	\$40.00	\$144.35
High	\$40.00	\$192.47

Table 5-5. Avoided Cost Scenario Assumptions

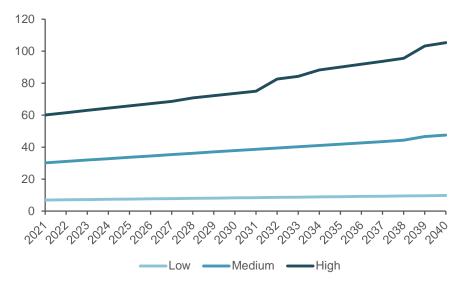
For these cases, the avoided costs are being split between avoided energy and avoided capacity costs. The avoided capacity cost, measured in dollars per kilowatt-year (\$/kW-yr), captures the fixed costs on the new generation unit. The avoided energy cost captures the variable costs including variable operations and maintenance costs and fuel costs for the new generation unit, measured in dollars per megawatt-hour (\$/MWh). Given that energy is assumed to be deferred to off-peak hours, it is assumed that there are no benefits generated from avoiding carbon costs. The avoided capacity costs are assumed to begin accruing immediately.

Cases with higher avoided costs will have larger economic potential, as seen in Figure 5-5. Several discontinuities can be seen in the medium and high scenarios, these occur when the total resource cost for a measure reaches or exceeds a value of 1 only after 2019. As discussed in section 4.3, the total resource cost can produce different values over time because some measures diminish in cost over time. As technologies become more prevalent, the installation cost is expected to decrease. The National

Renewable Energy Laboratory's Annual Technology Baseline¹⁷ was used to estimate price trends for batteries and solar panels.

Depending upon the avoided cost scenario, the economic potential for demand response varies between 10 and 105 MW by 2040, corresponding to between 1,236 and 18,954 MWh of deferred energy. There is a large variation between the low and high scenarios because of the large variation in avoided costs. HVAC accounts for 40-50% of the demand response technical potential. The benefits of other demand response measures are constrained by the frequency and duration of when the utility can call events.

Figure 5-5. Economic Potential for Demand Response Measures, MW



The cumulative economic potential is shown in the table below for the medium scenario. Similar to the technical potential, the economic potential is a theoretical estimate of the maximum deferred energy possible. This theoretical maximum assumes all customers will immediately adopt the measure once it become economically viable and that all customers will immediately replace measures at end of measure life. Limitations on the frequency and duration of events for demand response measures limit the economic feasibility of most measures. However, it is assumed that batteries would be operated each weekday during peak hours.

Table 5-6. Economic Potential for Demand Response Measures, Deferred MW	,
Medium Avoided Cost Scenario	

Economic Potential	2021	2025	2030	2035	2040
HVAC	19	21	23	25	27
Water Heating	4	4	5	6	7
Batteries	0	0	0	0	2
EVs	0	0	0	0	0

¹⁷ National Renewable Energy Laboratory. "Annual Technology Baseline 2018," July 2018. https://atb.nrel.gov/.

Industrial Processes	5	6	7	8	9
Lighting	0	0	0	0	0
Refrigeration	0	0	0	0	0
Voltage Reduction	3	3	3	3	3
Total Economic Potential	30	34	38	42	48
% of Peak Load	4%	5%	5%	6%	6%
Peak Load	673	679	691	710	744

Table 5-7. Economic Potential for Demand Response Measures, Deferred MWh,Medium Avoided Cost Scenario

Economic Potential	2021	2025	2030	2035	2040
HVAC	1,382	1,501	1,644	1,781	1,928
Water Heating	508	624	765	901	1,048
Batteries	0	0	0	0	1,077
EVs	0	0	0	0	0
Industrial Processes	657	796	963	1,116	1,259
Lighting	0	0	0	0	0
Refrigeration	0	0	0	0	0
Voltage Reduction	424	427	434	447	468
Total Economic Potential	2,970	3,348	3,807	4,246	5,778
% of Base Load Forecast	0.1%	0.1%	0.1%	0.1%	0.2%
Base Load Forecast	3,246,452	3,276,068	3,329,157	3,424,440	3,587,996

5.5 Achievable Potential

The achievable potential for demand response uses the same methodology provided in Section 4.4.

In any given year, the cumulative total customers is equal to the number of new installations plus any renewals, less any expiring customers, as shown in the figure below. The total cumulative customers is multiplied by the deferred energy to estimate the achievable potential.

Figure 5-6. Achievable Potential Calculation for Demand Response Measures



The achievable potential results are shown before for the three avoided cost scenarios.

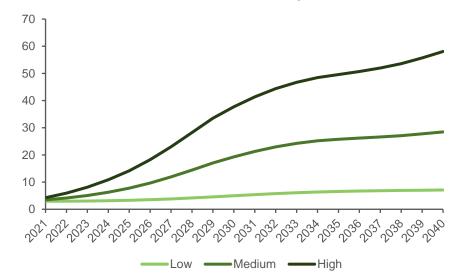


Figure 5-7. Achievable Potential for Demand Response Measures, MW

The achievable potential is shown by category below for the medium scenario. Given most measures are not economically viable, the achievable potential is limited.

Table 5-8. Achievable Potential for Demand Response Measures, MW, Medium	1
Avoided Cost Scenario	

Achievable Potential	2021	2025	2030	2035	2040
HVAC	0.5	4.1	12	15	15
Water Heating	0	0.3	2.0	3.6	4.2
Batteries	0	0	0	0	0.4
EVs	0	0	0	0	0
Industrial Processes	0	0.4	2.5	4.5	5.3
Lighting	0	0	0	0	0
Refrigeration	0	0	0	0	0
Voltage Reduction	2.9	3.0	3.0	3.1	3.3
Total Achievable Potential	3.5	7.8	19	26	28
% of Peak Load	1%	1%	3%	4%	4%
Peak Load	673	679	691	710	744

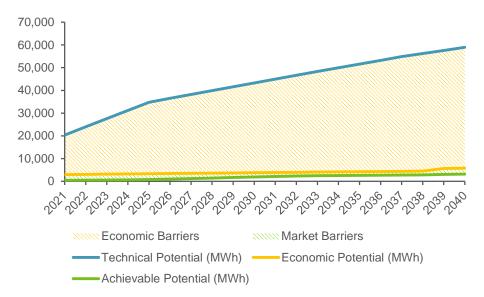
Table 5-9. Achievable Potential for Demand Response Measures, MWh, MediumAvoided Cost Scenario

Achievable Potential	2021	2025	2030	2035	2040
HVAC	36	294	851	1,047	1,103
Water Heating	2	44	283	514	602
Batteries	0	0	0	0	263
EVs	0	0	0	0	0
Industrial Processes	2	57	356	653	769
Lighting	0	0	0	0	0
Refrigeration	0	0	0	0	0
Voltage Reduction	424	427	434	447	468
Total Achievable Potential	463	823	1,925	2,661	3,206
% of Base Load Forecast	0.0%	0.0%	0.1%	0.1%	0.1%
Base Load Forecast	3,246,452	3,276,068	3,329,157	3,424,440	3,587,996

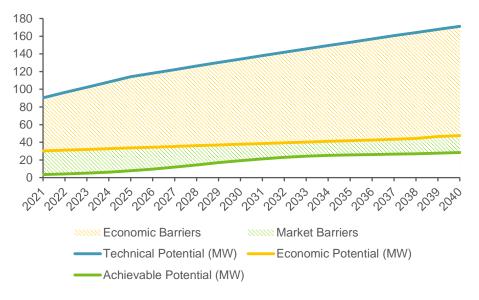
5.6 Demand Response Potential Summary

Figure 5-8 and Figure 5-9 illustrate the technical, economic, and achievable potential of deferred energy and peak load for demand response measures forecasted to 2040 for the medium avoided cost scenario. The total resource cost test eliminated any technical potential which was found to not be economically viable, shown through the area labeled "Economic Barriers." Market barriers, such as marketing, awareness, and customer behavior prevent the economic potential from being realized. Instead, the achievable potential is a subset of the economic potential, capturing customers that are anticipated to install demand response measures.

Figure 5-8. Technical, Economic, and Achievable Potential for Demand Response Measures, Deferred MWh, Medium Avoided Cost Scenario







Unlike energy efficiency measures which reduce the base load, demand response measures are designed to flatten peak energy consumption by deferring energy consumption to before or after peak hours.

	Technica	I Potential	Ec	onomic Poter	ntial	Achievable Potential		ntial
Year	Deferred MWh	% of Load Forecast	Deferred MWh	% of Load Forecast	% of Technical Potential	Deferred MWh	% of Load Forecast	% of Technical Potential
2021	20,363	0.6%	2,970	0.09%	14.6%	463	0.01%	2.3%
2025	34,767	1.1%	3,348	0.10%	9.6%	823	0.03%	2.4%
2030	43,308	1.3%	3,807	0.11%	8.8%	1,925	0.06%	4.4%
2035	51,588	1.5%	4,246	0.12%	8.2%	2,661	0.08%	5.2%
2040	58,925	1.6%	5,778	0.16%	9.8%	3,206	0.09%	5.4%
Year	Deferred MW	% of Summer Peak Load	Deferred MW	% of Summer Peak Load	% of Technical Potential	Deferred MW	% of Summer Peak Load	% of Technical Potential
2021	90	13.4%	30	4.5%	33.4%	3	0.6%	3.8%
2025	114	16.8%	34	5.0%	29.5%	8	1.2%	6.8%
2030	134	19.4%	38	5.5%	28.2%	19	3.0%	14.4%
2035	153	21.6%	42	5.9%	27.3%	26	3.9%	16.8%
2040	171	23.0%	48	6.4%	27.8%	28	4.1%	16.6%

Table 5-10. Demand Response Summary, Medium Avoided Cost Scenario

Distribut

The technical potential to defer electricity consumption to off-peak hours is relatively small compared to the overall load for the measures examined. Limitations on the frequency and duration of demand response limit the current economic viability of measures. Future technological changes could result in greater economic potential for demand response measures as costs may decrease and automated or connected technologies may improve.

The multi-year cumulative cost of the demand response achievable potential including the installation cost, the utility incentive, and the utility program administration cost is shown in Table 5-11.In order to achieve this potential, PRPA would have to spend \$11.8 million by 2030, and an additional \$18.5 million between 2031 and 2040.

Table 5-11. Multi-Year Cumulative Demand Response Costs, Medium Avoided
Cost Scenario

Multi-Year Cumulative Costs (\$000s)	2021-2025	2026-2030	2031-2035	2036-2040
HVAC	\$3,839	\$7,717	\$7,053	\$8,252
Water Heating	\$289	\$1,567	\$1,983	\$2,353
Batteries	\$0	\$0	\$0	\$336
EVs	\$0	\$0	\$0	\$0
Industrial Processes	\$194	\$1,056	\$1,417	\$1,705
Lighting	\$0	\$0	\$0	\$0
Refrigeration	\$0	\$0	\$0	\$0
Voltage Reduction	\$2,280	\$0	\$0	\$0
Total 5-Year Costs (\$000s)	\$6,602	\$10,339	\$10,452	\$12,645
Participant Costs	\$790	\$2,036	\$2,059	\$2,491
Utility Incentives	\$4,649	\$6,109	\$6,176	\$7,472
Utility Administrative Costs	\$1,164	\$2,193	\$2,217	\$2,682
Utility Cost Total	\$3,471	\$8,302	\$8,394	\$10,155

6 Distributed Solar Photovoltaic

Technical potential for a technology is the maximum amount of energy use that could be generated by that technology if all limiting constraints such as interconnection or use ability, cost competitiveness were ignored in the evaluation process. In the evaluation of distributed roof mounted solar photovoltaic (PV) systems for technical potential, HDR estimated maximum production based upon this assumption.

Satellite and geospatial data was referenced to determine the approximate area of rooftop space in the residential, commercial and industrial categories for distributed roof mounted solar. Digital zoning data was obtained for Fort Collins, Loveland, and Longmont in public databases and evaluated against building outlines obtained from Microsoft¹⁸. Roof areas were determined by joining and evaluating the two databases together. Roof area in Estes Park, which did not have zoning information readily available, was estimated based on an average breakdown of the other three cities. Parking structures and parking lots were not considered to be useable area. Solar PV on parking lots was deemed to be impractical because it would require costly site-specific mounting structures to be installed and would limit the potential for repurposing into commercial businesses or other type of development. Solar PV on parking garages would also require costly site-specific mounting structures to be installed and were therefore excluded from the potentially available space.

In all cases, it was assumed that approximately 80% of potentially available space could be utilized for solar system installations as useable rooftop area. Also, residential solar installations are impacted heavily by roof orientation, tree shading, and shading from other obstructions, so the technically feasible area was estimated to be 20% of the useable rooftop area. This 20% feasibility factor brings the average residential installation to be about 5.5 kW and is similar to the current average residential solar installation within the four cities. For customers that are technically able to install roof mounted solar, the commercial & industrial installations are assumed to be fixed-tilt panels that require row spacing thereby reducing the technically feasible solar area to be 75% of the usable rooftop area.

Furthermore, the technical applicability factor of installing solar panels (i.e. the percentage of customers whose rooftop is capable of such an installation due to roof orientation and type) is assumed to be 75% of single-family homes, 10% of multi-family homes, and 80% of commercial & industrial customers. Therefore, the technically feasible solar panel area is calculated as follows:

Solar Panel Array Area = Total Roof Area (sq. m) x Usable Roof Factor (%) x Feasibility Factor (%) x Customer Applicability Factor (%)

Example: Solar Panel Array Area = Total Roof Area (sq. m) x 80% x 20% x 75%

The following estimation of nameplate capacity available was determined via NREL PV Watts guidance for the following:

¹⁸ <u>https://github.com/Microsoft/USBuildingFootprints/</u>. Licensed by Microsoft under Open Data Commons Open Database License.

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Size = Array Area (sq. m) x 1 KW/Sq. m x 15% Efficiency**19

Data from PRPA and municipal customers was also reviewed for existing system installations to determine the level of solar penetration by customer type. Other than in locations where there was a municipally owned solar facility – such as the Foothills Solar Project – and commercial solar projects encouraged by the Fort Collins Solar Power Purchase Program -- the majority of solar installed to date is with residential customers. As of the end of 2017, installed solar capacity across all four cities is 13,785 kW (AC basis) including 5,481 MWac residential solar, 5,251 kWac commercial solar, and the 3,000 kWac Foothills Solar Project.

Estimated solar technical potential and existing installed solar capacity is provided in the following tables. The average solar capacity factor (a measure of the annual energy delivered at the meter, divided by the rated AC capacity) is 18.8% for northern Colorado.

Table 6-1. Technically Feasible Solar Potential and Existing Solar Power*

		Р	otential Solar P	Existing Solar PV		
Customer Type	Useable Rooftop Area (square meters)	Technically Feasible Rooftop Area (square meters)	Technical Potential Capacity (kWac)	Technical Potential Annual Production (MWh)	Existing Installed Capacity thru 2017 (kWac)	Existing Annual Production 2017 (MWh)
Residential	30,358,000	3,356,500	447,025	737,118	5,481	9,039
Commercial	6,601,300	3,960,800	525,643	866,755	5,250	8,658
Industrial	1,793,800	1,076,300	142,033	234,205	0	0
Other					3,053	5,035
Totals	38,753,100	8,393,600	1,114,701	1,838,078	13,784	22,732

*The technically feasible annual potential including existing installed capacity as of the end of 2017.

The average roof mounted solar project size per PRPA customer based on the above technically feasible potential is 5.4 kWac (6.3 kWdc) for residential, 34.5 kWac (40.6 kWdc) for commercial, and 640 kWac (757 kWdc) for industrial.

Solar PV cost benchmarks for all-in capital costs of various sizes and types of solar facilities is periodically assessed by NREL in publicly available reports. However, PRPA provided actual all-in capital costs for distributed solar PV systems that Fort Collins customers built from 2013 through 2018. This local customer cost data shows a decreasing cost trend since 2013, which is consistent with the larger solar industry. The following costs shown in Table 6-2 are based on the 2018 costs for installed systems by size and type in the PRPA service area. Furthermore, the analysis accounts for a reduction in solar capital costs based on NREL's Annual Technology Baseline²⁰ projection: an annual decrease by 4.3% to 5% until 2030 (depending on size) and an

¹⁹ Efficiency from standard panel efficiency per NREL PV Watts Technical Manual

²⁰ 2018 ATB Cost and Performance Summary. https://atb.nrel.gov/electricity/2018/summary.html

annual decrease of 0.8% to 1.3% (depending on size) from 2030 through 2050. Further details for the distributed solar measures are included in Appendix B.

Table 6-2. Solar Technology	Capital and O&M Costs
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Cost Type	Customer Type	Size (kW)	Туре	Cost Benchmark*
All-in Capital	Residential	3-10 kW	Roof Mount	\$3,250/kWdc (\$3,824/kWac)
All-in Capital	Commercial	10 -100 kW	Roof Mount	\$2,600/kWdc (\$3,060/kWac)
All-in Capital	Commercial & Industrial	500-1,000 kW	Roof Mount	\$2,000/kWdc (\$2,350/kWac)
Operation & Maintenance	All Types	All Sizes	Roof Mount	\$20/kW-yr

*The starting cost benchmark for this study is the 2018 installed cost and is decreased for future years by projected solar PV cost reductions from NREL's Annual Technology Baseline averaging 4.3% to 5% per year.

6.1 Technical Potential

Based on the average roof mounted solar project size, the technical potential is estimated through the study period. The technical potential for solar rooftop across the study period (2021-2040) is shown in Table 6-3. Given the above assumptions on Technically Feasible Rooftop Area, there is sufficient rooftop area to install approximately 1,161 MWac capacity in 2021 and supply up to 59% of the Base Load Forecast energy usage. The capability of the distribution system to interconnect the estimated amount of technical potential was not evaluated in this study.

Technical Potential	2021	2025	2030	2035	2040
Installed Capacity (MW)	1,161	1,247	1,354	1,454	1,554
Residential	465	498	538	577	618
Commercial	547	589	642	690	736
Industrial	148	159	173	187	199
Annual Production (MWh)	1,912,050	2,056,269	2,232,174	2,397,140	2,561,901
Residential	767,066	821,787	887,928	951,137	1,019,670
Commercial	901,414	971,873	1,058,287	1,138,398	1,214,156
Industrial	243,570	262,609	285,958	307,605	328,075
% of Base Load Forecast	59%	63%	67%	70%	71%

Table 6-3. Technical Potential Distributed Solar through 2040 by Customer Segment

6.2 Economic Potential

The economic potential is a subset of technical potential which reflects the distributed energy that is economically viable. This is defined as measures that generate benefits which exceed the costs.

In this analysis, three ranges of avoided costs are estimated to represent a low, medium and high case.

The low scenario is an avoided cost value that compares the distributed solar measure to constructing a natural gas aeroderivative combustion turbine (AERO). Under the low scenario, it is assumed that the AERO power plant provides the necessary electric capacity as existing generators are retired and the customer load grows. The avoided cost is determined as a blended energy and capacity cost that accounts for capital and fixed O&M of the comparison AERO plant, and the 20-year average market energy price. For the determination of avoided capacity cost and avoided fixed O&M, PRPA provided its estimate that avoided capacity equals 30% of solar nameplate AC capacity. This is based on the estimated reliable capacity of solar late in the day when PRPA's peak loads typically occur.

The medium and high scenario is intended to reflect PRPA's resource mix assuming the retirement of coal resources by 2030 and replacement with renewable generation, including utility-scale wind and solar. As a result, the distributed solar measure is compared to the cost of constructing a utility-scale solar PV resource. The avoided cost of utility-scale solar is determined as a blended energy and capacity cost that accounts for capital, fixed O&M, transmission losses, and distribution losses. In addition, it was assumed that the utility-scale solar will be located close to interconnection points along PRPA's existing transmission system, not requiring any added cost for transmission wheeling. The resulting avoided cost of \$34.46/MWh is still lower than cost of distributed solar causing an unfavorable TRC test result and no economically viable distributed solar for the medium or high scenario.

Scenario	Avoided Cost (\$/MWh)	Notes
Low	\$61.94	Avoided capacity from a 83MW AERO power plant and market energy prices, blended cost on energy basis
Medium	\$34.46	Avoided generation and capacity from utility-scale solar PV
High	\$34.46	Same assumptions as the medium avoided cost scenario.

Table 6-4. Avoided Cost Scenario Assumptions for Distributed Solar

Using the above costs for roof mounted solar and the TRC test (as described in section 5.4), the economic potential distributed solar capacity was evaluated for the three avoided cost scenarios. For all avoided cost scenarios, the TRC test shows no economically viable roof mounted distributed solar PV capacity across customer segments.



It is important to note that the distributed solar analysis has limitations. Distributed solar is analyzed for an average customer in the residential and commercial & industrial sector and is unable to account for economies of scale for systems larger or smaller than the defined average. In addition, the TRC test evaluates the benefits from a full societal perspective including the utility and participant. Participants may find distributed solar systems cost effective by avoiding retail electricity rates, though that is not captured in a TRC test. Since no economic potential was found during the study period, there is no achievable potential during the study period.

7 Combined Heat and Power

Cogeneration or Combined Heat and Power (CHP) facilities generate both electricity and thermal energy from a single source of energy. In a CHP facility, waste heat generated from the prime mover (e.g. engines / turbines) is used to generate steam and hot water for heating applications, or using an absorption chiller generate chilled water for cooling applications. CHP systems are typically installed in industrial, commercial facilities that have energy intensive operations and associated high annual costs. Other customers that benefit from CHP are healthcare and educational facilitates that operate in a large campus settings. In addition to energy cost optimization, CHP offers a level of supply redundancy to the grid. If CHP facilities are equipped with the necessary electrical systems, these facilities offer the ability to operate in an "islanded" mode when the utility grid is unavailable such as during adverse weather conditions.

CHP installations are economically feasible under certain operating and financial conditions. One of the key requirements is the high annual operating hours (close to base load) and high utilization of generated thermal energy from the CHP plant. Additionally, the ideal time to run comparative economic scenarios (against business as usual case) for competitiveness is when existing aging infrastructure (boilers or chillers etc.) is ready for replacement and there is an imminent need for upgrade and new capital expenses are earmarked. While CHP may provide long term economic benefits, project owners are faced with relatively higher capital costs (relative to boilers and chillers) and may not have the capability to finance.

While CHP offers the potential to optimize energy costs, combustion technologies that use natural gas or other fossil fuel results in greenhouse gas emissions (albeit significantly lower than electric-only power plants) which may not align with stakeholder interests. CHP plants operate in parallel with owner's needs and the local electric utility requirements. Such projects will require the owner to complete an electrical interconnection application and adhere to the requirements of the local utility as it relates to metering and safety. Also, securing an air emission permit for a CHP plant is more complex in comparison to a typical boiler installation. These activities require careful planning and in addition to higher initial costs, typically extend the project schedule by several months compared to a typical boiler installation.

PRPA's board recently passed a resource diversification policy²¹, which established a goal of a 100% non-carbon energy mix by 2030. Furthermore, three of PRPA's four owner communities have also adopted goals to achieve a 100% renewable mix by 2030. CHP facilities fueled by natural gas would not align with these policies and goals. Use of biomass may reduce or eliminate net greenhouse gas emissions. However, as described in PRPA's 2020 Generation Technology Review, available biomass sources are limited and costly. Due to these concerns, and due to the challenges of acquiring relevant data from PRPA's customers, this study finds no potential for CHP at this time. It is

²¹ <u>https://www.prpa.org/news/platte-river-board-passes-energy-policy/</u> - Platte River board passes energy policy, Dec 2018

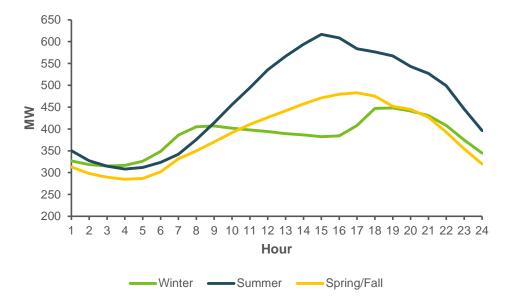


recommended that PRPA continue to monitor changes in biomass and CHP that could increase availability of biomass or reduce its costs.

8 Determination of Potential

This section expands on the achievable potential results presented in sections 4.4 and 5.4 to the impact on PRPA's Base Case hourly loads. Results were modeled to show the impacts against three representative days for each five year interval during the study period 2021-2040. The representative days include one summer day, one winter day and one spring or fall day. The forecasted PRPA load profiles on these days are used to determine peak hours and DER contribution to the load curtailment. The Base Case hourly load curves for the representative days in 2030 are shown in the figure below.

Figure 8-1. Representative Hourly Load Curves for 2030 Base Case Forecast



8.1 Energy Efficiency Potential

The following section describes the hourly modeling for the energy efficiency measures. Each energy efficiency measure is assumed to save energy per year, as shown in Appendix A. Further assumptions were made about the number of hours per year a measure is actively saving energy based on three representative days to determine the average savings per hour for each measure. The three representative days are composed of one summer day, one winter day, and one spring or fall day.

Each of these days assumed to be representative of activity for a certain number of months. The winter day was assumed to be representative of 3 months (i.e., December, January, and February); the summer day was assumed to be representative of 3 months (i.e., June, July, and August); the spring or fall day was assumed to be representative of 6 months (i.e., March, April, May, September, October, November). For each of these days, considerations were made on which hours of the day these measures would be active. For example, it was assumed that residential exterior LED lights would be active during evening and overnight hours, but these lights would not be active during the daytime hours.

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Considerations were also made to determine whether any measures would experience seasonality. For example, exterior lighting is assumed to be active irrespective of the season. However, air conditioning upgrades are assumed to only be active in the summer. Combined, these assumptions determine the average number of hours an energy efficiency measure is active in a given year.

The annual savings per hour in conjunction with the hourly schedules for measures and the achievable potential ramp rates provides the basis for estimating the impact to the base load. Results are generated to characterize the potential curtailment from energy efficiency measures at five year intervals. As provided in the table below, savings can on average reduce the base load by as much as 39.2 MW by 2030, increasing to 61.2 MW by 2040.

 Table 8-1. Energy Efficiency Hourly MW Impact, Winter Extract, Medium Avoided

 Cost Scenario

Hour	2021 Base Load	2021 EE Curtailment	2030 Base Load	2030 EE Curtailment	2040 Base Load	2040 EE Curtailment
1	326.9	3.4	335.2	25.2	361.3	39.5
2	318.4	3.4	326.5	25.2	351.9	39.5
3	315.3	3.4	323.3	25.2	348.4	39.5
4	316.6	3.4	324.6	25.2	349.9	39.5
5	326.0	3.4	334.3	25.2	360.3	39.5
6	348.9	3.9	357.8	37.2	385.6	54.0
7	386.2	3.6	396.1	36.0	426.8	52.7
8	405.2	5.0	415.5	43.4	447.8	68.4
9	406.7	5.0	417.1	43.4	449.5	68.4
10	401.9	4.6	412.1	34.4	444.2	56.6
11	397.7	4.6	407.8	34.4	439.5	56.6
12	393.9	4.6	403.9	34.4	435.3	56.6
13	389.5	4.6	399.4	34.4	430.4	56.6
14	386.5	4.6	396.3	34.4	427.1	56.6
15	382.2	4.6	391.9	34.4	422.4	56.6
16	384.2	5.0	394.0	43.4	424.7	68.4
17	408.1	7.1	418.5	50.3	451.1	75.6
18	447.0	7.1	458.4	50.3	494.1	75.6
19	448.1	3.9	459.5	37.2	495.2	54.0
20	441.3	3.9	452.6	37.2	487.8	54.0
21	430.8	3.9	441.7	37.2	476.1	54.0
22	408.1	3.7	418.5	34.2	451.0	51.3

Hour	2021 Base Load	2021 EE Curtailment	2030 Base Load	2030 EE Curtailment	2040 Base Load	2040 EE Curtailment
23	374.6	3.7	384.2	34.2	414.0	51.3
24	344.7	3.4	353.5	25.2	381.0	39.5

Detailed hourly load impacts are further included in Appendix D.

8.2 Distributed Energy Potential

The following section describes the hourly modeling for the demand response measures and distributed solar.

8.2.1 Demand Response Potential

Each measure is assumed to defer energy per event, as shown in Appendix B. Unlike the energy efficiency measures, demand response measures are assumed to only be active during peak periods. Analysis of the base load was performed to identify both peak hours and a requisite peak duration to prevent a new, higher peak deferred to a later time. Most demand response measures only defer energy, and as such, the majority of the energy that was avoided during an event is consumed at a later time. For the purposes of this analysis it was assumed that the deferred energy is consumed immediately after a demand response event ends for a customer. Similar to the energy efficiency analysis, three representative days were used for the analysis, composed of one summer day, one winter day, and one spring or fall day.

Each of these days assumed to be representative of activity for a certain number of months. The winter day was assumed to be representative of 3 months (i.e., December, January, and February); the summer day was assumed to be representative of 3 months (i.e., June, July, and August); the spring or fall day was assumed to be representative of 6 months (i.e., March, April, May, September, October, November). For the three representative days used to create the hourly analysis, a peak period was defined to ensure that the new peak after factoring in deferred energy did not exceed the original peak demand under the base load. Each of these days were modeled as if a demand response event was called for all achievable demand response measures in a given year. While all events do not need to be called simultaneously and limits will exist on the frequency of events, this analysis examines the maximum deferral available to PRPA under the forecast.

The demand response analysis was performed independent of the energy efficiency results. The peak periods are shown in the tables below.

	Winter	Spring/Fall	Summer
Number of Hours	6	6	6
Beginning of Peak Period	5 pm	3 pm	2 pm
End of Peak Period	10 pm	8 pm	7 pm

Table 8-2.Demand Response Peak Periods

The demand response measures are functional irrespective of the season, however, the season does impact the peak hours, altering the time of day when measures are likely to be deployed. The table below provides the peak load with and without demand response measures. The peak load with demand response assumes events are called for all measures, and the deferred energy replacement is added to the base load after the peak period ends.

Table 8-3. Demand Response Results, Medium Avoided Cost Scenario

	2021	2025	2030	2035	2040
Peak Load without Demand Response (MW)	617	622	632	651	682
Total Deferral Available (MW)	3.4	7.7	19.2	25.5	28.1
% of Peak Load Available to Defer	0.6%	1.2%	3.0%	3.9%	4.1%
Deferred Energy Replacement (MW)	0.5	4.8	16.3	22.6	25.2
Peak Load with Demand Response (MW)	613	615	613	625	653

As provided in the table below, savings can on average reduce the base load by as much as 19.2 MW by 2030, increasing to 28.1 MW by 2040.

Table 8-4. Demand Response Hourly MW Impact, Summer Extract, Medium Avoided Cost Scenario

Hour	2021 Base Load	2021 DR Curtailment	2030 Base Load	2030 DR Curtailment	2040 Base Load	2040 DR Curtailment
1	350.3	0.0	359.2	0.0	387.1	0.0
2	327.3	0.0	335.6	0.0	361.7	0.0
3	314.6	0.0	322.6	0.0	347.7	0.0
4	308.1	0.0	316.0	0.0	340.5	0.0
5	312.0	0.0	319.9	0.0	344.8	0.0
6	323.5	0.0	331.7	0.0	357.5	0.0
7	342.0	0.0	350.7	0.0	378.0	0.0
8	375.8	0.0	385.3	0.0	415.3	0.0
9	414.2	0.0	424.7	0.0	457.7	0.0
10	455.7	0.0	467.3	0.0	503.6	0.0
11	494.4	0.0	507.0	0.0	546.4	0.0
12	535.6	0.0	549.2	0.0	591.9	0.0
13	566.6	0.0	581.0	0.0	626.2	0.0
14	593.9	3.4	609.0	19.2	656.4	28.1
15	616.7	3.4	632.4	19.2	681.6	28.1

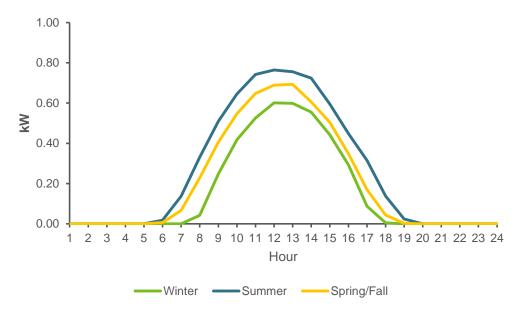
Hour	2021 Base Load	2021 DR Curtailment	2030 Base Load	2030 DR Curtailment	2040 Base Load	2040 DR Curtailment
16	608.5	3.4	624.0	19.2	672.5	28.1
17	583.7	3.4	598.5	19.2	645.1	28.1
18	576.6	3.4	591.3	19.2	637.3	28.1
19	567.3	3.4	581.8	19.2	627.0	28.1
20	543.1	-0.5	556.9	-16.3	600.2	-25.2
21	527.1	-0.5	540.5	-16.3	582.5	-25.2
22	499.0	-0.5	511.7	-16.3	551.5	-25.2
23	445.5	0.0	456.9	0.0	492.4	-0.4
24	396.3	0.0	406.4	0.0	438.0	0.0

Detailed hourly load impacts are further included in Appendix D.

8.2.2 Distributed Solar Potential

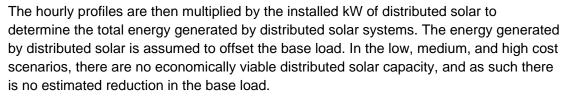
Distributed solar impacts were converted into hourly estimates based on the National Renewable Energy Laboratory's Solar Advisor Model (SAM)²² hourly simulation of a sample 1 kW rooftop fixed-tilt system in Fort Collins. The hourly annual profile developed by the Solar Advisor Model was converted into average hourly estimates for a representative winter, summer, and spring or fall day. The sample system annual output is shown in the figure below.

Figure 8-2. Solar PV Representative Hourly Profile per Installed kW



²² NREL System Advisor Model. Version 2017.9.5 rev4. <u>https://sam.nrel.gov/</u>

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Detailed hourly load impacts are further included in Appendix D.

9 Summary

The key results and findings from the DER study are displayed and discussed below. The section highlights the technical, economic, and achievable potential for energy efficiency, demand response, and distributed solar. Detailed results are further included in Appendix D.

9.1 Energy Efficiency

The Energy Efficiency summary of the technical, economic and achievable potential for the medium avoided cost scenario is summarized below.

		-	-	-				
	Technica	Potential	Economic Potential			Achievable Potential		
Year	MWh	% of Load Forecast	MWh	% of Load Forecast	% of Technical Potential	MWh	% of Load Forecast	% of Technical Potential
2021	1,181,269	36.4%	711,714	21.9%	60.2%	36,385	1.1%	3.1%
2025	1,239,928	37.8%	767,452	23.4%	61.9%	155,883	4.8%	12.6%
2030	1,313,173	39.4%	871,600	26.2%	66.4%	356,306	10.7%	27.1%
2035	1,382,130	40.4%	955,252	27.9%	69.1%	515,652	15.1%	37.3%
2040	1,450,130	40.4%	1,012,309	28.2%	69.8%	577,656	16.1%	39.8%

Table 9-1. Energy Efficiency Savings Summary, Medium Avoided Cost Scenario

The main findings for EE measures:

- Under the medium avoided cost scenario, about 40% of the base case customer consumption is technically achievable through EE measures. However, not all of this potential is economic. PRPA may be able to achieve a 11% reduction in the base load 2030 and 16% of the base case customer consumption by 2040;
- The largest potential end-use savings category is the LED interior and exterior lighting, about one-third of the projected achievable potential in 2030. Most of the measures in the lighting category are economical and are modeled with a fast adoption and renewal ramp rates;
- Overall, the estimated EE energy savings is about 20% residential and 80% commercial & industrial in 2030;
- By 2030, it is projected that energy efficiency measures can reduce the hourly base load by up to 69.3 MW. The expected peak reduction is 50 MW on an average winter day, 43 MW on an average spring or fall day, and 69 MW on an average summer;
- To achieve the energy efficiency savings presented, approximately \$139.8 million would be spent by PRPA through 2030 for the medium avoided cost scenario;
- From 2021 through 2025 the average annual utility cost (utility incentive and utility administrative cost) for the first year of installed measures is expected to be about \$9.6 million to achieve an average 31,330 MWh incremental annual energy savings,

or \$308/MWh (or a levelized first year cost of \$32.8/MWh based on 13 year measure life and 5% discount rate). PRPA is expecting to spend of \$14.1 million in 2020 on DER programs to save 34,000 MWh, or \$415/MWh (or a levelized cost of \$44.2/MWh based on 13 year measure life and 5% discount rate); and

 While PRPA's budget plan is higher than the savings and costs observed in the modeled EE estimates, it is important to note that the EE results described in this report are based on a least cost portfolio and do not include EE savings that result in a portfolio that has a levelized average utility cost above the avoided cost. The resulting energy savings estimates from 2021 through 2025 present PRPA with an opportunity to evaluate the effectiveness of their existing DER programs and a goal to strive towards.

9.2 Demand Response

A demand response measure summary of the technical, economic and achievable potential for the medium avoided cost scenario is provided below.

			-					
	Technica	l Potential	Ec	onomic Poter	ntial	Ac	hievable Poter	ntial
Year	MWh	% of Load Forecast	MWh	% of Load Forecast	% of Technical Potential	MWh	% of Load Forecast	% of Technical Potential
2021	20,363	0.6%	2,970	0.09%	14.6%	463	0.01%	2.3%
2025	34,767	1.1%	3,348	0.10%	9.6%	823	0.03%	2.4%
2030	43,308	1.3%	3,807	0.11%	8.8%	1,925	0.06%	4.4%
2035	51,588	1.5%	4,246	0.12%	8.2%	2,661	0.08%	5.2%
2040	58,925	1.6%	5,778	0.2%	9.8%	3,206	0.09%	5.4%
Year	MW	% of Summer Peak Load	MW	% of Summer Peak Load	% of Technical Potential	MW	% of Summer Peak Load	% of Technical Potential
2021	90	13.4%	30	4.5%	33.4%	3	0.6%	3.8%
2025	114	16.8%	34	5.0%	29.5%	8	1.2%	6.8%
2030	134	19.4%	38	5.5%	28.2%	19	3.0%	14.4%
2035	153	21.6%	42	5.9%	27.3%	26	3.9%	16.8%
2040	171	23.0%	48	6.4%	27.8%	28	4.1%	16.6%

Table 9-2. Demand Response Summary, Medium Avoided Cost Scenario

The main findings for the demand response measures:

 Under the medium avoided cost scenario, about 58,925 MWh of the base case customer consumption and about 171 MW is technically achievable through DR measures. PRPA may be able to defer as much as 19 MW of demand during peak periods by 2030 and 28 MW by 2040;

- The largest potential end-use savings category is the HVAC programmable communicating and direct load control thermostats, about 60% of the projected achievable potential by 2030. Most of the measures in the HVAC category are economical at the beginning of the study period and are modeled with a fast renewal ramp rate;
- By 2030, batteries have not yet become economically viable under the total resource cost test. However, anticipated cost reductions result in batteries becoming economic before 2040;
- Overall, the estimated DR load deferral capability is about 65% residential and 35% commercial & industrial; and
- In 2030, there is an anticipated maximum load deferral of 19.2 MW during peak periods through demand response. Nearly 3% of the peak load can be deferred through the measures.

9.3 Distributed Solar

A distributed solar measure summary of the technical, economic and achievable potential for the medium avoided cost scenario is provided below.

	Technica	I Potential	Eco	nomic Pote	ntial	Achievable Potential			
Year	MWh	% of Load Forecast	MWh	% of Load Forecast	% of Technical Potential	MWh	% of Load Forecast	% of Technical Potential	
2021	1,912,050	59%	0	0%	0%	0	0%	0%	
2025	2,056,269	63%	0	0%	0%	0	0%	0%	
2030	2,232,174	67%	0	0%	0%	0	0%	0%	
2035	2,397,140	70%	0	0%	0%	0	0%	0%	
2040	2,561,901	71%	0	0%	0%	0	0%	0%	

Table 9-3. Distributed Solar Summary, Medium Avoided Cost Scenario

The main findings for distributed solar PV measures:

- Distributed solar is not economically viable under the total resource cost test. There is significant technical potential and customers that find distributed solar economic can install systems which would reduce the base load;
- Although distribution system constraints were not evaluated for this study, the technical potential for distributed solar is comprised of nearly 40% residential and 60% commercial & industrial; and
- Installation of distributed solar would reduce the base load primarily during midday, peaking between 10 am and 2 pm, with the load reduction tapering off by 5 pm.

9.4 Concluding Remarks

By 2030, it is expected that PRPA's DER plan includes a mix of new energy efficiency and demand response measures. Under the medium avoided cost scenario, the evaluated energy efficiency measures could reduce PRPA's hourly load by about 50 MW, and reduce the annual base load customer consumption by nearly 10%. Evaluated demand response measures are anticipated to provide the capability to defer 20 MW of electricity during the peak load. For PRPA to achieve the DER savings assessed in this study, \$168 million in costs would be incurred to account for utility incentives, installation costs, and program administration costs.

ed	ium Avoided Cost Scenari	0				
		2021	2025	2030	2035	2040
	Base Load	3,246,452	3,276,068	3,329,157	3,424,440	3,587,996
	Energy Efficiency	36,385	155,883	356,306	515,652	577,656
	% of Base Load	1.1%	4.8%	10.7%	15.1%	16.1%
	Demand Response Deferral	463	823	1,925	2,661	3,206
	% of Base Load	0.0%	0.0%	0.1%	0.1%	0.1%
	Distributed Solar	0	0	0	0	0
	% of Base Load	0.0%	0.0%	0.0%	0.0%	0.0%

Table 9-4. Energy Savings Results Compared to Base Load Forecast, MWh, Medium Avoided Cost Scenario

Table 9-5. Load Reduction Results Compared to Peak Hourly Load Forecast, MW, Medium Avoided Cost Scenario

	2021	2025	2030	2035	2040
Peak Hourly Load	673	679	691	710	744
Maximum Hourly Energy Efficiency Savings	7.1	26.2	69.3	105	119
% of Peak Load	1.1%	3.9%	10.0%	14.8%	16.0%
Maximum Hourly Demand Response Deferral	3.4	7.7	19.2	25.5	28.1
% of Peak Load	0.6%	1.2%	3.0%	3.9%	4.1%
Maximum Hourly Distributed Solar Savings	0	0	0	0	0
% of Peak Load	0.0%	0.0%	0.0%	0.0%	0.0%

10 References

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Appendix A. Energy Efficiency Measure Assumptions

The table below presents a list of key assumptions pertaining to the energy efficiency measures examined in the study. Administrative costs were assumed to be an additional 30% increase on top of the average program cost.

Table A-1. Energy Efficiency Measure Assumptions

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
			Reside	ntial					
			Heati	ing					
Smart Thermostat installation - Electric Heating	Single Family	Thermostat - WiFi/Interactive	985	10	\$175	PacifiCorp 2017 Demand Side Management (DSM) Report	\$47	\$222	6570
Smart Thermostat installation - Electric Heating	Multi- Family	Thermostat - WiFi/Interactive	68	10	\$175	PacifiCorp 2017 DSM Report	\$47	\$222	6570
Smart Thermostat installation - Gas Heating	Single Family	Smart WiFi Thermostat	67	10	\$175	ComEd 2016 EE Potential	\$47	\$222	6570
Smart Thermostat installation - Gas Heating	Multi- Family	Smart WiFi Thermostat	44	10	\$175	ComEd 2016 EE Potential	\$47	\$222	6570
Programmable Thermostat installation - Heating	Single Family	Thermostat that can be programmed by the user to change temperature settings according to a schedule	93	10	\$160	PSE 2017 DSM Report	\$43	\$203	6570
Programmable Thermostat installation - Heating	Multi- Family	Thermostat that can be programmed by the user to change temperature settings according to a schedule	357	10	\$160	PSE 2017 DSM Report	\$43	\$203	6570

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Weatherization: Air Sealing	Single Family	Seal air leaks to reduce air changes per hour (ACH) from 0.6 to 0.36	136	10	\$2,398	PSE 2017 DSM Report	\$646	\$3,044	8760
Weatherization: Air Sealing	Multi- Family	Seal air leaks to reduce air changes per hour (ACH) from 0.6 to 0.36	271	10	\$2,398	PSE 2017 DSM Report	\$646	\$3,044	8760
Weatherization: Insulation	Single Family	Adding attic and ceiling insulation	347	25	\$1,540	PSE 2017 DSM Report	\$415	\$1,955	8760
High Efficiency Windows	Single Family	Windows with a U-value of 0.22	180	20	\$1,998	PSE 2017 DSM Report	\$538	\$2,536	8760
High Efficiency Windows	Multi- Family	Windows with a U-value of 0.22	364	20	\$999	PSE 2017 DSM Report	\$269	\$1,268	8760
Installation of ENERGY STAR® storm windows/doors	Single Family	Doors - Storm and Thermal	120	20	\$683	PacifiCorp 2017 DSM Report	\$184	\$866	8760
Installation of ENERGY STAR® storm windows/doors	Multi- Family	Doors - Storm and Thermal	19	20	\$683	PacifiCorp 2017 DSM Report	\$184	\$866	8760
Install Heat Recovery Ventilation	Single Family	Space Heating - Heat Recovery Ventilator - NEW HOMES ONLY	612	20	\$1,304	PSE 2017 DSM Report / 7th Power Plan	\$351	\$1,655	6570
Install Heat Recovery Ventilation	Multi- Family	Space Heating - Heat Recovery Ventilator - NEW HOMES ONLY	107	20	\$1,304	PSE 2017 DSM Report / 7th Power Plan	\$351	\$1,655	6570
			Cooli	ng					
Central Air Conditioner upgrade	Single Family	Replacing existing AC with an 18 SEER AC	288	13	\$606	PSE 2017 DSM Report / ComEd 2016 EE Potential	\$163	\$769	2190

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Central Air Conditioner upgrade	Multi- Family	Replacing existing AC with an 18 SEER AC	252	13	\$529	PSE 2017 DSM Report / ComEd 2016 EE Potential	\$142	\$672	2190
Smart Thermostat installation - Cooling	Single Family	Thermostat - WiFi/Interactive	215	10	\$175	PacifiCorp 2017 DSM Report / PRPA experience	\$47	\$222	2190
Smart Thermostat installation - Cooling	Multi- Family	Thermostat - WiFi/Interactive	215	10	\$175	PacifiCorp 2017 DSM Report / PRPA experience	\$47	\$222	2190
High efficiency air handler/rooftop units	Multi- Family	Air Handler/Rooftop Cooling Unit with 17 SEER and 12 EER	185	20	\$959	Xcel TRM 2017	\$258	\$1,218	2190
			Ventila	tion					
ECM Furnace Blower Motor	Single Family	Use Electronically Commutated Motor (ECM) fan motor instead of PSC or Shaded Pole Motor in furnace	582	13	\$742	PSE 2017 DSM Report	\$200	\$942	8760
ECM Furnace Blower Motor	Multi- Family	Use Electronically Commutated Motor (ECM) fan motor instead of PSC or Shaded Pole Motor in furnace	582	13	\$742	PSE 2017 DSM Report	\$200	\$942	8760
			Water He	eating					
Heat-Pump Electric storage water heater	Single Family	Purchase heat pump electric storage water heater	1,108	13	\$1,728	PSE 2017 DSM Report / PRPA experience	\$465	\$2,194	8760



EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Heat-Pump Electric storage water heater	Multi- Family	Purchase heat pump electric storage water heater	1,100	13	\$1,715	PSE 2017 DSM Report / PRPA experience	\$462	\$2,177	8760
			Lighti	ng					
LED Upgrade (interior)	Single Family	Install LED bulb instead of incandescent bulb	695	5	\$493	7th Power Plan - Residential Lighting / PRPA Experience	\$133	\$626	4380
LED Upgrade (interior)	Multi- Family	Install LED bulb instead of incandescent bulb	240	5	\$170	7th Power Plan - Residential Lighting / PRPA Experience	\$46	\$216	4380
LED Upgrade (exterior)	Single Family	Exterior - General Service Screw-In	210	10	\$55	PacifiCorp 2017 DSM Report	\$15	\$70	4288.7 5
			Refriger	ation					
ENERGY STAR® freezer	Single Family	High Efficiency Freezer	34	20	\$82	PSE 2017 DSM Report	\$22	\$104	8760
ENERGY STAR® freezer	Multi- Family	High Efficiency Freezer	32	20	\$77	PSE 2017 DSM Report	\$21	\$98	8760
ENERGY STAR® refrigerator	Single Family	High Efficiency Refrigerator	53	17	\$214	PSE 2017 DSM Report	\$58	\$272	8760
ENERGY STAR® refrigerator	Multi- Family	High Efficiency Refrigerator	39	17	\$157	PSE 2017 DSM Report	\$42	\$199	8760
Refrigerator Recycling	Single Family	Recycle post-1990 refrigerator instead keeping as 2nd refrigerator	463	5.75	\$120	ComEd 2016 EE Potential / PRPA experience	\$32	\$152	8760



EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Refrigerator Recycling	Multi- Family	Recycle post-1990 refrigerator instead keeping as 2nd refrigerator	463	5.75	\$120	ComEd 2016 EE Potential / PRPA experience	\$32	\$152	8760
			Miscellar	neous					
ENERGY STAR® pool pumps	Single Family	Pool Pump	703	15	\$873	PacifiCorp 2017 DSM Report	\$235	\$1,108	2190
ENERGY STAR® dishwasher	Single Family	Dishwasher that meets ENERGY STAR specification	80	15.4	\$37	PSE 2017 DSM Report	\$10	\$47	4380
ENERGY STAR® dishwasher	Multi- Family	Dishwasher that meets ENERGY STAR specification	80	15.4	\$37	PSE 2017 DSM Report	\$10	\$47	4380
ENERGY STAR® clothes washers	Single Family	Clothes washer that meets ENERGY STAR specification	85	14.2	\$142	PSE 2017 DSM Report / PRPA experience	\$38	\$180	4380
ENERGY STAR® clothes washers	Multi- Family	Clothes washer that meets ENERGY STAR specification	85	14.2	\$142	PSE 2017 DSM Report / PRPA experience	\$38	\$180	4380
ENERGY STAR® clothes dryer	Single Family	Electric clothes dryer that meets ENERGY STAR specification	329	12	\$335	PSE 2017 DSM Report	\$90	\$425	4380
ENERGY STAR® clothes dryer	Multi- Family	Electric clothes dryer that meets ENERGY STAR specification	329	12	\$335	PSE 2017 DSM Report	\$90	\$425	4380
ENERGY STAR® electronics	all residential	Advanced power strip that turns off equipment plugged into it when not in use	140	5	\$128	PSE 2017 DSM Report	\$34	\$162	8760



EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Faucet Aerators	all residential	Aerators on bathroom faucets that reduce flow to 0.5 gallons per minute	157	10	\$44	PSE 2017 DSM Report	\$12	\$56	4380
Low Flow Showerheads	all residential	Low-Flow Showerheads, Electric WH - Showerhead that restricts flow to 1.5 gallons per minute	1,021	10	\$60	PSE 2017 DSM Report	\$16	\$76	4380
			Comme	rcial					
			Heati	ing					
Smart Thermostat installation - Heating	Other	Thermostat - WiFi/Interactive	3,182	10	\$3,443	PacifiCorp 2017 DSM Report	\$927	\$4,369	6570
Smart Thermostat installation - Heating	Education	Thermostat - WiFi/Interactive	75,212	10	\$74,089	PacifiCorp 2017 DSM Report	\$19,947	\$94,036	6570
Smart Thermostat installation - Heating	Food Sales	Thermostat - WiFi/Interactive	4,560	10	\$4,180	PacifiCorp 2017 DSM Report	\$1,125	\$5,306	6570
Smart Thermostat installation - Heating	Food Service	Thermostat - WiFi/Interactive	2,379	10	\$2,211	PacifiCorp 2017 DSM Report	\$595	\$2,807	6570
Smart Thermostat installation - Heating	Healthcare	Thermostat - WiFi/Interactive	6,994	10	\$3,206	PacifiCorp 2017 DSM Report	\$863	\$4,069	6570
Smart Thermostat installation - Heating	Lodging	Thermostat - WiFi/Interactive	4,778	10	\$9,556	PacifiCorp 2017 DSM Report	\$2,573	\$12,129	6570
Smart Thermostat installation - Heating	Mixed	Thermostat - WiFi/Interactive	1,009	10	\$1,092	PacifiCorp 2017 DSM Report	\$294	\$1,386	6570
Smart Thermostat installation - Heating	Office	Thermostat - WiFi/Interactive	3,656	10	\$5,134	PacifiCorp 2017 DSM Report	\$1,382	\$6,516	6570
Smart Thermostat installation - Heating	Parking	Thermostat - WiFi/Interactive	42,888	10	\$46,403	PacifiCorp 2017 DSM Report	\$12,493	\$58,896	6570

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Smart Thermostat installation - Heating	Public Assembly	Thermostat - WiFi/Interactive	6,214	10	\$6,724	PacifiCorp 2017 DSM Report	\$1,810	\$8,534	6570
Smart Thermostat installation - Heating	Public Service	Thermostat - WiFi/Interactive	50,669	10	\$54,823	PacifiCorp 2017 DSM Report	\$14,760	\$69,583	6570
Smart Thermostat installation - Heating	Religious	Thermostat - WiFi/Interactive	9,740	10	\$10,539	PacifiCorp 2017 DSM Report	\$2,837	\$13,376	6570
Smart Thermostat installation - Heating	Retail	Thermostat - WiFi/Interactive	3,881	10	\$4,493	PacifiCorp 2017 DSM Report	\$1,210	\$5,703	6570
Smart Thermostat installation - Heating	Services	Thermostat - WiFi/Interactive	2,952	10	\$3,194	PacifiCorp 2017 DSM Report	\$860	\$4,054	6570
Smart Thermostat installation - Heating	Storage	Thermostat - WiFi/Interactive	11,155	10	\$10,370	PacifiCorp 2017 DSM Report	\$2,792	\$13,162	6570
Smart Thermostat installation - Heating	Utility	Thermostat - WiFi/Interactive	1,663	10	\$1,800	PacifiCorp 2017 DSM Report	\$485	\$2,284	6570
			Cooli	ng					
Air-cooled Chiller upgrade	Other Category	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	850	20	\$4,387	PSE 2017 DSM Report	\$1,181	\$5,568	2190
Air-cooled Chiller upgrade	Education Category	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	9,286	20	\$74,384	PSE 2017 DSM Report	\$20,026	\$94,410	2190
Air-cooled Chiller upgrade	Food Sales Category	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	600	20	\$3,856	PSE 2017 DSM Report	\$1,038	\$4,894	2190
Air-cooled Chiller upgrade	Food Service Category	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	758	20	\$4,869	Assume same as Food Service Category	\$1,311	\$6,180	2190

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Air-cooled Chiller upgrade	Healthcare Category	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	748	20	\$3,040	PSE 2017 DSM Report	\$818	\$3,858	2190
Air-cooled Chiller upgrade	Lodging Category	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	734	20	\$5,186	PSE 2017 DSM Report	\$1,396	\$6,583	2190
Air-cooled Chiller upgrade	Mixed	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	362	20	\$1,869	PSE 2017 DSM Report	\$503	\$2,373	2190
Air-cooled Chiller upgrade	Office Category	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	1,007	20	\$6,019	PSE 2017 DSM Report	\$1,620	\$7,639	2190
Air-cooled Chiller upgrade	Parking	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	11,459	20	\$59,129	Assume same as Other Category	\$15,919	\$75,048	2190
Air-cooled Chiller upgrade	Public Assembly Category	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	1,414	20	\$7,298	PSE 2017 DSM Report	\$1,965	\$9,263	2190
Air-cooled Chiller upgrade	Public Service Category	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	6,653	20	\$34,331	PSE 2017 DSM Report	\$9,243	\$43,575	2190
Air-cooled Chiller upgrade	Religious	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	2,046	20	\$10,559	PSE 2017 DSM Report	\$2,843	\$13,402	2190
Air-cooled Chiller upgrade	Services Category	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	326	20	\$1,680	Assume same as Other Category	\$452	\$2,133	2190
Air-cooled Chiller upgrade	Storage	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	324	20	\$3,896	PSE 2017 DSM Report	\$1,049	\$4,945	2190

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Air-cooled Chiller upgrade	Utility	Air-cooled chiller with an efficiency of 11.5 EER and 15.5 SEER	444	20	\$2,293	Assume same as Other Category	\$617	\$2,911	2190
Water-cooled Chiller upgrade	Healthcare Category	Centrifugal chiller with an efficiency of 0.60 Full Load Value (FLV) and 0.54 Integrated Part Load Value (IPLV)	370	20	\$3,026	PSE 2017 DSM Report	\$815	\$3,841	2190
Water-cooled Chiller upgrade	Industrial	Centrifugal chiller with an efficiency of 0.60 Full Load Value (FLV) and 0.54 Integrated Part Load Value (IPLV)	3,295	20	\$34,236	PSE 2017 DSM Report	\$9,217	\$43,454	2190
Water-cooled Chiller upgrade	Office Category	Centrifugal chiller with an efficiency of 0.60 Full Load Value (FLV) and 0.54 Integrated Part Load Value (IPLV)	498	20	\$5,992	PSE 2017 DSM Report	\$1,613	\$7,605	2190
Evaporative pre-cooling installation on air-cooled condenser	Retail Category	Evaporative pre-cooling of air-cooled condensers on direct expansion HVAC units	8,356	20	\$22,483	PSE 2017 DSM Report	\$6,053	\$28,536	2190
Evaporative pre-cooling installation on air-cooled condenser	Education Category	Evaporative pre-cooling of air-cooled condensers on direct expansion HVAC units	20,787	20	\$88,038	PSE 2017 DSM Report	\$23,703	\$111,74 1	2190
Evaporative pre-cooling installation on air-cooled condenser	Healthcare Category	Evaporative pre-cooling of air-cooled condensers on direct expansion HVAC units	1,674	20	\$3,598	PSE 2017 DSM Report	\$969	\$4,566	2190

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Evaporative pre-cooling installation on air-cooled condenser	Industrial	Evaporative pre-cooling of air-cooled condensers on direct expansion HVAC units	14,928	20	\$40,704	PSE 2017 DSM Report	\$10,959	\$51,663	2190
Evaporative pre-cooling installation on air-cooled condenser	Office Category	Evaporative pre-cooling of air-cooled condensers on direct expansion HVAC units	2,254	20	\$7,124	PSE 2017 DSM Report	\$1,918	\$9,041	2190
Evaporative pre-cooling installation on air-cooled condenser	Utility	Evaporative pre-cooling of air-cooled condensers on direct expansion HVAC units	995	20	\$2,714	PSE 2017 DSM Report	\$731	\$3,445	2190
High efficiency air handler/rooftop units	Other Category	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	2,160	20	\$3,484	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$938	\$4,422	2190
High efficiency air handler/rooftop units	Education Category	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	24,717	20	\$59,072	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$15,904	\$74,976	2190
High efficiency air handler/rooftop units	Food Sales Category	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	1,265	20	\$3,062	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$824	\$3,887	2190

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
High efficiency air handler/rooftop units	Food Service Category	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	2,398	20	\$3,867	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$1,041	\$4,908	2190
High efficiency air handler/rooftop units	Healthcare Category	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	1,913	20	\$2,414	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$650	\$3,064	2190
High efficiency air handler/rooftop units	Industrial	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	24,844	20	\$27,312	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$7,353	\$34,665	2190
High efficiency air handler/rooftop units	Lodging Category	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	2,238	20	\$4,119	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$1,109	\$5,228	2190
High efficiency air handler/rooftop units	Mixed	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	921	20	\$1,485	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$400	\$1,884	2190

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
High efficiency air handler/rooftop units	Office Category	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	4,348	20	\$4,780	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$1,287	\$6,067	2190
High efficiency air handler/rooftop units	Parking	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	29,119	20	\$46,957	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$12,642	\$59,600	2190
High efficiency air handler/rooftop units	Public Assembly Category	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	3,594	20	\$5,796	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$1,560	\$7,356	2190
High efficiency air handler/rooftop units	Public Service Category	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	24,802	20	\$27,264	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$7,340	\$34,605	2190
High efficiency air handler/rooftop units	Religious	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	3,509	20	\$8,386	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$2,258	\$10,643	2190

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
High efficiency air handler/rooftop units	Retail Category	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	1,526	20	\$3,693	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$994	\$4,687	2190
High efficiency air handler/rooftop units	Services Category	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	828	20	\$1,334	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$359	\$1,694	2190
High efficiency air handler/rooftop units	Storage	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	2,815	20	\$3,094	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$833	\$3,927	2190
High efficiency air handler/rooftop units	Utility	Air Handler/Rooftop Cooling Unit with 14 SEER and 11.4 EER	1,657	20	\$1,821	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$490	\$2,312	2190
Advanced RTU Controller (ARC) retrofit	Education Category	Packaged rooftop units with advanced controller upgrade	266,717	20	\$132,649	PNNL-22656	\$35,713	\$168,36 2	2190
Advanced RTU Controller (ARC) retrofit	Food Sales Category	Packaged rooftop units with advanced controller upgrade	13,827	20	\$13,434	PNNL-22656	\$3,617	\$17,050	2190

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Advanced RTU Controller (ARC) retrofit	Food Service Category	Packaged rooftop units with advanced controller upgrade	17,458	20	\$8,683	PNNL-22656	\$2,338	\$11,020	2190
Advanced RTU Controller (ARC) retrofit	Healthcare Category	Packaged rooftop units with advanced controller upgrade	10,899	20	\$10,589	PNNL-22656	\$2,851	\$13,440	2190
Advanced RTU Controller (ARC) retrofit	Lodging Category	Packaged rooftop units with advanced controller upgrade	18,596	20	\$9,249	PNNL-22656	\$2,490	\$11,739	2190
Advanced RTU Controller (ARC) retrofit	Mixed	Packaged rooftop units with advanced controller upgrade	6,703	20	\$6,512	PNNL-22656	\$1,753	\$8,266	2190
Advanced RTU Controller (ARC) retrofit	Office Category	Packaged rooftop units with advanced controller upgrade	21,581	20	\$10,733	PNNL-22656	\$2,890	\$13,623	2190
Advanced RTU Controller (ARC) retrofit	Public Service Category	Packaged rooftop units with advanced controller upgrade	123,102	20	\$61,223	PNNL-22656	\$16,483	\$77,707	2190
Advanced RTU Controller (ARC) retrofit	Religious	Packaged rooftop units with advanced controller upgrade	37,863	20	\$18,831	PNNL-22656	\$5,070	\$23,900	2190
Advanced RTU Controller (ARC) retrofit	Retail Category	Packaged rooftop units with advanced controller upgrade	16,672	20	\$8,292	PNNL-22656	\$2,232	\$10,524	2190
Advanced RTU Controller (ARC) retrofit	Services Category	Packaged rooftop units with advanced controller upgrade	6,025	20	\$5,854	PNNL-22656	\$1,576	\$7,429	2190
Smart Thermostat installation - Cooling	Other Category	Thermostat - WiFi/Interactive	2,556	5	\$3,443	PacifiCorp 2017 DSM Report	\$927	\$4,369	2190
Smart Thermostat installation - Cooling	Education Category	Thermostat - WiFi/Interactive	37,045	5	\$74,089	PacifiCorp 2017 DSM Report	\$19,947	\$94,036	2190

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Smart Thermostat installation - Cooling	Food Sales Category	Thermostat - WiFi/Interactive	7,410	5	\$4,180	PacifiCorp 2017 DSM Report	\$1,125	\$5,306	2190
Smart Thermostat installation - Cooling	Food Service Category	Thermostat - WiFi/Interactive	3,619	5	\$2,211	PacifiCorp 2017 DSM Report	\$595	\$2,807	2190
Smart Thermostat installation - Cooling	Healthcare Category	Thermostat - WiFi/Interactive	4,031	5	\$3,206	PacifiCorp 2017 DSM Report	\$863	\$4,069	2190
Smart Thermostat installation - Cooling	Lodging Category	Thermostat - WiFi/Interactive	6,660	5	\$9,556	PacifiCorp 2017 DSM Report	\$2,573	\$12,129	2190
Smart Thermostat installation - Cooling	Mixed	Thermostat - WiFi/Interactive	811	5	\$1,092	PacifiCorp 2017 DSM Report	\$294	\$1,386	2190
Smart Thermostat installation - Cooling	Office Category	Thermostat - WiFi/Interactive	4,434	5	\$5,134	PacifiCorp 2017 DSM Report	\$1,382	\$6,516	2190
Smart Thermostat installation - Cooling	Parking	Thermostat - WiFi/Interactive	34,451	5	\$46,403	PacifiCorp 2017 DSM Report	\$12,493	\$58,896	2190
Smart Thermostat installation - Cooling	Public Assembly Category	Thermostat - WiFi/Interactive	4,992	5	\$6,724	PacifiCorp 2017 DSM Report	\$1,810	\$8,534	2190
Smart Thermostat installation - Cooling	Public Service Category	Thermostat - WiFi/Interactive	40,702	5	\$54,823	PacifiCorp 2017 DSM Report	\$14,760	\$69,583	2190
Smart Thermostat installation - Cooling	Religious	Thermostat - WiFi/Interactive	7,824	5	\$10,539	PacifiCorp 2017 DSM Report	\$2,837	\$13,376	2190
Smart Thermostat installation - Cooling	Retail Category	Thermostat - WiFi/Interactive	4,834	5	\$4,493	PacifiCorp 2017 DSM Report	\$1,210	\$5,703	2190
Smart Thermostat installation - Cooling	Services Category	Thermostat - WiFi/Interactive	2,372	5	\$3,194	PacifiCorp 2017 DSM Report	\$860	\$4,054	2190
Smart Thermostat installation - Cooling	Storage	Thermostat - WiFi/Interactive	5,499	5	\$10,370	PacifiCorp 2017 DSM Report	\$2,792	\$13,162	2190



EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Smart Thermostat installation - Cooling	Utility	Thermostat - WiFi/Interactive	1,336	5	\$1,800	PacifiCorp 2017 DSM Report	\$485	\$2,284	2190
			Ventila	tion					
NEMA Super Premium Motors	Education Category	Installation of NEMA Super Premium motor (+1% efficiency)	1,631	20	\$1,577	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$424	\$2,001	8760
NEMA Super Premium Motors	Healthcare Category	Installation of NEMA Super Premium motor (+1% efficiency)	717	20	\$693	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$187	\$879	8760
NEMA Super Premium Motors	Industrial	Installation of NEMA Super Premium motor (+1% efficiency)	4,321	20	\$4,176	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$1,124	\$5,301	8760
NEMA Super Premium Motors	Office Category	Installation of NEMA Super Premium motor (+1% efficiency)	698	20	\$675	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$182	\$857	8760

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
NEMA Super Premium Motors	Utility	Installation of NEMA Super Premium motor (+1% efficiency)	13,244	20	\$12,800	Xcel Technical Resource Manual 2017 (2017/2018 Demand-Side Management Plan)	\$3,446	\$16,246	8760
ECM-Variable Air Volume	Other	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	3,703	18	\$1,252	7th Power Plan - Commercial ECM-Variable Air Volume	\$337	\$1,589	8760
ECM-Variable Air Volume	Education	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	79,702	18	\$26,942	7th Power Plan - Commercial ECM-Variable Air Volume	\$7,254	\$34,195	8760
ECM-Variable Air Volume	Food Sales	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	4,497	18	\$1,520	7th Power Plan - Commercial ECM-Variable Air Volume	\$409	\$1,929	8760
ECM-Variable Air Volume	Food Service	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	2,379	18	\$804	7th Power Plan - Commercial ECM-Variable Air Volume	\$216	\$1,021	8760

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
ECM-Variable Air Volume	Healthcare	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	3,449	18	\$1,166	7th Power Plan - Commercial ECM-Variable Air Volume	\$314	\$1,480	8760
ECM-Variable Air Volume	Lodging	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	10,280	18	\$3,475	7th Power Plan - Commercial ECM-Variable Air Volume	\$936	\$4,410	8760
ECM-Variable Air Volume	Mixed	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	1,175	18	\$397	7th Power Plan - Commercial ECM-Variable Air Volume	\$107	\$504	8760
ECM-Variable Air Volume	Office	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	5,523	18	\$1,867	7th Power Plan - Commercial ECM-Variable Air Volume	\$503	\$2,370	8760
ECM-Variable Air Volume	Parking	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	49,919	18	\$16,874	7th Power Plan - Commercial ECM-Variable Air Volume	\$4,543	\$21,417	8760

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
ECM-Variable Air Volume	Public Assembly	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	7,233	18	\$2,445	7th Power Plan - Commercial ECM-Variable Air Volume	\$658	\$3,103	8760
ECM-Variable Air Volume	Public Service	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	58,976	18	\$19,936	7th Power Plan - Commercial ECM-Variable Air Volume	\$5,367	\$25,303	8760
ECM-Variable Air Volume	Religious	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	11,337	18	\$3,832	7th Power Plan - Commercial ECM-Variable Air Volume	\$1,032	\$4,864	8760
ECM-Variable Air Volume	Retail	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	4,834	18	\$1,634	7th Power Plan - Commercial ECM-Variable Air Volume	\$440	\$2,074	8760
ECM-Variable Air Volume	Services	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	3,436	18	\$1,162	7th Power Plan - Commercial ECM-Variable Air Volume	\$313	\$1,474	8760

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
ECM-Variable Air Volume	Storage	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	11,155	18	\$3,771	7th Power Plan - Commercial ECM-Variable Air Volume	\$1,015	\$4,786	8760
ECM-Variable Air Volume	Utility	High efficiency electronically commutated permanent magnet (ECM or ECPM) motors with built-in variable speed control for VAV fans	1,936	18	\$654	7th Power Plan - Commercial ECM-Variable Air Volume	\$176	\$831	8760
			Light	ing					
LED Screw-in Upgrade from CFL (interior)	Other Category	Install LED fixture instead of CFL Fixture	2,597	15	\$1,593	7th Power Plan - Commercial Indoor Lighting	\$429	\$2,023	4015
LED Screw-in Upgrade from CFL (interior)	Education Category	Install LED fixture instead of CFL Fixture	14,899	15	\$14,647	7th Power Plan - Commercial Indoor Lighting	\$3,943	\$18,590	4015
LED Screw-in Upgrade from CFL (interior)	Food Sales Category	Install LED fixture instead of CFL Fixture	2,247	15	\$1,239	7th Power Plan - Commercial Indoor Lighting	\$334	\$1,573	4015
LED Screw-in Upgrade from CFL (interior)	Food Service Category	Install LED fixture instead of CFL Fixture	3,107	15	\$1,527	7th Power Plan - Commercial Indoor Lighting	\$411	\$1,938	4015
LED Screw-in Upgrade from CFL (interior)	Healthcare Category	Install LED fixture instead of CFL Fixture	2,417	15	\$825	7th Power Plan - Commercial Indoor Lighting	\$222	\$1,047	4015

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
LED Screw-in Upgrade from CFL (interior)	Lodging Category	Install LED fixture instead of CFL Fixture	12,368	15	\$7,588	7th Power Plan - Commercial Indoor Lighting	\$2,043	\$9,631	4015
LED Screw-in Upgrade from CFL (interior)	Mixed	Install LED fixture instead of CFL Fixture	824	15	\$506	7th Power Plan - Commercial Indoor Lighting	\$136	\$642	4015
LED Screw-in Upgrade from CFL (interior)	Office Category	Install LED fixture instead of CFL Fixture	1,670	15	\$2,254	7th Power Plan - Commercial Indoor Lighting	\$607	\$2,861	4015
LED Screw-in Upgrade from CFL (interior)	Parking	Install LED fixture instead of CFL Fixture	35,000	15	\$21,479	7th Power Plan - Commercial Indoor Lighting	\$5,783	\$27,261	4015
LED Screw-in Upgrade from CFL (interior)	Public Assembly Category	Install LED fixture instead of CFL Fixture	3,276	15	\$3,308	7th Power Plan - Commercial Indoor Lighting	\$891	\$4,199	4015
LED Screw-in Upgrade from CFL (interior)	Public Service Category	Install LED fixture instead of CFL Fixture	41,350	15	\$25,376	7th Power Plan - Commercial Indoor Lighting	\$6,832	\$32,208	4015
LED Screw-in Upgrade from CFL (interior)	Religious	Install LED fixture instead of CFL Fixture	5,135	15	\$5,186	7th Power Plan - Commercial Indoor Lighting	\$1,396	\$6,582	4015
LED Screw-in Upgrade from CFL (interior)	Retail Category	Install LED fixture instead of CFL Fixture	1,160	15	\$1,080	7th Power Plan - Commercial Indoor Lighting	\$291	\$1,370	4015
LED Screw-in Upgrade from CFL (interior)	Services Category	Install LED fixture instead of CFL Fixture	2,409	15	\$1,479	7th Power Plan - Commercial Indoor Lighting	\$398	\$1,877	4015
LED Screw-in Upgrade from CFL (interior)	Storage	Install LED fixture instead of CFL Fixture	1,344	15	\$398	7th Power Plan - Commercial Indoor Lighting	\$107	\$505	4015

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
LED Screw-in Upgrade from CFL (interior)	Utility	Install LED fixture instead of CFL Fixture	1,358	15	\$833	7th Power Plan - Commercial Indoor Lighting	\$224	\$1,057	4015
LED Linear Upgrade from T8/T12 (interior)	Other Category	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	5,128	15	\$6,735	7th Power Plan - Commercial Indoor Lighting	\$1,813	\$8,549	4015
LED Linear Upgrade from T8/T12 (interior)	Education Category	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	106,243	15	\$190,381	7th Power Plan - Commercial Indoor Lighting	\$51,257	\$241,63 8	4015
LED Linear Upgrade from T8/T12 (interior)	Food Sales Category	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	14,559	15	\$11,567	7th Power Plan - Commercial Indoor Lighting	\$3,114	\$14,681	4015
LED Linear Upgrade from T8/T12 (interior)	Food Service Category	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	3,409	15	\$3,170	7th Power Plan - Commercial Indoor Lighting	\$853	\$4,023	4015
LED Linear Upgrade from T8/T12 (interior)	Healthcare Category	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	8,651	15	\$7,465	7th Power Plan - Commercial Indoor Lighting	\$2,010	\$9,475	4015
LED Linear Upgrade from T8/T12 (interior)	Lodging Category	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	2,960	15	\$5,019	7th Power Plan - Commercial Indoor Lighting	\$1,351	\$6,371	4015
LED Linear Upgrade from T8/T12 (interior)	Mixed	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	1,627	15	\$2,137	7th Power Plan - Commercial Indoor Lighting	\$575	\$2,712	4015
LED Linear Upgrade from T8/T12 (interior)	Office Category	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	7,060	15	\$13,734	7th Power Plan - Commercial Indoor Lighting	\$3,697	\$17,431	4015
LED Linear Upgrade from T8/T12 (interior)	Parking	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	69,120	15	\$90,788	7th Power Plan - Commercial Indoor Lighting	\$24,443	\$115,23 0	4015

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
LED Linear Upgrade from T8/T12 (interior)	Public Assembly Category	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	6,807	15	\$12,386	7th Power Plan - Commercial Indoor Lighting	\$3,335	\$15,721	4015
LED Linear Upgrade from T8/T12 (interior)	Public Service Category	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	81,661	15	\$107,260	7th Power Plan - Commercial Indoor Lighting	\$28,878	\$136,13 8	4015
LED Linear Upgrade from T8/T12 (interior)	Religious	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	10,669	15	\$19,414	7th Power Plan - Commercial Indoor Lighting	\$5,227	\$24,641	4015
LED Linear Upgrade from T8/T12 (interior)	Retail Category	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	7,570	15	\$12,396	7th Power Plan - Commercial Indoor Lighting	\$3,337	\$15,733	4015
LED Linear Upgrade from T8/T12 (interior)	Services Category	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	4,758	15	\$6,250	7th Power Plan - Commercial Indoor Lighting	\$1,683	\$7,932	4015
LED Linear Upgrade from T8/T12 (interior)	Storage	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	5,719	15	\$13,613	7th Power Plan - Commercial Indoor Lighting	\$3,665	\$17,278	4015
LED Linear Upgrade from T8/T12 (interior)	Utility	Install LED fixture instead of linear T8 or T12 fluorescent or equiv.	2,681	15	\$3,521	7th Power Plan - Commercial Indoor Lighting	\$948	\$4,469	4015
LED Screw-in Upgrade from CFL (interior)	Industrial	Replace screw-in fixtures	4,957	15	\$3,042	PacifiCorp 2017 DSM Report	\$819	\$3,861	8760
LED Linear Upgrade from T8/T12 (interior)	Industrial	Replace linear lighting fixtures	68,410	7	\$21,582	PacifiCorp 2017 DSM Report	\$5,810	\$27,392	8760
LED High-bay Fixtures (interior)	Industrial	Replace high-bay fixtures	18,783	9	\$4,113	PacifiCorp 2017 DSM Report	\$1,107	\$5,221	8760
LED Upgrade (exterior)	Other Category	Install LED instead of metal halide or high pressure sodium in an exterior location	1,202	12	\$162	PSE 2017 DSM Report	\$44	\$206	4380

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
LED Upgrade (exterior)	Education Category	Install LED instead of metal halide or high pressure sodium in an exterior location	30,534	12	\$5,798	PSE 2017 DSM Report	\$1,561	\$7,359	4380
LED Upgrade (exterior)	Food Sales Category	Install LED instead of metal halide or high pressure sodium in an exterior location	5,071	12	\$1,022	PSE 2017 DSM Report	\$275	\$1,297	4380
LED Upgrade (exterior)	Food Service Category	Install LED instead of metal halide or high pressure sodium in an exterior location	4,863	12	\$752	PSE 2017 DSM Report	\$202	\$954	4380
LED Upgrade (exterior)	Healthcare Category	Install LED instead of metal halide or high pressure sodium in an exterior location	4,484	12	\$901	PSE 2017 DSM Report	\$242	\$1,143	4380
LED Upgrade (exterior)	Lodging Category	Install LED instead of metal halide or high pressure sodium in an exterior location	4,784	12	\$808	PSE 2017 DSM Report	\$217	\$1,025	4380
LED Upgrade (exterior)	Mixed	Install LED instead of metal halide or high pressure sodium in an exterior location	381	12	\$51	PSE 2017 DSM Report	\$14	\$65	4380
LED Upgrade (exterior)	Office Category	Install LED instead of metal halide or high pressure sodium in an exterior location	3,415	12	\$617	PSE 2017 DSM Report	\$166	\$783	4380
LED Upgrade (exterior)	Parking	Install LED instead of metal halide or high pressure sodium in an exterior location	16,207	12	\$2,184	PSE 2017 DSM Report	\$588	\$2,772	4380

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
LED Upgrade (exterior)	Public Assembly Category	Install LED instead of metal halide or high pressure sodium in an exterior location	5,190	12	\$861	PSE 2017 DSM Report	\$232	\$1,093	4380
LED Upgrade (exterior)	Public Service Category	Install LED instead of metal halide or high pressure sodium in an exterior location	19,147	12	\$2,581	PSE 2017 DSM Report	\$695	\$3,275	4380
LED Upgrade (exterior)	Religious	Install LED instead of metal halide or high pressure sodium in an exterior location	8,134	12	\$1,349	PSE 2017 DSM Report	\$363	\$1,713	4380
LED Upgrade (exterior)	Retail Category	Install LED instead of metal halide or high pressure sodium in an exterior location	2,249	12	\$425	PSE 2017 DSM Report	\$114	\$539	4380
LED Upgrade (exterior)	Services Category	Install LED instead of metal halide or high pressure sodium in an exterior location	1,116	12	\$150	PSE 2017 DSM Report	\$40	\$191	4380
LED Upgrade (exterior)	Storage	Install LED instead of metal halide or high pressure sodium in an exterior location	6,637	12	\$1,213	PSE 2017 DSM Report	\$327	\$1,539	4380
LED Upgrade (exterior)	Utility	Install LED instead of metal halide or high pressure sodium in an exterior location	629	12	\$85	PSE 2017 DSM Report	\$23	\$108	4380
LED Screw-in Upgrade (exterior)	Industrial	Replace screw-in fixtures	6,359	8	\$124	PacifiCorp 2017 DSM Report	\$34	\$158	4380
LED Area Lighting Upgrade (exterior)	Industrial	Replace exterior area lighting	39,261	15	\$715	PacifiCorp 2017 DSM Report	\$193	\$908	4380

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
LED Linear Lighting Upgrade (exterior)	Industrial	Replace linear lighting fixtures	172	17	\$47	PacifiCorp 2017 DSM Report	\$13	\$60	4380
Smart Lighting controllers / Occupancy sensors	Other Category	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)	3,121	8	\$2,452	PSE 2017 DSM Report	\$660	\$3,112	4015
Smart Lighting controllers / Occupancy sensors	Education Category	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)	69,528	8	\$54,629	PSE 2017 DSM Report	\$14,708	\$69,337	4015
Smart Lighting controllers / Occupancy sensors	Food Sales Category	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)	12,201	8	\$3,355	PSE 2017 DSM Report	\$903	\$4,259	4015
Smart Lighting controllers / Occupancy sensors	Food Service Category	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)	4,036	8	\$1,707	PSE 2017 DSM Report	\$460	\$2,167	4015

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Smart Lighting controllers / Occupancy sensors	Healthcare Category	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)	5,329	8	\$2,443	PSE 2017 DSM Report	\$658	\$3,100	4015
Smart Lighting controllers / Occupancy sensors	Lodging Category	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)	8,529	8	\$5,864	PSE 2017 DSM Report	\$1,579	\$7,443	4015
Smart Lighting controllers / Occupancy sensors	Mixed	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)	990	8	\$778	PSE 2017 DSM Report	\$209	\$987	4015
Smart Lighting controllers / Occupancy sensors	Office Category	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)	6,792	8	\$4,150	PSE 2017 DSM Report	\$1,117	\$5,268	4015
Smart Lighting controllers / Occupancy sensors	Parking	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)	42,062	8	\$33,049	PSE 2017 DSM Report	\$8,898	\$41,946	4015

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Smart Lighting controllers / Occupancy sensors	Public Assembly Category	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)	6,200	8	\$4,871	PSE 2017 DSM Report	\$1,311	\$6,183	4015
Smart Lighting controllers / Occupancy sensors	Public Service Category	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)	49,694	8	\$39,045	PSE 2017 DSM Report	\$10,512	\$49,557	4015
Smart Lighting controllers / Occupancy sensors	Religious	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)	9,717	8	\$7,635	PSE 2017 DSM Report	\$2,056	\$9,691	4015
Smart Lighting controllers / Occupancy sensors	Retail Category	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)	9,685	8	\$3,805	PSE 2017 DSM Report	\$1,024	\$4,829	4015
Smart Lighting controllers / Occupancy sensors	Services Category	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)	2,895	8	\$2,275	PSE 2017 DSM Report	\$612	\$2,887	4015

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Smart Lighting controllers / Occupancy sensors	Storage	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)	6,227	8	\$4,281	PSE 2017 DSM Report	\$1,153	\$5,434	4015
Smart Lighting controllers / Occupancy sensors	Utility	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)	1,631	8	\$1,282	PSE 2017 DSM Report	\$345	\$1,627	4015
Smart Lighting controllers / Daylight sensors	Education Category	Sensor on a light fixture that turns off the light when sufficient natural light exists	97,487	8	\$125,903	PSC of Colorado 2017/2018 DSM Plan	\$33,897	\$159,80 0	4015
Smart Lighting controllers / Daylight sensors	Lodging Category	Sensor on a light fixture that turns off the light when sufficient natural light exists	9,188	8	\$25,632	PSC of Colorado 2017/2018 DSM Plan	\$6,901	\$32,533	4015
Smart Lighting controllers / Daylight sensors	Mixed	Sensor on a light fixture that turns off the light when sufficient natural light exists	1,351	8	\$2,225	PSC of Colorado 2017/2018 DSM Plan	\$599	\$2,824	4015
Smart Lighting controllers / Daylight sensors	Office Category	Sensor on a light fixture that turns off the light when sufficient natural light exists	7,401	8	\$11,081	PSC of Colorado 2017/2018 DSM Plan	\$2,983	\$14,064	4015
Smart Lighting controllers / Daylight sensors	Parking	Sensor on a light fixture that turns off the light when sufficient natural light exists	57,409	8	\$94,542	PSC of Colorado 2017/2018 DSM Plan	\$25,454	\$119,99 6	4015

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Smart Lighting controllers / Daylight sensors	Public Assembly Category	Sensor on a light fixture that turns off the light when sufficient natural light exists	8,065	8	\$12,093	PSC of Colorado 2017/2018 DSM Plan	\$3,256	\$15,349	4015
Smart Lighting controllers / Daylight sensors	Public Service Category	Sensor on a light fixture that turns off the light when sufficient natural light exists	67,825	8	\$111,696	PSC of Colorado 2017/2018 DSM Plan	\$30,072	\$141,76 8	4015
Smart Lighting controllers / Daylight sensors	Religious	Sensor on a light fixture that turns off the light when sufficient natural light exists	12,641	8	\$18,955	PSC of Colorado 2017/2018 DSM Plan	\$5,103	\$24,058	4015
Smart Lighting controllers / Daylight sensors	Services Category	Sensor on a light fixture that turns off the light when sufficient natural light exists	5,571	8	\$6,508	PSC of Colorado 2017/2018 DSM Plan	\$1,752	\$8,260	4015
Smart Lighting controllers / Daylight sensors	Storage	Sensor on a light fixture that turns off the light when sufficient natural light exists	7,359	8	\$7,985	PSC of Colorado 2017/2018 DSM Plan	\$2,150	\$10,135	4015
Smart Lighting controllers / Daylight sensors	Utility	Sensor on a light fixture that turns off the light when sufficient natural light exists	2,227	8	\$3,667	PSC of Colorado 2017/2018 DSM Plan	\$987	\$4,654	4015
			Cook	ing					
Electric Combination Ovens	Food Sales	Electric combination ovens that meet ENERGY STAR specifications	7,543	12	\$810	PSE 2017 DSM Report	\$218	\$1,028	5840

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Electric Combination Ovens	Food Service	Electric combination ovens that meet ENERGY STAR specifications	15,086	12	\$1,620	PSE 2017 DSM Report	\$436	\$2,057	5840
Electric Combination Ovens	Healthcare	Electric combination ovens that meet ENERGY STAR specifications	15,086	12	\$1,620	PSE 2017 DSM Report	\$436	\$2,057	5840
Electric exhaust hood	Food Sales	Commercial cooking equipment exhaust hood with demand-controlled ventilation that operates only as much as needed	3,257	15	\$2,471	PSE 2017 DSM Report	\$665	\$3,136	5840
Electric exhaust hood	Food Service	Commercial cooking equipment exhaust hood with demand-controlled ventilation that operates only as much as needed	12,326	15	\$11,717	PSE 2017 DSM Report	\$3,154	\$14,871	5840
Electric exhaust hood	Healthcare	Commercial cooking equipment exhaust hood with demand-controlled ventilation that operates only as much as needed	2,407	15	\$1,826	PSE 2017 DSM Report	\$492	\$2,317	5840
			Refriger	ation					
Refrigerator Floating-Head Pressure Controls	Food Sales	Controls that adjust operating pressure of a commercial refrigeration system based on ambient temperature conditions	45,218	15	\$28,393	PSE 2017 DSM Report	\$7,644	\$36,037	8760

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Refrigerator Floating-Head Pressure Controls	Food Service	Controls that adjust operating pressure of a commercial refrigeration system based on ambient temperature conditions	23,921	15	\$15,021	PSE 2017 DSM Report	\$4,044	\$19,065	8760
Refrigerator/Freezer gaskets	Food Sales	replace gaskets on door perimeter	1,425	4	\$207	PacifiCorp 2017 DSM Report	\$56	\$262	8760
Refrigerator/Freezer gaskets	Food Service	replace gaskets on door perimeter	3,607	4	\$109	PacifiCorp 2017 DSM Report	\$29	\$139	8760
		Off	ice Equipment	and Compu	ting				
Advanced power strips	Other	Advanced power strip that turns off equipment plugged into it when not in use	110	5	\$94	PSE 2017 DSM Report	\$25	\$119	8760
Advanced power strips	Education	Advanced power strip that turns off equipment plugged into it when not in use	2,300	5	\$1,954	PSE 2017 DSM Report	\$526	\$2,481	8760
Advanced power strips	Food Sales	Advanced power strip that turns off equipment plugged into it when not in use	247	5	\$210	PSE 2017 DSM Report	\$57	\$266	8760
Advanced power strips	Food Service	Advanced power strip that turns off equipment plugged into it when not in use	152	5	\$129	PSE 2017 DSM Report	\$35	\$164	8760
Advanced power strips	Healthcare	Advanced power strip that turns off equipment plugged into it when not in use	76	5	\$64	PSE 2017 DSM Report	\$17	\$82	8760

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Advanced power strips	Industrial	Advanced power strip that turns off equipment plugged into it when not in use	1,011	5	\$859	PSE 2017 DSM Report	\$231	\$1,090	8760
Advanced power strips	Lodging	Advanced power strip that turns off equipment plugged into it when not in use	155	5	\$132	PSE 2017 DSM Report	\$36	\$168	8760
Advanced power strips	Mixed	Advanced power strip that turns off equipment plugged into it when not in use	35	5	\$30	PSE 2017 DSM Report	\$8	\$38	8760
Advanced power strips	Office	Advanced power strip that turns off equipment plugged into it when not in use	512	5	\$435	PSE 2017 DSM Report	\$117	\$553	8760
Advanced power strips	Parking	Advanced power strip that turns off equipment plugged into it when not in use	1,486	5	\$1,263	PSE 2017 DSM Report	\$340	\$1,603	8760
Advanced power strips	Public Assembly	Advanced power strip that turns off equipment plugged into it when not in use	171	5	\$146	PSE 2017 DSM Report	\$39	\$185	8760
Advanced power strips	Public Service	Advanced power strip that turns off equipment plugged into it when not in use	1,400	5	\$1,190	PSE 2017 DSM Report	\$320	\$1,511	8760
Advanced power strips	Religious	Advanced power strip that turns off equipment plugged into it when not in use	327	5	\$278	PSE 2017 DSM Report	\$75	\$353	8760



EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Advanced power strips	Retail	Advanced power strip that turns off equipment plugged into it when not in use	115	5	\$98	PSE 2017 DSM Report	\$26	\$124	8760
Advanced power strips	Services	Advanced power strip that turns off equipment plugged into it when not in use	82	5	\$69	PSE 2017 DSM Report	\$19	\$88	8760
Advanced power strips	Storage	Advanced power strip that turns off equipment plugged into it when not in use	222	5	\$189	PSE 2017 DSM Report	\$51	\$239	8760
Advanced power strips	Utility	Advanced power strip that turns off equipment plugged into it when not in use	58	5	\$49	PSE 2017 DSM Report	\$13	\$62	8760
			Miscellan	eous**					
Energy Assessment Retrocommissioning	Other Category	Commercial Retrocommissioning Program	6,781	7	\$1,826	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$492	\$2,317	8760
Energy Assessment Retrocommissioning	Education Category	Commercial Retrocommissioning Program	145,934	7	\$39,290	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$10,578	\$49,868	8760

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Energy Assessment Retrocommissioning	Food Sales Category	Commercial Retrocommissioning Program	8,234	7	\$2,217	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$597	\$2,814	8760
Energy Assessment Retrocommissioning	Food Service Category	Commercial Retrocommissioning Program	4,356	7	\$1,173	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$316	\$1,488	8760
Energy Assessment Retrocommissioning	Healthcare Category	Commercial Retrocommissioning Program	6,314	7	\$1,700	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$458	\$2,158	8760
Energy Assessment Retrocommissioning	Industrial	Commercial Retrocommissioning Program	93,029	7	\$25,046	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$6,743	\$31,789	8760
Energy Assessment Retrocommissioning	Lodging Category	Commercial Retrocommissioning Program	18,822	7	\$5,068	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$1,364	\$6,432	8760

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Energy Assessment Retrocommissioning	Mixed	Commercial Retrocommissioning Program	2,151	7	\$579	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$156	\$735	8760
Energy Assessment Retrocommissioning	Office Category	Commercial Retrocommissioning Program	10,113	7	\$2,723	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$733	\$3,456	8760
Energy Assessment Retrocommissioning	Public Service Category	Commercial Retrocommissioning Program	107,984	7	\$29,073	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$7,827	\$36,900	8760
Energy Assessment Retrocommissioning	Religious	Commercial Retrocommissioning Program	20,758	7	\$5,589	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$1,505	\$7,093	8760
Energy Assessment Retrocommissioning	Retail Category	Commercial Retrocommissioning Program	8,850	7	\$2,383	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$642	\$3,024	8760

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Energy Assessment Retrocommissioning	Services Category	Commercial Retrocommissioning Program	6,292	7	\$1,694	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$456	\$2,150	8760
Energy Assessment Retrocommissioning	Storage	Commercial Retrocommissioning Program	20,425	7	\$5,499	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$1,481	\$6,980	8760
Energy Assessment Retrocommissioning	Utility	Commercial Retrocommissioning Program	3,545	7	\$954	ComEd 2016 EE Potential; assume applies to all C&I categories / PRPA Experience	\$257	\$1,211	8760
Energy Management System with Data Analysis	Other Category	Energy management measures for commercial buildings, excluding single-zone ducted systems. Suite of measures, most of which are focused on making HVAC systems work better through controls changes.	4,709	5	\$1,304	7th Power Plan - Commercial Energy Management Systems (Com- EM- 7P_V5.xlsm)	\$351	\$1,655	8760

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Energy Management System with Data Analysis	Education Category	Energy management measures for commercial buildings, excluding single-zone ducted systems. Suite of measures, most of which are focused on making HVAC systems work better through controls changes.	90,202	5	\$28,064	7th Power Plan - Commercial Energy Management Systems (Com- EM- 7P_V5.xlsm)	\$7,556	\$35,620	8760
Energy Management System with Data Analysis	Food Sales Category	Energy management measures for commercial buildings, excluding single-zone ducted systems. Suite of measures, most of which are focused on making HVAC systems work better through controls changes.	9,313	5	\$1,583	7th Power Plan - Commercial Energy Management Systems (Com- EM- 7P_V5.xlsm)	\$426	\$2,010	8760
Energy Management System with Data Analysis	Food Service Category	Energy management measures for commercial buildings, excluding single-zone ducted systems. Suite of measures, most of which are focused on making HVAC systems work better through controls changes.	6,427	5	\$838	7th Power Plan - Commercial Energy Management Systems (Com- EM- 7P_V5.xlsm)	\$226	\$1,063	8760

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Energy Management System with Data Analysis	Healthcare Category	Energy management measures for commercial buildings, excluding single-zone ducted systems. Suite of measures, most of which are focused on making HVAC systems work better through controls changes.	8,635	5	\$1,214	7th Power Plan - Commercial Energy Management Systems (Com- EM- 7P_V5.xlsm)	\$327	\$1,541	8760
Energy Management System with Data Analysis	Industrial	Energy management measures for commercial buildings, excluding single-zone ducted systems. Suite of measures, most of which are focused on making HVAC systems work better through controls changes.	16,382	5	\$17,890	7th Power Plan - Commercial Energy Management Systems (Com- EM- 7P_V5.xlsm)	\$4,817	\$22,707	8760
Energy Management System with Data Analysis	Lodging Category	Energy management measures for commercial buildings, excluding single-zone ducted systems. Suite of measures, most of which are focused on making HVAC systems work better through controls changes.	14,407	5	\$3,620	7th Power Plan - Commercial Energy Management Systems (Com- EM- 7P_V5.xlsm)	\$975	\$4,594	8760

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Energy Management System with Data Analysis	Mixed	Energy management measures for commercial buildings, excluding single-zone ducted systems. Suite of measures, most of which are focused on making HVAC systems work better through controls changes.	1,494	5	\$414	7th Power Plan - Commercial Energy Management Systems (Com- EM- 7P_V5.xlsm)	\$111	\$525	8760
Energy Management System with Data Analysis	Office Category	Energy management measures for commercial buildings, excluding single-zone ducted systems. Suite of measures, most of which are focused on making HVAC systems work better through controls changes.	6,300	5	\$1,945	7th Power Plan - Commercial Energy Management Systems (Com- EM- 7P_V5.xlsm)	\$524	\$2,468	8760
Energy Management System with Data Analysis	Public Service Category	Energy management measures for commercial buildings, excluding single-zone ducted systems. Suite of measures, most of which are focused on making HVAC systems work better through controls changes.	74,988	5	\$20,766	7th Power Plan - Commercial Energy Management Systems (Com- EM- 7P_V5.xlsm)	\$5,591	\$26,357	8760

EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Energy Management System with Data Analysis	Religious	Energy management measures for commercial buildings, excluding single-zone ducted systems. Suite of measures, most of which are focused on making HVAC systems work better through controls changes.	14,415	5	\$3,992	7th Power Plan - Commercial Energy Management Systems (Com- EM- 7P_V5.xlsm)	\$1,075	\$5,067	8760
Energy Management System with Data Analysis	Retail Category	Energy management measures for commercial buildings, excluding single-zone ducted systems. Suite of measures, most of which are focused on making HVAC systems work better through controls changes.	7,103	5	\$1,702	7th Power Plan - Commercial Energy Management Systems (Com- EM- 7P_V5.xlsm)	\$458	\$2,160	8760
Energy Management System with Data Analysis	Services Category	Energy management measures for commercial buildings, excluding single-zone ducted systems. Suite of measures, most of which are focused on making HVAC systems work better through controls changes.	4,369	5	\$1,210	7th Power Plan - Commercial Energy Management Systems (Com- EM- 7P_V5.xlsm)	\$326	\$1,536	8760



EE Measure Name	Customer Segment	Description	Average Annual Savings (kWh/year)	Measure Life (years)	Average Installation Cost (\$)	Measure Source	Administrative Cost (\$)	Total Program Cost (\$)	Active Hours per Year
Energy Management System with Data Analysis	Storage	Energy management measures for commercial buildings, excluding single-zone ducted systems. Suite of measures, most of which are focused on making HVAC systems work better through controls changes.	3,597	5	\$3,928	7th Power Plan - Commercial Energy Management Systems (Com- EM- 7P_V5.xlsm)	\$1,058	\$4,985	8760

The initial cost references for the EE measures as the starting point costs in the modeling are based on PRPA program information or other EE potential assessments. Where applicable, HDR used cost trend projections to adjust the future costs of some of the EE measures. Analysis from the U.S. EIA study on Updated Buildings Sector Appliance and Equipment Costs and Efficiency²³ was used to project the cost trends in the following EE measures through 2040.

Table A-2. Forward Cost Projections by EE Measure Technology

Technology Category	2015- 2019	2020- 2024	2025- 2029	2030- 2034	2035- 2039
Residential Interior LED Lighting	-12.3%	-5.5%	-5.5%	-5.4%	-5.4%
Residential Exterior LED Lighting	-4.9%	-6.5%	-6.5%	-3.9%	-3.9%
Residential Clothes Washer	-	+0.9%	+0.9%	-	-
Residential Clothes Dryer	-	+0.9%	+0.9%	-	-
Commercial Interior LED Lighting	-4.6%	-4.6%	-4.4%	-2.1%	-2.1%

²³ EIA Updated Buildings Sector Appliance and Equipment Costs and Efficiency, June 2018. Appendix A & C. <u>https://www.eia.gov/analysis/studies/buildings/equipcosts/</u>

Technology Category	2015- 2019	2020- 2024	2025- 2029	2030- 2034	2035- 2039
Commercial Exterior LED Lighting	-4.6%	-4.6%	-4.4%	-2.1%	-2.1%
Industrial Interior LED Lighting	-4.6%	-4.6%	-4.4%	-2.1%	-2.1%
Industrial Linear LED Lighting	-12.3%	-2.8%	-2.8%	-1.6%	-1.6%
Industrial High Bay LED Lighting	-9.6%	-4.5%	-4.5%	-3.7%	-3.7%
Commercial / Industrial Exterior LED Lighting	-4.6%	-4.6%	-4.4%	-2.1%	-2.1%

Appendix B. Demand Response Measure Assumptions

The following table presents key assumptions used in the evaluation of demand response measures.

Table B-1.Demand Response Measure Assumptions

DR Measure	Description	kW Installed by DR measure (kW/year)	kW Deferred by DR measure (kW/year)	Deferred energy replacement	Measure Life (years)	Average Program Cost (\$/unit)	Administrative Cost (\$/unit)	Source
				Residenti	al			
HVAC Programmable Communicating Thermostat (PCTs)	Smart thermostat that adapts to user behavior and can be controlled by WiFi	0.95	0.48	100%	10	\$452	\$122	2025 California Demand Response Potential Study for load shed, life and cost values (Page 163 and 164).
HVAC DLC	Remotely activated switches to allow air conditioners to be switched on/off for a short time during peak periods and critical events	0.51	0.26	100%	10	\$234	\$63	Based on results of the PRPA demand response pilot program of 2015. Residential and business HVAC and WH DLC was tested for Fort Collins. There were 1700 HVAC customers and 2000 WH customer participants.
Water Heater DLC	Remotely activated switches to allow electric water heaters to be switched on/off for a short time during peak periods and critical events	0.35	0.18	100%	10	\$161	\$43	Based on results of the PRPA demand response pilot program of 2015. Residential and business HVAC and WH DLC was tested for Fort Collins. There were 1700 HVAC customers and 2000 WH customer participants.

DR Measure	Description	kW Installed by DR measure (kW/year)	kW Deferred by DR measure (kW/year)	Deferred energy replacement	Measure Life (years)	Average Program Cost (\$/unit)	Administrative Cost (\$/unit)	Source
Battery and Plug-in Hybrid Vehicles DLC - Charging Interruption during peak hours	Two way communication capable DR device(DLC switch)/ or advanced controller with communication, separate smart metering capability	1.30	0.87	100%	10	\$2,700	\$727	Xcel Energy Colorado EV Charging Station Pilot Evaluation Results - May 2015. Avg energy = 2663.7kWh /yr /vehicle. Total demand = 1.31kW /vehicle. Per PRPA call no of EV in 2019 = 2000 increase to 37,000 by 2030 5,327,400 kWh/yr.
BESS (5kW) Automated Demand Response	BESS with advanced metering with communication and controller to curtail power during peak periods.	5.00	3.33	100%	10	\$13,600	\$3,662	Deferred kW and kWh computed, see EV BESS analysis page.
BESS (5 -10 kW) Automated Demand Response	Advanced metering with communication and controller to curtail power during peak periods.	10.00	6.67	100%	10	\$20,300	\$5,465	Deferred kW and kWh computed, see EV BESS analysis page
Distributed Solar		5.40	5.40	0%	20	\$20,656	\$5,561	Industry Average
	Commercial / Industrial							
HVAC Automated Demand Response	Demand response programs where PRPA is able to control customer's HVAC load for DR purposes.	0.60	0.30	100%	15	\$400	\$108	2025 California Demand Response Potential Study for load shed, life and cost values (Page 132).

DR Measure	Description	kW Installed by DR measure (kW/year)	kW Deferred by DR measure (kW/year)	Deferred energy replacement	Measure Life (years)	Average Program Cost (\$/unit)	Administrative Cost (\$/unit)	Source
HVAC DLC and PCTs	Similar to residential customers, remotely activated switches to allow air conditioners to be switched on/off for a short time during peak periods and critical events.	0.35	0.18	100%	15	\$160	\$43	Used the same results as the residential values based on the PRPA demand response pilot program of 2015. Peak shed value from pilot matched the base case values in the 2025 California DR Potential Study (Page 131). Assumed kWh energy reduction also matches.
50kW BESS Automated Demand Response	BESS with advanced metering with communication and controller to curtail power during peak periods.	50.0	16.7	100%	10	\$61,875	\$16,659	Deferred kW and kWh computed, see EV BESS analysis page
150kW BESS Automated Demand Response	BESS with advanced metering with communication and controller to curtail power during peak periods.	150.0	50.0	100%	10	\$182,625	\$49,168	Deferred kW and kWh computed, see EV BESS analysis page
Industrial Process - Automated Demand Response	Generic automated DR strategy- automatic temporary reduction of an industrial process throughput or full interruption during peak hrs	61.44	30.72	100%	10	\$25,598	\$6,892	2025 California Demand Response Potential Study for load shed, life and cost values (Page 190 and 191).
Industrial Process - Manual Demand Response	Generic manual DR strategy- manual temporary reduction of an industrial process throughput or full interruption during peak hrs	51.20	25.60	100%	10	\$3,000	\$808	2025 California Demand Response Potential Study for load shed, life and cost values (Page 190 and 191).

DR Measure	Description	kW Installed by DR measure (kW/year)	kW Deferred by DR measure (kW/year)	Deferred energy replacement	Measure Life (years)	Average Program Cost (\$/unit)	Administrative Cost (\$/unit)	Source
Lighting - Luminaire, Zonal, and Standard Control Options	Generic automated DR strategy- automatic temporary reduction of lighting in retail/office buildings. Assumed to be a composite of luminaire, zonal, and standard control options.	2.93	1.47	0%	10	\$4,948	\$1,332	2025 California Demand Response Potential Study for load shed, life and cost values. Values represent the average of the medium size office/retail options for the base case (Page 145 and 146).
Refrigerated Warehouse - Automated Demand Response	Automated DR strategies - temporary shut off, temp set point adjustments during peak hrs	1.10	0.55	100%	15	\$10,000	\$2,692	Refrigerated Warehouse Demand Response Strategy Guide - Lawrence Berkeley Labs Nov 2015. Cap cost buildup does not include cost of chillers
Commercial Distributed Solar		34.5	34.5	0%	20	\$105,586	\$28,427	Industry Average
Industrial Distributed Solar		643.5	643.5	0%	20	\$1,512,228	\$407,138	Industry Average
				System W	ide			
Voltage Regulation	Intentional reduction on system voltage to lower load. Requires remotely operated load tap changers on feeder distribution transformers.	2900	1,933	0%	20	\$2,280,000		System-wide PRPA impact based on scaled proportion. Based on results of the PRPA demand response pilot program in 2015. Voltage regulation was tested for Longmont. Longmont represents 27% of the electrical demand for the PRPA system.

The initial cost references for the DR measures as the starting point costs in the modeling are based on PRPA program information or other DR potential assessments. Where applicable, HDR used cost trend projections to adjust the future costs of the DR

measures. The National Renewable Energy Laboratory's Annual Technology Baseline 2018²⁴ was used to project the cost reductions in batteries and solar panels through 2040.

Technology Category	2015- 2019	2020- 2024	2025- 2029	2030- 2034	2035- 2039
Battery Storage	-11.3%	-8.3%	-6.4%	-2.4%	-2.4%
Residential Solar PV	-5.0%	-5.0%	-5.0%	-1.3%	-1.3%
Commercial Solar PV	-4.3%	-4.3%	-4.3%	-0.8%	-0.8%
Industrial Solar PV	-4.3%	-4.3%	-4.3%	-0.8%	-0.8%

Table B-2. Forward Cost Projections of Compound Annual Growth Rate by DER Technology

²⁴ National Renewable Energy Laboratory. "Annual Technology Baseline 2018," July 2018. https://atb.nrel.gov/.

Appendix C. Detailed Avoided Cost Assumptions

The sections below contain detailed assumptions regarding the avoided cost assumptions used in each of the models.

C.1 Energy Efficiency Avoided Cost Assumptions

Low Avoided Cost Scenario

In this case, the avoided energy costs are measured based on market rates, and the avoided capacity costs are measured based on avoiding construction an aeroderivative LM6000 (AERO) unit, blended with energy costs assuming a 60% load factor. The assumptions used in deriving the blended avoided cost of \$59.38 are shown in the table below.

Table C-1. Low Case Avoided Cost Scenario Assumptions²⁵

	AERO
Gross Capacity (MW)	83
Economic Life	30
Discount Rate	5%
Capacity Factor (%)	60%
Annual Energy (MWh)	436,248
Capital Cost (\$/kW)	\$1,202
Replacement Cost (\$/kW)	N/A
Fixed O&M (\$/kW-yr)	\$10.10
Firm Gas Cost (\$/kW-yr)	\$25.33
Avoided Capacity Costs (\$/kW-yr)	\$113.60
Energy Cost	\$37.77
Avoided Energy Costs (\$/MWh)	\$37.77
Blended Avoided Cost (\$/MWh)	\$59.38

Medium Avoided Cost Scenario

The avoided energy costs for the medium scenario are measured based on a coal retirement scenario. The avoided energy costs are based on solar and wind PPAs, and the avoided capacity cost are measured based on avoiding a batteries with a 72% electric load carrying capacity. The assumptions used in deriving the blended avoided cost of \$67.47 are shown in the table below.

²⁵ Avoided cost assumptions include transmission losses (assumed to be 1.8%) and distribution losses (assumed to be 3.0%).

Table C-2. Avoided Cost Assumptions for	Medium Scenario ²⁶
---	-------------------------------

	Wind	Solar	Battery
Installed Capacity (MW)	200	300	300
Economic Life	30	30	30
Discount Rate	5%	5%	5%
Capacity Factor (%)	45%	28%	N/A
Annual Energy (MWh)	788,400	735,840	N/A
Capital Cost (\$/kW)	N/A	N/A	\$2,219
Fixed O&M (\$/kW-yr)	N/A	N/A	N/A
Avoided Capacity Costs (\$/kW-yr)	N/A	N/A	\$144.35
PPA Cost (\$/MWh)	\$26.25	\$33.68	N/A
Ancillary Services (\$/MWh)	\$3.39	\$0.82	N/A
Transmission Costs (\$/MWh)	\$15.50	N/A	N/A
Avoided Energy Costs (\$/MWh)	\$45.14	\$34.50	N/A
Blended Avoided Cost (\$/MWh)		\$67.47	

New solar projects are assumed to be located close to interconnection points and therefore not require wheeling or construction of long transmission lines. New wind projects are assumed to be subject to regional tariffs.

High Avoided Cost Scenario

The high avoided cost scenario is designed as a storage and non-carbon energy scenario. This scenario contains a blend of solar, wind and battery resources. For solar and wind, all avoided costs are treated as energy costs as neither are a dispatchable resource that offers continuous firm capacity. The costs associated with the battery resources are measured as the avoided capacity costs and blended based on the assumptions in the table below. The blended avoided cost is \$76.62/MWh for the mix of resources presented.

Table C-3. Avoided Cost Assumptions for High Scenario²⁷

	Wind	Solar	Battery
Installed Capacity (MW)	200	300	300
Economic Life	30	30	15
Discount Rate	5%	5%	5%
Capacity Factor (%)	45%	28%	N/A

²⁶ Avoided cost assumptions include transmission losses (assumed to be 1.8%) and distribution losses (assumed to be 3.0%). Battery costs are assumed to decrease 2% per year. The four technologies are blended as a weighted average based on the annual energy generated.

²⁷ Avoided cost assumptions include transmission losses (assumed to be 1.8%) and distribution losses (assumed to be 3.0%). Battery costs are assumed to decrease 3% per year. The four technologies are blended as a weighted average based on the annual energy generated.

	Wind	Solar	Battery
Annual Energy (MWh)	788,400	735,840	N/A
Capital Cost (\$/kW)	N/A	N/A	\$2,959
Fixed O&M (\$/kW-yr)	\$38.84	\$21.00	N/A
Avoided Capacity Costs (\$/kW-yr)	N/A	N/A	\$192.47
PPA Cost (\$/MWh)	\$26.25	\$33.68	N/A
Ancillary Services (\$/MWh)	\$3.39	\$0.82	N/A
Transmission Costs (\$/MWh)	\$15.50	N/A	N/A
Avoided Energy Costs (\$/MWh)	\$45.14	\$34.50	N/A
Blended Avoided Cost (\$/MWh)		\$76.62	

C.2 Demand Response Avoided Cost Assumptions

Low Avoided Cost Scenario

In this case, the avoided energy costs are measured based on market rates, and the avoided capacity costs are measured based on the fixed costs of avoiding construction an AERO unit. The assumptions used in deriving the avoided cost values are shown in the table below.

Table C-4. Low Case Avoided Cost Scenario Assumptions²⁸

	AERO
Gross Capacity (MW)	83
Economic Life	30
Discount Rate	5%
Capital Cost (\$/kW)	\$1,145
Fixed O&M (\$/kW-yr)	\$10.10
Firm Gas Cost (\$/kW-yr)	\$25.33
Avoided Capacity Costs (\$/kW-yr)	\$113.60
Energy Cost (\$/MWh)	\$37.77
Avoided Energy Costs (\$/MWh)	\$37.77

Medium Avoided Cost Scenario

The avoided energy costs for the medium scenario are measured based on a coal retirement scenario. The avoided energy cost is determined by solar and wind PPAs. The avoided capacity costs is calculated as the fixed costs for batteries.

²⁸ Avoided cost assumptions include transmission losses (assumed to be 1.8%) and distribution losses (assumed to be 3.0%).

Table C-5. Medium Case Avoided Cost Scenario Assumptions²⁹

	Wind	Solar	Battery
Installed Capacity (MW)	200	300	300
Economic Life	30	30	30
Discount Rate	5%	5%	5%
Capacity Factor (%)	45%	28%	N/A
Annual Energy (MWh)	788,400	735,840	N/A
Capital Cost (\$/kW)	N/A	N/A	\$2,219
Fixed O&M (\$/kW-yr)	N/A	N/A	N/A
Avoided Capacity Costs (\$/kW-yr)	N/A	N/A	\$144.35
PPA Cost (\$/MWh)	\$26.25	\$33.68	N/A
Ancillary Services (\$/MWh)	\$3.39	\$0.82	N/A
Transmission Costs (\$/MWh)	\$15.50	N/A	N/A
Avoided Energy Costs (\$/MWh)	\$45.14	\$34.50	N/A
Blended Energy Cost (\$/MWh)	\$40.00		N/A

High Avoided Cost Scenario

The high avoided cost scenario is calculated as a storage and non-carbon energy scenario. This scenario contains a blend of solar, wind and battery resources. For solar and wind, all avoided costs are treated as energy costs as neither are a dispatchable resource that offers continuous firm capacity. The costs associated with the battery resources are measured as the avoided capacity costs and blended based on the assumptions in the table below.

Table C-6. High Case Avoided Cost Scenario Assumptions³⁰

	Wind	Solar	Battery
Installed Capacity (MW)	200	300	300
Economic Life	30	30	30
Discount Rate	5%	5%	5%
Capacity Factor (%)	45%	28%	N/A
Annual Energy (MWh)	788,400	735,840	N/A
Capital Cost (\$/kW)	N/A	N/A	\$2,959
Fixed O&M (\$/kW-yr)	N/A	N/A	N/A
Avoided Capacity Costs (\$/kW-yr)	N/A	N/A	\$192.47
PPA Cost (\$/MWh)	\$26.25	\$33.68	N/A

²⁹ Avoided cost assumptions include transmission losses (assumed to be 1.8%) and distribution losses (assumed to be 3.0%). Battery costs are assumed to decrease 2% per year.

³⁰ Avoided cost assumptions include transmission losses (assumed to be 1.8%) and distribution losses (assumed to be 3.0%). Battery costs are assumed to decrease 2% per year.

	Wind	Solar	Battery
Ancillary Services (\$/MWh)	\$3.39	\$0.82	N/A
Transmission Costs (\$/MWh)	\$15.50	N/A	N/A
Avoided Energy Costs (\$/MWh)	\$45.14	\$34.50	N/A
Blended Energy Cost (\$/MWh)	\$40.00		N/A

C.3 Distributed Solar Avoided Cost Assumptions

Low Avoided Cost Scenario

In this case, the avoided energy costs are measured based on market energy prices, and the avoided capacity costs are measured based on the fixed costs of avoiding construction an AERO unit. Given that solar output is assumed to be primarily available outside of peak hours, distributed solar will not add significant capacity to curtail evening loads. It was assumed that roughly 30% of the solar load is produced during peak hours, and as such, the avoided capacity costs are adjusted to reflect the reduced capacity benefit distributed solar provides. The market energy cost is based on a 20 year levelized average of the around the clock power price forecast to correspond with an anticipated average 20 year life of solar PV systems. The assumptions used in deriving the avoided cost values are shown in the table below.

AERO Gross Capacity (MW) 83 Economic Life 30 **Discount Rate** 5% Capital Cost (\$/kW) \$1.202 Fixed O&M (\$/kW-yr) \$10.10 Firm Gas Cost (\$/kW-yr) \$25.33 Solar Capacity Credit 30% Avoided Capacity Costs (\$/kW-yr) \$34.08 \$42.49 Market Energy (\$/MWh) Avoided Energy Costs (\$/MWh) \$42.49 Blended Avoided Cost (\$/MWh) \$61.94

Table C-7. Low Case Avoided Cost Scenario Assumptions³¹

Medium Avoided Cost Scenario

The avoided energy costs for the medium scenario are measured based on avoiding utility-scale solar. The avoided energy cost is determined by the utility solar costs. It is assumed there is no capacity benefit. All utility-scale solar fixed costs are blended with energy costs using a capacity factor of 28%.

³¹ Avoided cost assumptions include transmission losses (assumed to be 1.8%) and distribution losses (assumed to be 3.0%).

Table C-8. Medium Case Avoided Cost Scenario Assumptions³²

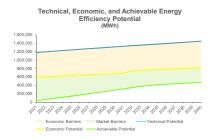
	Solar
Economic Life	30
Discount Rate	5%
Annual Capacity Factor	28%
Annual Energy (MWh/MW-yr)	2,453
PPA Cost (\$/MWh)	\$33.68
Fixed O&M (\$/kW-yr)	N/A
Ancillary Services (\$/MWh)	\$0.78
Transmission Cost (\$/MWh)	N/A
Avoided Energy Costs (\$/MWh)	\$34.46

High Avoided Cost Scenario

The avoided energy costs for the high scenario are measured based on the same assumptions as the medium avoided cost scenario.

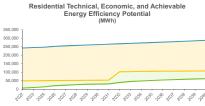
³² Avoided cost assumptions include transmission losses (assumed to be 1.8%) and distribution losses (assumed to be 3.0%).

Appendix D. Distributed Energy Resources Results by Avoided Cost Scenario



Combined					
Technical Potential (MWh)	2021	2025	2030	2035	2040
Heating	29,905	32.310	35,437	38,592	42,105
Cooling	178,715	192,422	209,184	224,819	240.042
Ventilation	33,929	33,102	32,209	31,425	30,744
Water Heating	16,009	17,151	18,531	19,851	21,281
Lighting	437,265	435,517	435,002	435,191	436,379
Cooking	33,850	36,496	39,741	42,749	45,594
Office Equipment & Computing	4,396	4,740	5,161	5,552	5,921
Refrigeration	83,923	89,596	96,546	102,993	109,144
Miscellaneous	363,277	398,594	441,360	480,959	518,920
Total Technical Potential (MWh)	1,181,269	1,239,928	1,313,173	1,382,130	1,450,130
Economic Potential (MWh)	2021	2025	2030	2035	2040
Heating	9,962	10,688	11,569	12,404	13,282
Cooling	83,082	89,569	97,523	104,899	111,888
Ventilation	10,047	9,012	7,864	6,861	5,984
Water Heating	-	-	-	-	-
Lighting	129,231	132,130	128,447	179,721	175,830
Cooking	21,088	22,736	24,758	26,632	28,404
Office Equipment & Computing	70.000			-	400.400
Refrigeration	78,698	83,998	90,497	96,514	102,198
Miscellaneous Total Economic Potential (MWh)	257,073 589,181	284,408 632,540	317,443 678,100	349,786 776,817	378,709 816,295
	565,161	632,540	678,100	110,011	010,295
Achievable Potential (MWh)	2021	2025	2030	2035	2040
Heating	321	2,573	7,281	9,303	9,962
Cooling	376	7,536	41,980	72,734	83,174
Ventilation	19	365	2,004	4,149	4,440
Water Heating	-	-	-	-	-
Lighting	22,083	63,853	80,203	110,755	125,299
Cooking	680	5,473	15,582	16,995	13,538
Office Equipment & Computing	-	-	-	-	-
Refrigeration	2,687	20,543	54,266	63,884	50,192
Miscellaneous	6,203	37,053	79,810	134,130	180,080
Total Achievable Potential (MWh)	32,370	137,396	281,126	411,951	466,685
Incremental Achievable Potential (MWh)	2021	2025	2030	2035	2040
Heating	321	717	1,206	981	1,273
Cooling	376	3,292	8,318	4,213	1,524
Ventilation	19	146	446	320	13
Water Heating	-				-
Lighting	22,083 680	7,415	9,100	16,671 703	22,696
Cooking Office Equipment & Computing	660	1,532	1,907	703	1,630
Refrigeration	2.687	5.857	7.200	1.635	3.023
Miscellaneous	6,203	9,087	17.611	28,290	35.819
Total Incremental Achievable Potential (MWh		28,046	45,789	52,812	65,977
	02,010	20,040	40,100	02,012	00,011
Total Achievable Incremental Costs (\$000s)	2021	2025	2030	2035	2040
Heating	\$90	\$202	\$340	\$277	\$358
Cooling	\$201	\$1,686	\$4,237	\$2,159	\$815
Ventilation	\$7	\$50	\$153	\$110	\$4
Water Heating Lighting	\$6.215	\$2.337	\$2,743	- \$4.541	\$5.267
Cooking	\$0,215	\$2,337	\$2,743	\$4,541	\$179
Office Equipment & Computing	\$15	\$100	\$209	- arr	\$179
Refrigeration	\$1,464	\$3.266	\$4.034	\$643	\$1.510
Miscellaneous	\$1,526	\$2,244	\$4,423	\$7,105	\$9,284
Total Incremental Costs (\$000s)	\$9,578	\$9,953	\$16,140	\$14,913	\$17,417
Multi Year Cumulative Costs (\$000-)			0004 000		
Multi-Year Cumulative Costs (\$000s)	2021-2025				
Heating Cooling	\$724 \$3.893	\$1,419 \$17.562	\$1,448 \$15.861	\$1,680 \$5,947	
Ventilation	\$3,893	\$17,562 \$562	\$15,861 \$736	\$5,947 \$141	
Water Heating	\$120	\$30Z	\$130		
Lighting	\$18,532	\$12.608	\$20.004	\$25.319	

water neating	-	-	-	-	
Lighting	\$18,532	\$12,608	\$20,004	\$25,319	
Cooking	\$601	\$1,110	\$588	\$689	
Office Equipment & Computing	-	-	-	-	
Refrigeration	\$11,705	\$21,441	\$9,348	\$5,337	
Miscellaneous	\$9,158	\$17,021	\$30,365	\$41,935	
Total 5-Year Costs (\$000s)	\$44,738	\$71,724	\$78,351	\$81,047	
Participant Cost	\$8,812	\$14,128	\$15,433	\$15,964	
Utility Incentives	\$26,436	\$42,383	\$46,298	\$47,892	
Utility Administrative Costs	\$9,490	\$15,214	\$16,620	\$17,192	



Economic Potential Achievable Potential

Residential
 2030
 2035

 30,316
 33,083

 44,431
 47,594

 17,533
 17,236
 2025 27,607 2040 36,230 Technical Potential (MWh) 2021 Heating Cooling 25,544 38,384 41,122 51,024 16,945 18,079 17,835 Ventilation Water Heating Lighting 16,009 58,594 17 151 18,531 56,942 19,851 56,043 21,281 55,159 57,855 Cooking Office Equipment & Computing n/a Refrigeration Miscellaneous 14,481 69,383 14,726 74,332 15,019 15,294 80,315 86,032 15,609 92,231 Total Technical Potential (MWh) 240,472 250,627 263,087 275,134 288,478 Economic Potential (MWh) 2021 2025 2030 2035 2040 7,739 8,959 9,597 10,288 8,292 Heating Cooling Ventilation 1,101 1,180 1,275 1,365 1,464 Water Heating Lighting 7,672 7,582 7,471 56,043 55,159 Cooking n/a n/a 9,255 n/a n/a n/a n/a Office Equipment & Computing n/a 9,127 n/a 8,970 n/a n/a Refrigeration Miscellaneous 8 8 15 8 663 22,675 24,292 26,247 29,998 32,159 48,442 50,473 52,922 105,818 107,733 Total Economic Potential (MWh) Achievable Potential (MWh) 2021 2025 2030 2035 2040 250 36 1,996 5,639 802 7,198 1,024 7,716 Heating Cooling Ventilation 284 1,098 Water Heating Lighting 1,273 3,642 4,907 26,028 35,671 n/a n/a 3,448 Cooking n/a n/a 298 n/a n/a n/a n/a 989 n/a n/a Office Equipment & Computing Refrigeration 2,197 0 17,602 Miscellaneous 1 687 9 182 15 695 16 215 Total Achievable Potential (MWh) 3,543 17,301 30,491 51,453 62,088 Incremental Achievable Potential (MWh) 2021 2025 2030 2035 2040 Heating Cooling Ventilation 250 36 759 108 556 79 933 133 989 141 Water Heating Lighting 1.273 407 1.442 3.383 13.082 Cooking n/a n/a 298 n/a n/a 580 n/a n/a 593 n/a n/a Office Equipment & Computing n/a n/a Refrigeration Miscellaneous 1.687 2.001 1,433 1 764 1.908 Total Incremental Achievable Potential (MWh 3,543 3,623 4,534 6,013 16,120 Total Achievable Incremental Costs (\$000s) 2025 2030 2035 2021 2040 Heating Cooling Ventilation \$51 \$30 \$113 \$189 \$111 \$154 \$200 \$118 \$66 \$90 Water Heating Lighting \$270 \$66 \$172 \$734 \$2,211 n/a n/a \$81 Cooking n/a n/a n/a n/a n/a n/a \$0 n/a n/a \$0 Office Equipment & Computing \$161 \$157 Refrigeration Miscellaneous \$274 \$334 \$231 \$254 \$359 Total Incremental Costs (\$000s) \$863 \$1,231 \$2,887 \$705 \$736 Multi-Year Cur 0024 2025 2026 2020 2024 2025 2026 2040 H С Ŵ

Multi-fear Cumulative Costs (\$000s)	2021-2025 2	2026-20302	031-2035	2036-2040	
Heating	\$404	\$788	\$803	\$936	
Cooling	\$237	\$463	\$472	\$550	
Ventilation	-	-	-	-	
Water Heating	-	-	-	-	
Lighting	\$706	\$324	\$5,702	\$8,392	
Cooking	n/a	n/a	n/a	n/a	
Office Equipment & Computing	n/a	n/a	n/a	n/a	
Refrigeration	\$596	\$936	\$268	-	
Miscellaneous	\$1,509	\$1,344	\$1,078	\$1,594	
Total 5-Year Costs (\$000s)	\$3,452	\$3,854	\$8,324	\$11,472	
Participant Cost	\$680	\$759	\$1,640	\$2,260	
Utility Incentives	\$2,040	\$2,278	\$4,919	\$6,779	
Utility Administrative Costs	\$732	\$818	\$1,766	\$2,433	

	0004	2025	2030	2035	
Technical Potential (MWh)	2021				2040
Heating Cooling	4,362 140,331	4,703 151,300	5,121 164,753	5,509 177,225	5,875 189,018
Ventilation	15,850	15,268	14,677	14,189	13,799
Water Heating	n/a	n/a	n/a	n/a	n/a
Lighting	378,672	377.662	378,060	379.148	381.220
Cooking	33,850	36,496	39,741	42,749	45.594
Office Equipment & Computing	4,396	4,740	5,161	5.552	5.921
Refrigeration	69,442	74.870	81.527	87.699	93,535
Miscellaneous	293,894	324,262	361,046	394,927	426,689
Total Technical Potential (MWh)	940,797	989,301	1,050,086	1,106,996	1,161,652
Economic Potential (MWh)	2021	2025	2030	2035	2040
Heating	2,223	2025	2,610	2,807	2,994
Cooling	81,981	88,389	96,248	103,534	110,424
Ventilation	10,047	9,012	7,864	6 861	5,984
Water Heating	n/a	n/a	n/a	n/a	n/a
Lighting	121,560	124,548	120,976	123,678	120,671
Cooking	21,088	22,736	24,758	26,632	28,404
Office Equipment & Computing	-		-	-	
Refrigeration	69,442	74,870	81,527	87,699	93,535
Miscellaneous	234,398	260,115	291,195	319,789	346,550
Total Economic Potential (MWh)	540,739	582,067	625,178	670,999	708,562
Achievable Potential (MWh)	2021	2025	2030	2035	2040
Heating	72	577	1,642	2,105	2,245
Cooling	340	7,252	41,178	71,710	82,077
Ventilation	19	365	2,004	4,149	4,440
Water Heating	n/a	n/a	n/a	n/a	n/a
Lighting	20,810	60,211	75,296	84,727	89,628
Cooking	680	5,473	15,582	16,995	13,538
Office Equipment & Computing	-	-	-	-	-
Refrigeration	2,389	18,346	50,818	62,896	50,192 162,478
Miscellaneous Total Achievable Potential (MWh)	4,516 28,827	27,870 120,095	64,115 250,635	117,915 360,497	404,597
Total Achievable Potential (WWWII)	20,027	120,095	250,635	300,497	404,597
Incremental Achievable Potential (MWh)	2021	2025	2030	2035	2040
Heating	72	161	273	222	284
Cooling	340	3,213	8,185	4,105	1,383
Ventilation	19	146	446	320	13
Water Heating	n/a	n/a	n/a	n/a	n/a
Lighting	20,810	7,008	7,658	13,288	9,613
Cooking	680	1,532	1,907	703	1,630
Office Equipment & Computing	2,389	5,277	6,607	1,635	3,023
Refrigeration				1,635	3,023
				26 526	22 011
Miscellaneous Total Incremental Achievable Potential (MWh)	4,516	7,086	16,178 41,255	26,526 46,799	33,911 49,858
Total Incremental Achievable Potential (MWh)	4,516 28,827	24,423	41,255	46,799	49,858
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s)	4,516 28,827 2021	24,423 2025	41,255 2030	46,799 2035	49,858
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s] Heating	4,516 28,827 2021 \$40	24,423 2025 \$90	41,255 2030 \$151	46,799 2035 \$123	49,858 2040 \$158
Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling	4,516 28,827 2021 \$40 \$171	24,423 2025 \$90 \$1,620	41,255 2030 \$151 \$4,126	46,799 2035 \$123 \$2,069	49,858 2040 \$158 \$697
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation	4,516 28,827 2021 \$40 \$171 \$7	24,423 2025 \$90 \$1,620 \$50	41,255 2030 \$151 \$4,126 \$153	46,799 2035 \$123 \$2,069 \$110	49,858 2040 \$158 \$697 \$4
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating	4,516 28,827 2021 \$40 \$171 \$7 n/a	24,423 2025 \$90 \$1,620 \$50 n/a	2030 \$151 \$4,126 \$153 n/a	46,799 2035 \$123 \$2,069 \$110 n/a	49,858 2040 \$158 \$697 \$4 n/a
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Ventilation Water Heating Lighting	4,516 28,827 2021 \$40 \$171 \$7 n/a \$5,945	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808	49,858 2040 \$158 \$697 \$4 n/a \$3,056
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Ventilation Water Heating Lighting Cooking	4,516 28,827 2021 \$40 \$171 \$7 n/a	24,423 2025 \$90 \$1,620 \$50 n/a	2030 \$151 \$4,126 \$153 n/a	46,799 2035 \$123 \$2,069 \$110 n/a	49,858 2040 \$158 \$697 \$4 n/a \$3,056
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$9006; Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing	4,516 28,827 2021 \$40 \$171 \$7 n/a \$5,945 \$75	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271 \$168	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808	49,855 2040 \$158 \$697 \$4 n/a \$3,056 \$175
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous	4,516 28,827 2021 \$40 \$171 \$7 n/a \$5,945 \$75 \$75 \$75 \$1,383 \$1,252	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271 \$168 - \$3,109 \$1,910	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209 - \$3,874 \$4,192	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808 \$77 - \$643 \$6,851	49,858 2040 \$158 \$697 \$4 n/a \$3,056 \$1,750 \$1,510 \$8,926
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration	4,516 28,827 2021 \$40 \$171 \$7 n/a \$5,945 \$75 \$75 \$1,383	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271 \$168 - \$3,109	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209 - \$3,874	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808 \$777 - \$643	49,858 2040 \$158 \$697 \$4 n/a \$3,056 \$1,750 \$1,510 \$8,926
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s)	4,516 28,827 2021 \$40 \$171 \$7 n/a \$5,945 \$75 \$75 \$75 \$1,383 \$1,252	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271 \$168 - \$3,109 \$1,910 \$9,217	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209 - \$3,874 \$4,192 \$15,276	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808 \$77 - \$643 \$6,851 \$13,682	49,858 2040 \$158 \$697 \$4 n/a \$3,056 \$1,750 \$1,510 \$8,926
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Ventilation Ventilation Vater Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s)	4,516 28,827 2021 \$40 \$171 \$7 n/a \$5,945 \$75 \$1,383 \$1,252 \$8,873	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271 \$168 - \$3,109 \$1,910 \$9,217	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209 - \$3,874 \$4,192 \$15,276	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808 \$77 - \$643 \$6,851 \$13,682	49,858 2040 \$158 \$697 \$4 n/a \$3,056 \$1,750 \$1,510 \$8,926
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Ventilation Ventilation Vater Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s)	4,516 28,827 2021 \$40 \$171 \$7 n/a \$5,945 \$75 \$1,383 \$1,252 \$8,873 2021-2025	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271 \$168 \$3,109 \$1,910 \$9,217 2026-2030	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209 - \$3,874 \$4,192 \$15,276 2031-2035	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808 \$777 - \$643 \$6,851 \$13,682 2036-2040	49,858 2040 \$158 \$697 \$4 n/a \$3,056 \$1,750 \$1,510 \$8,926
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s)	4,516 28,827 2021 \$40 \$171 \$7 n/a \$5,945 \$75 \$1,383 \$1,252 \$8,873 2021-2025 \$320	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271 \$168 - \$3,109 \$1,910 \$9,217 2026-2030 \$631	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209 - \$3,874 \$4,192 \$15,276 \$15,276 \$644	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808 \$77 - \$643 \$6,851 \$13,682 2036-2040 \$744	49,858 2040 \$158 \$697 \$4 n/a \$3,056 \$1,750 \$1,510 \$8,926
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Venilation Water Heating Lighting Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Venilation Water Heating	4,516 28,827 2021 \$40 \$171 \$7 r/a \$5,945 \$75 \$75 \$1,252 \$8,873 2021-2025 \$320 \$3,655 \$125 r/a	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271 \$168 - \$3,109 \$1,910 \$9,217 2026-2030 \$631 \$17,100 \$562 n/a	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209 - \$3,874 \$4,192 \$15,276 \$15,276 \$644 \$15,389 \$736 \$7,389 \$7,389 \$7,389 \$7,389 \$7,51 \$6,126 \$6,1	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808 \$777 - \$6433 \$6,851 \$13,682 2036-2040 \$744 \$5,397 \$141 n/a	49,858 2040 \$158 \$697 \$4 n/a \$3,056 \$1,750 \$1,510 \$8,926
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Ventlation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Mutit /Vear Cumulative Costs (\$000s) Heating Cooling Ventlation Water Heating Lighting	4,516 28,827 2021 \$40 \$171 \$7 \$5,945 \$5,945 \$75 \$1,383 \$1,252 \$8,873 2021-2025 \$3,855 \$125 \$3,255 \$125 \$125 \$125 \$125 \$125 \$125 \$125 \$	24,423 2025 \$90 \$1,620 \$5,2271 \$1,620 \$2,271 \$1,910 \$9,217 2026-2030 \$631 \$1,71,00 \$562 n/a \$12,284	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209 \$3,874 \$4,192 \$15,276 2031-2035: \$644 \$15,389 \$736 n/a \$15,389 \$736 \$736 \$736 \$74,389 \$736 \$74,389 \$736 \$736 \$74,389 \$736	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808 \$643 \$643 \$643 \$6,851 \$13,682 2036-2040 \$744 \$5,397 \$141 n/a \$16,927	49,858 2040 \$158 \$697 \$4 n/a \$3,056 \$1,750 \$1,510 \$8,926
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Venilation Water Heating Lighting Cocking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Venilation Water Heating Lighting Cooking	4,516 28,827 2021 \$40 \$171 \$7 r/a \$5,945 \$75 \$75 \$1,252 \$8,873 2021-2025 \$320 \$3,655 \$125 r/a	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271 \$168 - \$3,109 \$1,910 \$9,217 2026-2030 \$631 \$17,100 \$562 n/a	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209 - \$3,874 \$4,192 \$15,276 \$15,276 \$644 \$15,389 \$736 \$7,389 \$7,389 \$7,389 \$7,389 \$7,51 \$6,126 \$6,1	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808 \$777 - \$6433 \$6,851 \$13,682 2036-2040 \$744 \$5,397 \$141 n/a	49,858 2040 \$158 \$697 \$4 n/a \$3,056 \$1,750 \$1,510 \$8,926
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Mutil Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing	4,516 28,827 2021 \$40 \$171 \$7 n/a \$5,945 \$5,945 \$1,383 \$1,252 \$8,873 2021-2025 \$3265 \$125 \$3,655 \$125 n/a \$3265 \$125 n/a \$125 \$3,655 \$125 \$125 \$125 \$125 \$125 \$125 \$125 \$1	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271 \$168 \$3,109 \$1,910 \$9,217 2026-2030 \$631 \$17,100 \$562 n/a \$12,284 \$1,110	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209 \$3,874 \$4,192 \$15,276 2031-2035: \$644 \$15,389 \$736 n/a \$14,302 \$544 \$5,899 \$736 \$644 \$15,389 \$736 \$756 \$756 \$756 \$766 \$766 \$766 \$766 \$76	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808 \$777 \$643 \$6.851 \$13,682 2036-2040 \$744 \$5,397 \$141 n/a \$16,927 \$649 \$100	49,858 2040 \$158 \$697 \$4 n/a \$3,056 \$1,750 \$1,510 \$8,926
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Ventlation Water Heating Lighting Cooling Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventlation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration	4,516 28,827 2021 \$40 \$1711 \$7 n/a \$5,945 \$75 \$1,252 \$8,873 2021-2025 \$12,52 \$12,52 \$320 \$3,655 \$12,525 \$12,525\$ \$12,525\$\$12	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271 \$168 \$3,109 \$1,910 \$9,217 2026-2030 \$631 \$17,100 \$562 n/a \$12,284 \$1,110 \$22,506	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209 - \$3,874 \$4,192 \$15,276 \$3,874 \$4,192 \$15,276 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$15,276 \$3,874 \$15,276 \$3,874 \$15,276 \$3,874 \$15,276 \$3,874 \$15,276 \$3,874 \$15,276 \$3,874 \$15,276 \$3,874 \$15,276 \$3,874 \$15,276 \$3,874 \$15,276 \$3,874 \$15,276 \$5,874 \$15,276 \$5,874 \$15,276 \$5,887 \$5,874 \$14,302 \$5,888 \$5,99,880 \$5,887 \$5,874 \$14,302 \$5,887 \$5,887 \$14,302 \$5,887 \$14,302 \$5,887 \$14,302 \$5,887 \$14,302 \$5,888 \$14,302 \$5,888 \$14,302 \$5,888 \$14,302 \$5,888 \$14,302 \$5,888 \$14,302 \$5,888 \$14,302 \$5,888 \$14,302 \$5,888 \$14,302 \$5,888 \$14,302 \$5,888 \$14,302 \$5,888 \$14,302 \$5,888 \$14,302 \$15,506 \$15,	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808 \$777 - \$643 \$6,851 \$13,682 2036-2040 \$744 \$5,397 \$141 n/a \$1,6,927 \$689 \$51,027 \$689 \$5,5,337	49,858 2040 \$158 \$697 \$4 n/a \$3,056 \$1,750 \$1,510 \$8,926
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s) Heating Cooling Ventlation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Mutti-Year Cumulative Costs (\$000s) Heating Cooling Ventlation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Mater Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous	4,516 28,827 2021 \$40 \$171 \$7 n/a \$5,945 \$75 \$75 \$1,383 \$1,252 \$8,873 2021-2025 \$3,855 \$125 n/a \$1,287 \$3,865 \$125 \$1,78,27 \$3,865 \$125 \$1,78,27 \$3,865 \$125 \$1,78,27 \$1,79,27 \$1,79,27 \$1,79,27 \$1,79,27 \$1,79,27 \$1,79,27	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271 \$168 \$- \$3,109 \$1,910 \$9,217 2026-2030 \$631 \$17,100 \$562 n/a \$12,284 \$1,110 \$12,284 \$1,284 \$1,226,577	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209 - \$3,874 \$4,192 \$15,276 2031-2035: \$644 \$15,389 \$736 n/a \$15,389 \$736 \$14,302 \$588 \$14,302 \$588 \$14,302 \$588 \$2,59,080 \$2,9,287	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808 \$77 - \$643 \$6,851 \$13,682 2036-2040 \$744 \$5,397 \$141 n/a \$16,927 \$689 \$5,337 \$40,341	49,858 2040 \$158 \$697 \$4 n/a \$3,056 \$179 \$1,510 \$8,926
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Ventlation Water Heating Lighting Cooling Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Unitation Ventlation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous	4,516 28,827 2021 2021 3171 55,945 575 575 575 51,383 51,252 \$8,873 2021-2025 \$3,655 \$12,52 \$3,655 \$12,52 \$3,655 \$12,52 \$3,655 \$12,52 \$3,655 \$12,52 \$3,655 \$12,52\$12,52 \$1	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271 \$1,910 \$9,217 2026-2030: \$6310 \$6,11 \$17,100 \$562 n/a \$12,284 \$1,110 \$562 n/a \$12,284 \$1,120 \$6,100 \$6,1000 \$6,1000 \$6,1000 \$6,1000 \$6,1000 \$6,1000	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209 - \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$4,192 \$3,874 \$3,874 \$3,874 \$5,588 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,36 \$7,90,207 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$7,0427 \$	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808 \$777 \$6433 \$6,851 \$13,682 2036-2040 \$744 \$5,397 \$141 n/a \$16,927 \$689 \$689 \$689 \$5,337 \$40,341 \$69,576	49,858 2040 \$158 \$697 \$4 n/a \$3,056 \$1,750 \$1,510 \$8,926
Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s) Heating Cooling Ventlation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Mutti-Year Cumulative Costs (\$000s) Heating Cooling Ventlation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Mater Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous	4,516 28,827 2021 \$40 \$171 \$7 n/a \$5,945 \$75 \$75 \$1,383 \$1,252 \$8,873 2021-2025 \$3,855 \$125 n/a \$1,287 \$3,865 \$125 \$1,78,27 \$3,865 \$125 \$1,78,27 \$3,865 \$125 \$1,78,27 \$1,79,27 \$1,79,27 \$1,79,27 \$1,79,27 \$1,79,27 \$1,79,27	24,423 2025 \$90 \$1,620 \$50 n/a \$2,271 \$168 \$- \$3,109 \$1,910 \$9,217 2026-2030 \$631 \$17,100 \$562 n/a \$12,284 \$1,110 \$12,284 \$1,284 \$1,226,577	41,255 2030 \$151 \$4,126 \$153 n/a \$2,571 \$209 - \$3,874 \$4,192 \$15,276 2031-2035: \$644 \$15,389 \$736 n/a \$15,389 \$736 \$14,302 \$588 \$14,302 \$588 \$14,302 \$588 \$2,59,080 \$2,9,287	46,799 2035 \$123 \$2,069 \$110 n/a \$3,808 \$77 - \$643 \$6,851 \$13,682 2036-2040 \$744 \$5,397 \$141 n/a \$16,927 \$689 \$5,337 \$40,341	33,911 49,858 2040 \$158 \$697 \$4 n/a \$3,056 \$179 \$1,510 \$8,926 \$14,531

EE.Hourly.Low: Hourly Energy Efficiency Results, Medium Avoided Cost Scenario

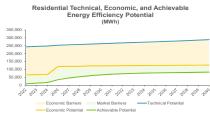
	Winter	202	21	202	25	203	30	203	35	20	40
	12/19	Base Load (MW)	Total EE Curtailment								
8449	1	326.9	3.3	329.9	12.5	335.2	22.9	344.8	S0.9	361.3	34.5
8450	2	318.4	3.3	321.3	12.5	326.5	22.9	335.8	30.9	351.9	34.5
8451 8452	3 4	315.3 316.6	3.3 3.3	318.2 319.4	12.5 12.5	323.3 324.6	22.9 22.9	332.6 333.9	30.9 30.9	348.4 349.9	34.5 34.5
8453	5	326.0	3.3	329.0	12.5	334.3	22.9	343.9	30.9	360.3	34.5
8454	6	348.9	3.8	352.1	15.5	357.8	29.1	368.0	42.2	385.6	47.7
8455 8456	7 8	386.2 405.2	3.5 4.2	389.7 408.9	14.7 17.7	396.1 415.5	28.0 32.3	407.4 427.4	41.0 47.4	426.8 447.8	46.4 54.1
8457	9	406.7	4.2	410.4	17.7	417.1	32.3	429.0	47.4	449.5	54.1
8458	10	401.9	3.8	405.5	15.6	412.1	28.7	423.9	39.0	444.2	43.2
8459 8460	11 12	397.7 393.9	3.8 3.8	401.3 397.5	15.6 15.6	407.8 403.9	28.7 28.7	419.5 415.5	39.0 39.0	439.5 435.3	43.2 43.2
8461	13	389.5	3.8	393.0	15.6	399.4	28.7	410.8	39.0	430.4	43.2
8462	14	386.5	3.8	390.0	15.6	396.3	28.7	407.7	39.0	427.1	43.2
8463 8464	15 16	382.2 384.2	3.8 4.2	385.7 387.8	15.6 17.7	391.9 394.0	28.7 32.3	403.2 405.3	39.0 47.4	422.4 424.7	43.2 54.1
8465	10	408.1	6.3	411.8	23.3	418.5	39.2	430.5	54.5	451.1	61.2
8466	18	447.0	6.3	451.1	23.3	458.4	39.2	471.5	54.5	494.1	61.2
8467 8468	19 20	448.1 441.3	3.8 3.8	452.2 445.4	15.5 15.5	459.5 452.6	29.1 29.1	472.7 465.5	42.2 42.2	495.2 487.8	47.7 47.7
8469	20	441.3	3.8	445.4	15.5	432.0	29.1	405.5	42.2	467.8	47.7
8470	22	408.1	3.7	411.8	14.6	418.5	26.5	430.4	39.3	451.0	45.4
8471	23	374.6	3.7	378.0	14.6	384.2	26.5	395.2	39.3	414.0	45.4
8472	24	344.7	3.3	347.8	12.5	353.5	22.9	363.6	30.9	381.0	34.5
s	Spring/Fall	202 Base Load	21 Total EE	202 Base Load	25 Total EE	203 Base Load	30 Total EE	203 Base Load	35 Total EE	20 Base Load	40 Total EE
	09/15	(MW)	Curtailment								
6169	1	313.1	3.3	315.9	12.5	321.0	22.9	330.2	30.9	346.0	34.5
6170 6171	2 3	298.0 289.5	3.3 3.3	300.8 292.1	12.5 12.5	305.6 296.9	22.9 22.9	314.4 305.4	30.9 30.9	329.4 320.0	34.5 34.5
6172	4	284.7	3.3	287.3	12.5	290.9	22.9	300.3	30.9	314.6	34.5
6173	5	286.6	3.3	289.2	12.5	293.9	22.9	302.3	30.9	316.7	34.5
6174	6 7	302.0	3.8 1.7	304.8 334.5	15.5 9.9	309.7	29.1 22.2	318.6	42.2 35.1	333.8 366.4	47.7 40.6
6175 6176	8	331.5 349.7	4.2	352.9	9.9 17.7	340.0 358.7	32.3	349.7 368.9	47.4	386.5	40.8 54.1
6177	9	370.4	4.2	373.8	17.7	379.8	32.3	390.7	47.4	409.4	54.1
6178	10	391.3	3.8	394.9	15.6	401.3	28.7	412.8	39.0	432.5	43.2
6179 6180	11 12	410.7 426.4	3.8 3.8	414.4 430.3	15.6 15.6	421.2 437.2	28.7 28.7	433.2 449.8	39.0 39.0	453.9 471.2	43.2 43.2
6181	12	420.4	3.8	430.3	15.6	452.7	28.7	465.6	39.0	487.9	43.2
6182	14	457.2	3.8	461.4	15.6	468.8	28.7	482.2	39.0	505.3	43.2
6183	15	471.3	3.8 4.2	475.6 483.9	15.6	483.3	28.7	497.2	39.0 47.4	520.9 530.0	43.2
6184 6185	16 17	479.5 482.9	4.2	483.9 487.4	17.7 17.7	491.8 495.2	32.3 32.3	505.8 509.4	47.4	533.8	54.1 54.1
6186	18	475.4	4.2	479.7	17.7	487.5	32.3	501.4	47.4	525.4	54.1
6187	19	451.8	3.8	455.9	15.5	463.3	29.1	476.5	42.2	499.3	47.7
6188 6189	20 21	444.8 427.0	3.8 3.8	448.9 430.9	15.5 15.5	456.2 437.9	29.1 29.1	469.2 450.4	42.2 42.2	491.6 471.9	47.7 47.7
6190	22	392.5	3.7	396.1	14.6	402.5	26.5	414.0	39.3	433.8	45.4
6191	23	354.1	3.7	357.3	14.6	363.1	26.5	373.5	39.3	391.4	45.4
6192	24	319.9	3.3	322.8	12.5	328.1	22.9	337.5	30.9	353.6	34.5
	Summer	202		202		203		203		20	
	07/10	Base Load (MW)	Total EE Curtailment								
4561	1	350.3	3.4	353.5	15.5	359.2	40.9	369.5	62.7	387.1	71.2
4562 4563	2 3	327.3 314.6	3.4 3.4	330.3 317.5	15.5 15.5	335.6 322.6	40.9 40.9	345.2 331.9	62.7 62.7	361.7 347.7	71.2 71.2
4563	4	308.1	3.4	317.5	15.5	316.0	40.9	325.0	62.7	340.5	71.2
4565	5	312.0	3.4	314.8	15.5	319.9	40.9	329.1	62.7	344.8	71.2
4566	6 7	323.5	1.9	326.4	13.0	331.7	40.3	341.2 360.8	66.9	357.5	77.2
4567 4568	7 8	342.0 375.8	1.9 4.3	345.1 379.2	13.0 20.8	350.7 385.3	40.3 50.3	360.8 396.4	66.9 79.2	378.0 415.3	77.2 90.7
4569	9	414.2	4.3	418.0	20.8	424.7	50.3	436.9	79.2	457.7	90.7
4570	10	455.7	3.9	459.8	18.7	467.3	46.7	480.6	70.8	503.6	79.9
4571 4572	11 12	494.4 535.6	3.9 3.9	498.9 540.5	18.7 18.7	507.0 549.2	46.7 46.7	521.5 564.9	70.8 70.8	546.4 591.9	79.9 79.9
4572	12	566.6	3.9	571.7	18.7	581.0	46.7	597.6	70.8	626.2	79.9
4574	14	593.9	3.9	599.3	18.7	609.0	46.7	626.4	70.8	656.4	79.9
4575	15	616.7	3.9	622.3	18.7	632.4	46.7	650.5	70.8	681.6	79.9
4576 4577	16 17	608.5 583.7	4.3 4.3	614.0 589.0	20.8 20.8	624.0 598.5	50.3 50.3	641.9 615.7	79.2 79.2	672.5 645.1	90.7 90.7
4578	18	576.6	4.3	581.8	20.8	591.3	50.3	608.2	79.2	637.3	90.7
4579	19	567.3	1.9	572.5	13.0	581.8	40.3	598.4	66.9	627.0	77.2
4580 4581	20 21	543.1 527.1	1.9 3.9	548.0 531.9	13.0 18.5	556.9 540.5	40.3 47.2	572.8 556.0	66.9 74.0	600.2 582.5	77.2 84.3
4582	21	499.0	3.8	503.5	17.6	511.7	44.5	526.3	74.0	551.5	82.0
4583	23	445.5	3.8	449.6	17.6	456.9	44.5	470.0	71.1	492.4	82.0
4584	24	396.3	3.4	399.9	15.5	406.4	40.9	418.1	62.7	438.0	71.2

EE.Hourly.Low: Hourly Energy Efficiency Results, Medium Avoided Cost Scenario

	Winter	202	21	20:	25	203	30	20	35	20	40
Peak Hours	12/19	Base Load (MW)	Load w/EE Curtailment								
20	1	327	324	330	317	335	312	345	314	361	327
22 24	2 3	318 315	315 312	321 318	309 306	326 323	304 300	336 333	305 302	352 348	317 314
23	4	317	313	319	307	325	302	334	303	350	315
21 18	5 6	326 349	323 345	329 352	317 337	334 358	311 329	344 368	313 326	360 386	326 338
14 8	7	386	383	390	375 391	396	368 383	407 427	366 380	427	380 394
7	8 9	405 407	401 403	409 410	393	416 417	385	427	380	448 450	394 395
9 10	10 11	402 398	398 394	406 401	390 386	412 408	383 379	424 419	385 381	444 439	401 396
11	12	394	390	397	382	404	375	415	377	435	392
12 13	13 14	389 386	386 383	393 390	377 374	399 396	371 368	411 408	372 369	430 427	387 384
16	15	382	378	386	370	392	363	403	364	422	379
15 5	16 17	384 408	380 402	388 412	370 389	394 419	362 379	405 430	358 376	425 451	371 390
2	18	447	441	451	428	458	419	472	417	494	433
1	19 20	448 441	444 438	452 445	437 430	460 453	430 423	473 466	430 423	495 488	448 440
4	21	431	427	435	419	442	413	454	412	476	428
6 17	22 23	408 375	404 371	412 378	397 363	418 384	392 358	430 395	391 356	451 414	406 369
19	24	345	341	348	335	353	331	364	333	381	346
	pring/Fall	202		202		203		20		20	-
Peak Hours	09/15	Base Load (MW)	Load w/EE Curtailment								
19 21	1 2	313 298	310 295	316 301	303 288	321 306	298 283	330 314	299 284	346 329	311 295
22	3	290	286	292	280	297	203	305	275	320	285
24 23	4 5	285 287	281 283	287 289	275 277	292 294	269 271	300 302	269 271	315 317	280 282
20	6	302	298	305	289	310	281	319	276	334	286
17 16	7 8	332 350	330 346	335 353	325 335	340 359	318 326	350 369	315 322	366 387	326 332
14	9	370	366	374	356	380	348	391	343	409	355
13 11	10 11	391 411	388 407	395 414	379 399	401 421	373 392	413 433	374 394	433 454	389 411
10	12	426	423	430	415	437	409	450	411	471	428
8 5	13 14	441 457	438 453	445 461	430 446	453 469	424 440	466 482	427 443	488 505	445 462
4	15	471	468	476	460	483	455	497	458	521	478
2	16 17	480 483	475 479	484 487	466 470	492 495	460 463	506 509	458 462	530 534	476 480
3	18	475	471	480	462	487	455	501	454	525	471
6 7	19 20	452 445	448 441	456 449	440 433	463 456	434 427	477 469	434 427	499 492	452 444
9 12	21	427	423 389	431 396	415	438	409	450 414	408 375	472	424 388
12	22 23	392 354	350	357	381 343	402 363	376 337	374	375	434 391	366
18	24	320	317	323	310	328	305	337	307	354	319
Peak	Summer	202 Base Load	21 Load w/EE	202 Base Load	25 Load w/EE	203 Base Load	30 Load w/EE	20 Base Load	35 Load w/EE	20 Base Load	40 Load w/EE
Hours	07/10	(MW)	Curtailment								
18 20	1 2	350 327	347 324	353 330	338 315	359 336	318 295	369 345	307 283	387 362	316 291
22	3	315	311	317	302	323	282 275	332	269 262	348	277
24 23	4 5	308 312	305 309	311 315	295 299	316 320	279	325 329	266	341 345	269 274
21	6 7	323	322 340	326 345	313	332	291 310	341 361	274	357	280
19 17	8	342 376	371	379	332 358	351 385	335	396	294 317	378 415	301 325
15 13	9 10	414 456	410 452	418 460	397 441	425 467	374 421	437 481	358 410	458 504	367 424
12	11	494	490	499	480	507	460	522	451	546	467
9 7	12 13	536 567	532 563	540 572	522 553	549 581	502 534	565 598	494 527	592 626	512 546
3	14	594	590	599	581	609	562	626	556	656	576
1	15 16	617 608	613 604	622 614	604 593	632 624	586 574	651 642	580 563	682 673	602 582
4	17	584	579	589	568	599	548	616	536	645	554
2 4 5 6 8	18 19	577 567	572 565	582 573	561 560	591 582	541 542	608 598	529 532	637 627	547 550
8	20	543	541	548	535	557	517	573	506	600	523
10 11	21 22	527 499	523 495	532 504	513 486	540 512	493 467	556 526	482 455	583 551	498 469
14	23	446	442	450	432	457	412	470	399	492	410
16	24	396	393	400	384	406	365	418	355	438	367

Technical, Economic, and Achievable Energy Efficiency Potential (MWh) 1,600,000 1,400,000 1,200,000 1,000,000 800,000 600,000 400.000 200.000 Economic Barriers
 Achievable Potential

Combined					
	2021	2025	2030	2035	2040
Technical Potential (MWh) Heating	29,905	32,310	35,437	38,592	42,105
Cooling	29,905	32,310	209,184	224,819	240,042
Ventilation	33,929	33,102	32,209	31,425	30,744
Water Heating	16.009	17,151	18,531	19.851	21,281
Lighting	437.265	435.517	435,002	435,191	436.379
Cooking	33,850	36,496	39,741	42,749	45,594
Office Equipment & Computing	4,396	4,740	5,161	5,552	5,921
Refrigeration	83,923	89,596	96,546	102,993	109,144
Miscellaneous	363,277	398,594	441,360	480,959	518,920
Total Technical Potential (MWh)	1,181,269			1,382,130	
Economic Detentici (MW/h)	2021	2025	2030	2035	2040
Economic Potential (MWh) Heating	16.564	17,345	18 291	19,183	20.113
Cooling	114,141	122,979	133,803	143.867	153 525
Ventilation	15,850	15,268	14,677	14,189	13,799
Water Heating	10,000	10,200			
Lighting	148,100	155,813	222.840	233.014	234,473
Cooking	23,358	25,183	27,423	29,498	31,461
Office Equipment & Computing					
Refrigeration	78,698	83,998	90,497	96,514	102,198
Miscellaneous	315,003	346,867	387,212	422.947	456,739
Total Economic Potential (MWh)	711,714	767,452	894,742	959,213	1,012,309
	2021	0005		0005	2040
Achievable Potential (MWh) Heating	2021	2025 4 175	2030 11.512	2035 14 398	15,145
Cooling	873	12.508	60,566	100.659	114,240
Ventilation	28	565	3,371	7,638	8,992
Water Heating	20		3,371	1,030	0,092
Lighting	25,214	72.884	116,404	146,510	162,148
Cooking	753	6,062	17,260	19,080	15,297
Office Equipment & Computing	100	0,002	17,200	10,000	10,207
Refrigeration	2.687	20,543	54.266	63.884	50,192
Miscellaneous	6 296	39,146	92,927	163,482	211,641
Total Achievable Potential (MWh)	36,385	155,883	356,306	515,652	577,656
Incremental Achievable Potential (MWh)	2021	2025	2030	2035	2040
Heating	534	1,147	1,884	1,502	1,915
Cooling	873	5,001	11,881	6,667	3,731
Ventilation	28	231	796	718	116
	-	-	-	-	-
Lighting	25,214	9,604	21,552	27,907	22,078
Lighting Cooking	25,214 753	9,604 1,696	21,552 2,113	- 27,907 740	22,078 1,744
Lighting Cooking Office Equipment & Computing	753	1,696	2,113	740	1,744
Lighting Cooking Office Equipment & Computing Refrigeration	753 2,687	1,696 - 5,857	2,113 7,200	740	1,744 3,023
Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous	753	1,696	2,113	740	1,744
Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh)	753 2,687 6,296 36,385	1,696 - 5,857 10,037 33,573	2,113 7,200 22,224 67,649	740 - 1,635 36,257 75,426	1,744 3,023 43,475 76,082
Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s)	753 2,687 6,296 36,385 2021	1,696 5,857 10,037 33,573 2025	2,113 - 7,200 22,224 67,649 2030	740 1,635 36,257 75,426 2035	1,744 3,023 43,475 76,082 2040
Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating	2,687 6,296 36,385 2021 \$590	1,696 5,857 10,037 33,573 2025 \$1,193	2,113 7,200 22,224 67,649 2030 \$1,886	740 1,635 36,257 75,426 2035 \$1,455	1,744 3,023 43,475 76,082 2040 \$1,798
Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling	753 2,687 6,296 36,385 2021 \$590 \$624	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495	740 1,635 36,257 75,426 2035 \$1,455 \$4,325	1,744 3,023 43,475 76,082 2040 \$1,798 \$2,664
Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Ancemental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation	2,687 6,296 36,385 2021 \$590	1,696 5,857 10,037 33,573 2025 \$1,193	2,113 7,200 22,224 67,649 2030 \$1,886	740 1,635 36,257 75,426 2035 \$1,455	1,744 3,023 43,475 76,082 2040 \$1,798
Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating	753 2,687 6,296 36,385 2021 \$590 \$624 \$18	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$156	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$588	740 1,635 36,257 75,426 2035 \$1,455 \$4,325 \$605	1,744 3,023 43,475 76,082 2040 \$1,798 \$2,664 \$132
Lighting Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting	753 2,687 6,296 36,385 2021 \$590 \$624 \$18 \$8,128	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$156 \$4,166	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$588 \$6,882	740 1,635 36,257 75,426 2035 \$1,455 \$4,325 \$605 \$9,668	1,744 3,023 43,475 76,082 2040 \$1,798 \$2,664 \$132 \$7,682
Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking	753 2,687 6,296 36,385 2021 \$590 \$624 \$18	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$156	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$588	740 1,635 36,257 75,426 2035 \$1,455 \$4,325 \$605	1,744 3,023 43,475 76,082 2040 \$1,798 \$2,664 \$132
Lighting Office Equipment & Computing Refrigeration Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (5000s) Main Costing Venillation Water Heating Lighting Cooking Office Equipment & Computing	753 2,687 6,296 36,385 2021 \$590 \$624 \$18 \$8,128 \$8,128 \$131	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$156 \$4,166 \$295	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$588 \$6,882 \$368	740 1,635 36,257 75,426 2035 \$1,455 \$4,325 \$605 \$9,668 \$106	1,744 3,023 43,475 76,082 2040 \$1,798 \$2,664 \$132 \$7,682 \$267
Lighting Cooking Office Equipment & Computing Refrigeration Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration	753 2,687 6,296 36,385 2021 \$590 \$624 \$18 \$8,128 \$131 \$1,464	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$156 \$4,166 \$295 \$3,266	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$588 \$588 \$6,882 \$6,882 \$368 \$368	740 1,635 36,257 75,426 2035 \$1,455 \$4,325 \$605 \$9,668 \$106 \$106	1,744 3,023 43,475 76,082 2040 \$1,798 \$2,664 \$132 \$7,682 \$267 \$1,510
Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooking United States (\$000 States) Ventice Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous	753 2,687 6,296 36,385 2021 \$590 \$624 \$18 \$8,128 \$8,128 \$131	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$156 \$4,166 \$295	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$588 \$6,882 \$368	740 1,635 36,257 75,426 2035 \$1,455 \$4,325 \$605 \$9,668 \$106	1,744 3,023 43,475 76,082 2040 \$1,798 \$2,664 \$132 \$7,682 \$267
Lighting Cooking Office Equipment & Computing Refrigeration Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Uventiation Upthing Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s)	753 2,687 6,296 36,385 2021 \$590 \$624 \$18 \$1,464 \$1,556 \$12,510	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$156 \$4,166 \$295 \$3,266 \$2,548 \$14,846	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$5,888 \$6,882 \$368 \$4,034 \$5,904 \$27,158	740 1.635 36.257 75,426 2035 \$1,455 \$4,325 \$605 \$9,668 \$106 \$1,655 \$4,325 \$605 \$4,325 \$605 \$1,455 \$4,325 \$605 \$1,655 \$4,325 \$605 \$1,655 \$4,325 \$605 \$1,655 \$4,325 \$605 \$1,655 \$4,325 \$605 \$1,655 \$4,325 \$605 \$1,655 \$4,325 \$605 \$1,655 \$4,325 \$605 \$1,655 \$4,325 \$605 \$1,655 \$4,325 \$605 \$1,655 \$605 \$1,655 \$4,325 \$605 \$1,655 \$605 \$1,655 \$4,325 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$605 \$1,655 \$1,655 \$605 \$1,655 \$1,5555 \$1,5555 \$1,5555 \$1,5555 \$1,555	1,744 3,023 43,475 76,082 2040 \$1,798 \$2,664 \$132 \$7,682 \$267 \$7,682 \$267 \$1,510 \$11,737
Lighting Cooking Office Equipment & Computing Refrigeration Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s)	753 2,667 <u>6,296</u> 36,385 2021 \$590 \$624 \$18 \$8,128 \$1,464 \$1,556 \$12,510 2021-2025	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$156 \$255 \$3,266 \$2,548 \$14,846 \$206-2030	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$588 \$6,882 \$368 \$4,03 \$4,03 \$5,904 \$27,158 2031-2035	740 1,635 36,257 75,426 2035 \$1,455 \$4,355 \$4,355 \$0,678 \$0,678 \$0,674 \$26,476 2036-2040	1,744 3,023 43,475 76,082 2040 \$1,798 \$2,664 \$132 \$7,682 \$267 \$7,682 \$267 \$1,510 \$11,737
Lighting Cooking Office Equipment & Computing Refrigeration Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooking Uventiataton Uphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s)	753 2,687 6,296 36,385 2021 \$590 \$624 \$18 \$18,128 \$131 \$1,556 \$12,510 2021-2025 \$4,447	1,696 5,857 10,037 33,573 2025 \$1,193 \$1,93 \$1,193 \$1,56 \$1,193 \$1,56 \$1,193 \$1,66 \$2,548 \$14,846 \$14,846 \$2,548 \$14,846\$2,548 \$14,846 \$2,548 \$14,846\$2,548 \$14,846 \$2,548 \$14,846\$2,548 \$14,846\$2,548 \$14,846\$2,548 \$14,846\$2,548 \$14,846\$2,548 \$14,846\$2,548 \$14,846\$2,548 \$14,846\$2,548 \$14,846\$2,548 \$15,847 \$15,847\$2,548 \$15,847\$2,548 \$15,847\$2,548 \$15,847\$2,548 \$15,847\$2,548 \$15,847\$2,548 \$15,847\$2,548 \$15,847\$2,548 \$16,947\$2,548 \$16,9	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$5,888 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3666 \$3666 \$3666 \$3666 \$3666 \$36666 \$366666666	740 1,635 36,257 75,426 2035 \$1,455 \$605 \$605 \$0,668 \$106 \$106 \$106 \$106 \$106 \$106 \$106 \$1,455 \$605 \$605 \$205 \$1,455 \$605 \$205 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$0,577 \$1,655 \$605 \$1,455 \$205 \$1,455 \$1,455 \$605 \$1,455 \$1,455 \$605 \$1,455 \$205 \$1,455 \$205 \$1,455 \$205 \$1,455 \$205 \$1,455 \$205	1,744 3,023 43,475 76,082 2040 \$1,798 \$2,664 \$132 \$7,682 \$267 \$7,682 \$267 \$1,510 \$11,737
Lighting Office Equipment & Computing Refigeration Nitecellancous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Valitation Water Heating Lighting Cooking Office Equipment & Computing Office Equipment & Computing Office Equipment & Computing Office Equipment & Computing Office Equipment & Computing Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling	753 2.687 6.296 36,385 2021 \$590 \$624 \$18 \$18 \$18,128 \$1,464 \$1,556 \$12,510 2021.2025 \$4,447 \$8,329	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,205 \$1,193 \$3,265 \$2,548 \$14,846 \$295 \$3,266 \$2,548 \$14,846 \$205 \$3,266 \$2,548 \$14,846	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$588 \$368 \$368 \$368 \$4,034 \$27,158 2031-2035 \$7,684 \$29,110	740 1,635 36,257 75,426 2035 \$1,455 \$4,325 \$605 \$9,668 \$106 \$106 \$0,674 \$26,476 2036-2040 \$8,529 \$1,5671	1,744 3,023 43,475 76,082 2040 \$1,798 \$2,664 \$132 \$7,682 \$267 \$7,682 \$267 \$1,510 \$11,737
Lighting Cooking Office Equipment & Computing Refrigeration Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Wentilation Water Heating Water Heating Miscellaneous Total Incremental Costs (\$000s) Mutti-Year Cumulative Costs (\$000s) Heating Cooling	753 2,687 6,296 36,385 2021 \$590 \$624 \$18 \$18,128 \$131 \$1,556 \$12,510 2021-2025 \$4,447	1,696 5,857 10,037 33,573 2025 \$1,193 \$1,93 \$1,193 \$1,203 \$1,193 \$1,193 \$1,203 \$1,193 \$1,290\$	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$5,888 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3686 \$3666 \$3666 \$3666 \$3666 \$3666 \$36666 \$366666666	740 1,635 36,257 75,426 2035 \$1,455 \$605 \$605 \$0,668 \$106 \$106 \$106 \$106 \$106 \$106 \$106 \$1,455 \$605 \$605 \$205 \$1,455 \$605 \$205 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$605 \$1,455 \$0,577 \$1,655 \$605 \$1,455 \$205 \$1,455 \$1,455 \$605 \$1,455 \$1,455 \$605 \$1,455 \$205 \$1,455 \$205 \$1,455 \$205 \$1,455 \$205 \$1,455 \$205	1,744 3,023 43,475 76,082 2040 \$1,798 \$2,664 \$132 \$7,682 \$267 \$7,682 \$267 \$1,510 \$11,737
Lighting Office Equipment & Computing Refrigeration Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Ventilation Weter Heating	753 2.687 6.296 36,385 2021 \$590 \$524 \$18 \$18 \$1,31 \$1,464 \$1,556 \$12,510 2021-2025 \$4,447 \$8,329 \$374	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$156 \$3,220 \$1,93 \$3,220 \$1,93 \$2,548 \$1,846 \$205 \$2,548 \$1,846 \$205 \$7,907 \$31,043 \$2,014	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$588 \$36,882 \$3688 \$4,034 \$27,158 \$2031-2035 \$7,644 \$29,110 \$3,376	740 1,635 36,257 75,426 2035 \$4,325 \$6,325 \$4,355 \$4,355 \$4,355 \$4,355 \$4,355 \$4,355 \$4,355 \$4,355 \$4,355 \$4,355 \$4,355 \$4,559 \$4,557 \$4,576	1,744 3,023 43,475 76,082 2040 \$1,798 \$2,664 \$132 \$7,682 \$267 \$7,682 \$267 \$1,510 \$11,737
Lighting Cooking Office Equipment & Computing Refrigeration Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Cooling Water Heating Cooling Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting	753 2,687 6,296 36,385 \$590 \$624 \$18 \$131 \$131 \$131 \$1,556 \$12,510 2021-2025 \$4,447 \$8,329 \$374 \$374	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$156 \$2,2548 \$14,846 \$2,2548 \$14,846 \$2,2548 \$14,846 \$2,2548 \$14,846 \$2,2548 \$14,846 \$2,2548 \$14,846 \$2,2548 \$14,846 \$2,2548 \$14,846 \$2,2548 \$14,846 \$2,2548 \$14,846 \$2,2548 \$14,846 \$2,2548 \$14,846 \$2,2548 \$14,846 \$2,2548 \$14,846 \$2,2548 \$14,846 \$2,2548 \$14,947\\\$14,947\\\$14,	2,113 7,200 22,224 67,649 2030 \$1,886 \$1,886 \$1,886 \$5,944 \$5,904 \$27,158 \$7,684 \$27,158 \$7,684 \$29,110 \$3,376 \$3,8119	740 1,635 36,257 75,426 2035 \$1,455 \$4,325 \$605 \$9,668 \$106 \$0,664 \$0,664 \$0,674 \$26,476 2036-2040 \$5,529 \$15,671 \$1,475 \$37,392	1,744 3,023 43,475 76,082 \$1,798 \$2,664 \$1,798 \$2,664 \$1,798 \$1,576 \$2,662 \$2,6
Lighting Ordice Equipment & Computing Refrigeration Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Venilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscelaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Venilation Water Heating Lighting Cooking	753 2.687 6.296 36,385 2021 \$590 \$524 \$18 \$18 \$1,31 \$1,464 \$1,556 \$12,510 2021-2025 \$4,447 \$8,329 \$374	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$156 \$3,220 \$1,93 \$3,220 \$1,93 \$2,548 \$1,846 \$205 \$2,548 \$1,846 \$205 \$7,907 \$31,043 \$2,014	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$588 \$36,882 \$3688 \$4,034 \$27,158 \$2031-2035 \$7,644 \$29,110 \$3,376	740 1,635 36,257 75,426 2035 \$4,325 \$6,325 \$4,355 \$4,355 \$4,355 \$4,355 \$4,355 \$4,355 \$4,355 \$4,355 \$4,355 \$4,355 \$4,355 \$4,559 \$4,557 \$4,576	1,744 3,023 43,475 76,082 \$1,798 \$2,664 \$1,798 \$2,664 \$1,798 \$1,576 \$2,662 \$2,6
Lighting Cooking Office Equipment & Computing Refrigeration Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Office Equipment & Computing Mitis-Vaer Cumulative Costs (\$000s) Multi-Yaer Cumulat	753 2,687 6,296 36,385 \$500 \$624 \$18 \$18,128 \$14,44 \$1,556 \$12,510 2021-2025 \$4,447 \$8,329 \$374 \$8,329 \$374 \$24,262 \$1,056	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$156 \$2256 \$2,2568 \$2,2568 \$2,2568 \$2,2568 \$2,2568 \$14,846 2026-2030 \$,31,043 \$2,014\$}\$2,014 \$2,014\$}\$2,014 \$2,014\$}\$2,014 \$2,014\$}\$2,014 \$2,014\$}\$2,014 \$2,014\$}\$2,014\$}\$2,014 \$2,014\$}\$2,014\$}\$2,014 \$2,014\$}\$2,015\$}\$2,014\$}\$2,014\$}\$2,015\$}\$2,014\$}\$2,015\$}\$2,016\$}	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$5,88 \$3,403 \$2,5904 \$27,158 \$7,684 \$29,110 \$3,376 \$7,684 \$29,110 \$3,376 \$3,38,119 \$9599	740 1,635 36,257 75,426 2035 \$1,455 \$4,325 \$605 \$9,668 \$1046 \$643 \$9,674 \$26,476 2036-2040 \$8,529 \$15,671 \$1,475 \$37,392 \$989 -	1,744 3,023 43,475 76,082 \$1,798 \$2,664 \$1,798 \$2,664 \$1,798 \$1,576 \$2,662 \$2,6
Lighting Office Equipment & Computing Refrigeration Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Venilation Water Heating Uphting Cooking Office Equipment & Computing Refrigeration Multi-Year Cumulative Costs (\$000s) Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooking Cooking Office Equipment & Computing Refrigeration	753 2,687 6,296 36,385 \$2021 \$590 \$624 \$18 \$131 \$1,464 \$12,510 \$12,510 \$2021-2025 \$4,447 \$8,329 \$374 \$24,262 \$1,056 \$11,705	1,696 5,857 10,037 33,573 33,573 33,573 33,573 33,573 33,573 33,573 33,573 33,575 51,193 53,266 52,548 \$14,846 \$205-2030 \$14,846 \$2026-2030 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$1,1937 \$	2,113 7,200 22,224 67,649 57,649 5,588 5,588 5,588 5,588 5,588 5,588 5,588 5,588 5,588 5,588 5,588 5,7,158 5,7,684 5,29,110 5,37,684 5,29,110 5,37,684 5,7,895 5,7,7,895 5,7,995 5,7,9	740 1,635 36,257 75,426 \$1,455 \$4,325 \$805 \$9,668 \$106 \$9,668 \$106 \$9,668 \$106 \$9,664 \$26,476 \$26,476 \$26,476 \$35,529 \$15,671 \$1,475 \$36,529 \$15,671 \$1,475 \$26,476	1,744 3,023 43,475 76,082 \$1,798 \$2,664 \$1,798 \$2,664 \$1,798 \$1,576 \$2,662 \$2,6
Lighting Cooking Office Equipment & Computing Refrigeration Viscollancous Total Incremental Achievable Potential (MVM) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Office Equipment & Computing With Strag Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Mult	753 2,687 6,296 36,385 \$500 \$500 \$620 \$131 \$131 \$1,464 \$1,556 \$12,510 2021-2025 \$4,447 \$8,329 \$374 \$12,510 \$24,262 \$11,705 \$9,858	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,260 \$156 \$295 \$3,266 \$2,548 \$14,846 2026-2030 \$7,907 \$31,043 \$2,014 \$28,058 \$1,957 \$2,058 \$1,957 \$2,1441 \$21,686	2,113 7,200 22,224 67,649 2030 51,886 \$7,849 \$1,886 \$7,849 \$36,882 \$368 \$4,034 \$27,158 \$29,110 \$3,376 \$7,684 \$29,110 \$3,376 \$7,684 \$29,110 \$3,38,119 \$9,348 \$41,603	740 1,635 36,257 75,426 \$1,455 \$4,355 \$605 \$9,668 \$106 \$9,668 \$106 \$0,674 \$26,476 2036-2040 \$8,529 \$15,671 \$1,475 \$3,7392 \$5,337 \$5,4,513	1,744 3,023 43,475 76,082 \$1,798 \$2,664 \$1,798 \$2,664 \$1,798 \$1,576 \$2,662 \$2,6
Lighting Cooking Office Equipment & Computing Refrigeration Viscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooking Office Equipment & Computing Refrigeration Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Vanilation Valer Heating Upting Office Equipment & Computing Refrigeration Miscellaneous Total Encrement & Computing Refrigeration Refrigeration Miscellaneous Total S-Year Costs (\$000s)	2,687 6,296 36,385 2021 \$590 \$624 \$18 \$18 \$1,856 \$12,510 2021-2025 \$4,447 \$4,329 \$3,74 \$24,262 \$1,056 \$11,705 \$9,858 \$60,300	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$3,225 \$3,226 \$2,548 \$14,846 \$25,548 \$14,846 \$2026-2030 \$7,907 \$31,043 \$7,907 \$31,043 \$7,907 \$31,043 \$2,950 \$14,100 \$1,950 \$1	2,113 7,200 22,224 67,649 57,649 55588 55888 56,82 \$3688 54,034 \$27,158 \$27,158 \$27,158 \$27,158 \$27,158 \$27,158 \$27,158 \$3,376\$3,376 \$3,3766 \$3,376 \$3,3766 \$3,3766 \$3,3766 \$3,3766 \$3,3766 \$3,3766 \$3,3766 \$	740 1.635 36.257 75,426 2035 \$1,455 \$4,455 \$4,605 \$9,668 \$106 \$0,674 \$26,476 2036-2049 \$15,671 \$1,475 \$4,515 \$4,513 \$122,906	1,744 3,023 43,475 76,082 \$1,798 \$2,664 \$1,798 \$2,664 \$1,798 \$1,576 \$2,662 \$2,6
Lighting Office Equipment & Computing Refrigeration Viscollanceous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Valter Heating Lighting Cooking Valter Heating Lighting Cooking Valter Heating Cooking Water Heating Cooling Ventilation Water Heating Lighting Cooling Ventilation Mater Heating Lighting Cooling Ventilation Mater Heating Cooling Ventilation Mater Heating Lighting Cooling Ventilation Ventilation Mater Heating Lighting Cooling Ventilation	24,262 24,447 26,296 2021 \$550 \$550 \$550 \$550 \$550 \$131 \$131 \$1,464 \$1,556 \$12,510 2021-2025 \$4,447 \$8,329 \$374 \$1,556 \$12,410 \$1,464 \$1,556 \$12,510 \$24,262 \$1,170 \$2,825 \$4,447 \$1,556 \$11,705 \$2,856 \$11,705 \$1,856 \$11,705 \$1,856 \$11,705 \$1,856 \$11,705 \$1,857 \$1	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,267 \$1,193 \$3,268 \$2,548 \$14,846 2026-2030 \$7,907 \$31,043 \$2,014 \$28,058 \$14,846 \$2,548 \$14,846 \$2,548 \$14,846 \$2,2474 \$21,686 \$14,100 \$22,474	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$5,888 \$5,888 \$6,882 \$3,688 \$20,110 \$3,376 \$22,1158 \$7,684 \$29,110 \$3,376 \$3,376 \$3,376 \$3,376 \$29,110 \$3,376 \$3,376 \$3,376 \$29,110 \$3,376 \$3,376 \$29,110 \$3,376 \$3,376 \$3,376 \$3,376 \$29,110 \$3,376\$3,376 \$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376\$3,376 \$3,376\$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376\$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,37	740 1,635 36,257 75,445 \$1,455 \$4,355 \$605 \$9,668 \$106 \$9,668 \$106 \$2036-2040 \$5,529 \$15,671 \$1,475 \$3,37,392 \$5,337 \$4,513 \$12,3906 \$24,406	1,744 3,023 43,475 76,082 \$1,798 \$2,664 \$1,798 \$2,664 \$1,798 \$1,576 \$2,662 \$2,6
Lighting Cooking Office Equipment & Computing Refrigeration Niscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooking Office Equipment & Computing Refrigeration Mutel-Year Cumulative Costs (\$000s) Mutel-Year Costs (\$000s) Participant Cost Utility Incentives	753 2,687 6,296 36,385 2021 \$550 \$62,44 \$18 \$1,84 \$1,556 \$12,510 \$21,2510 \$21,2510 \$24,262 \$1,056\$1,056 \$1,056\$1,0	1,696 5,857 10,037 33,573 2025 \$1,193 \$1,290 \$1,193 \$1,290 \$1,193 \$1,290 \$1,295 \$2,548 \$14,846 \$2,2548 \$14,846 \$1,950 \$7,907 \$31,043 \$2,8,058 \$1,950 \$2,2474 \$2,1441 \$21,441\$21,441\$21,441\$21,441\$21,441\$21,441\$21,441\$21,441\$21,441\$2	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$7,495 \$3,688 \$5,888 \$40,34 \$5,904 \$27,158 2031-2035 \$7,684 \$29,590 \$38,119 \$959 \$38,119 \$959 \$338,119 \$959 \$338,119 \$35,2646 \$76,937	740 1.635 36.257 75,426 2035 \$1,455 \$405 \$605 \$605 \$006 \$106 \$106 \$1,455 \$405 \$605 \$605 \$605 \$605 \$006 \$1,455 \$405 \$605 \$505	1,744 3,023 43,475 76,082 \$1,798 \$2,664 \$1,798 \$2,664 \$1,798 \$1,576 \$2,662 \$2,6
Lighting Cooking Office Equipment & Computing Refigeration Nitecellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Valiet Heating Lighting Cooking Office Equipment & Computing Office Equipment & Computing Office Equipment & Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Cooling Ventilation Water Heating Lighting Cooling Officing Officing Officing Multi-Year Costs (\$000s) Total Scar Scar (\$000s) Fatal Scar Costs (\$000s)	753 2,687 6,296 36,385 2021 \$550 \$624 \$18 \$18 \$18 \$13,444 \$1,556 \$12,510 \$2021-2025 \$4,447 \$12,510 \$3,744 \$1,556 \$4,447 \$3,374 \$1,056 \$11,824 \$10,566 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,824 \$11,825 \$11,824 \$11,825 \$11,824 \$11,825\$\$11,825\$\$11,825\$\$11,825\$\$11,825\$\$11,825\$\$11,825\$\$11,825\$	1,696 5,857 10,037 33,573 33,573 33,573 33,220 \$1,193 \$3,220 \$1,255 \$3,266 \$2,2548 \$14,846 \$14,846 \$14,846 \$14,846 \$1,907 \$31,047 \$20,25,2014 \$21,25,2014 \$21,25,2014 \$21,25,2014 \$21,25,2014 \$21,25,2014 \$21,25,2014 \$21,25,2014 \$21,25,2014 \$21,25,2014 \$21,25,2014 \$21,25,2014 \$21,25,2014 \$21,25,2014 \$21,25,2014 \$21,25,2014 \$21,25,2014 \$22,25,2014 \$21,25,2014 \$22,25,2014\$\$22,25,25,25,25,25,25,25,25,25,25,25,25,2	2,113 7,200 22,224 67,649 87,686 \$1,886 \$1,886 \$4,034 \$5,904 \$27,158 2031-2035 2031-2035 \$7,684 \$29,110 \$3,376 \$7,684 \$29,110 \$3,376 \$3,476 \$3,476 \$3,376\$3,376 \$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376\$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,376 \$3,376 \$3,376\$3,	740 1.635 36.257 75,426 2035 \$4,325 \$605 \$4,325 \$605 \$9,668 \$106 \$26,476 \$26,476 \$26,476 \$26,476 \$3,507 \$3,507 \$3,507 \$3,507 \$26,473 \$3,7392 \$3,899 \$5,537 \$54,513 \$1,475 \$3,7392 \$3,899 \$5,537 \$54,513 \$1,475 \$3,7392 \$3,899 \$3,537 \$3,53,75 \$24,406 \$3,73,217 \$26,248 \$26,246 \$24,246 \$25,247 \$25,247 \$25,247 \$25,247 \$25,247 \$26,476 \$26,476 \$26,476 \$26,476 \$26,476 \$26,476 \$26,476 \$26,476 \$26,476 \$26,476 \$26,476 \$26,476 \$26,476 \$26,476 \$26,299 \$3,579 \$25,377 \$26,476 \$24,475 \$26,283 \$26,285 \$26,285 \$26,285 \$26,285 \$26,285 \$26,285 \$26,285	1,744 3,023 43,475 76,082 2040 \$1,788 \$2,664 \$132 \$7,682 \$2,854 \$132 \$7,682 \$2,854 \$132 \$2,5789
Lighting Cooking Office Equipment & Computing Refrigeration Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooking Office Equipment & Computing Refrigeration Mitescellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooling Ventilation Refrigeration Mice Equipment & Computing Refrigeration Mice Increment & Computing Refrigeration Mice Incours Total S-Year Costs (\$000s) Participant Cost Utility Incentives Utility Administrative Costs	2,687 6,296 36,385 2021 \$550 \$624 \$1550 \$12,510 \$1,464 \$1,556 \$12,510 \$2021-2025 \$4,447 \$1,556 \$12,510 \$2021-2025 \$4,447 \$1,556 \$12,510 \$2021-2025 \$4,447 \$1,755 \$4,947 \$1,755 \$1,955 \$1,955 \$1,1655 \$1,1655 \$1,1655 \$1,1655 \$1,1655 \$1,175 \$1,1755 \$1,1655 \$1,1755\$\$1,1755\$\$1	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$1,573 \$1,907 \$3,266 \$2,548 \$2,548 \$2,648 \$2,548 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$14,000 \$2,014 \$1,907 \$2,014 \$1,907 \$	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$5,888 \$4,034 \$5,904 \$27,158 2031-2035 \$7,684 \$27,158 2031-2035 \$7,684 \$29,348 \$41,803 \$130,201 \$25,646 \$76,937 \$27,618 2236	740 1.635 36.257 75,426 2035 \$1,455 \$4,406 \$4,425 \$4,405 \$4,252,283 \$2,4406 \$4,406	1,744 3,023 43,475 76,082 \$2,664 \$2,664 \$2,267 \$7,682 \$2,67 \$1,570 \$11,737 \$25,789
Lighting Cooking Office Equipment & Computing Refrigeration Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Valler Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellarences Total Incremental Costs (\$000s) Multi-Year Comunitive Costs (\$000s) Multi-Year Comunitive Costs (\$000s) Heating Cooking Office Equipment & Computing Refrigeration Multi-Year Costs (\$000s) Total Stream Costs (\$000s) Destinger Costs (\$00	2,687 6,296 36,385 2021 \$\$590 \$\$24 \$18 \$13 \$1,464 \$12,510 2021-2025 \$4,447 \$12,510 \$12,510 \$374 \$374 \$374 \$374 \$374 \$374 \$374 \$374	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$156 \$2,548 \$14,846 2026-2030 \$7,907 \$31,043 \$2,014 \$24,058 \$14,846 \$22,474 \$24,058 \$14,846 \$22,474 \$24,058 \$14,100 \$22,474 \$24,203 \$22,474 \$27,423 \$24,203 \$25,205 \$25,205 \$25,205 \$25,205 \$25,205 \$25,205 \$25,205 \$25,205	2,113 7,200 22,224 67,649 67,649 2030 51,886 57,495 5588 2368 2368 2368 237,458 237,458 237,458 227,118 229,110 53,376 57,684 529,110 53,376 53,8119 525,646 541,603 525,646 576,937 527,618 225,646 576,937 527,618 225,646 576,937 527,618	740 1.635 36.257 75,426 2035 \$4.325 \$605 \$5,668 \$106 \$5,643 \$5,668 \$106 \$5,643 \$5,674 \$26,476 2036-2040 \$8,629 \$15,671 \$26,476 2036-2040 \$5,637 \$5,513 \$12,3906 \$7,542,613 \$12,3906 \$7,542,613 \$24,446 \$24,305 \$24,406 \$3,217 \$26,273 \$24,245 \$25,247 \$26,245 \$26,245 \$25,247 \$26,245 \$26,245 \$25,247 \$26,245 \$26,245 \$26,245 \$27,247 \$26,245 \$26,245 \$27,247 \$26,245	1,744 3,023 43,475 76,082 2040 \$1,798 \$2,664 \$3,2 57,682 \$2,674 \$1,570 \$12,5789 \$15,5789 \$25,789
Lighting Cooking Office Equipment & Computing Refrigeration Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooking Office Equipment & Computing Refrigeration Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Total Brances Total Brances	2,687 6,296 36,385 2021 \$\$590 \$\$24 \$18 \$13 \$1,464 \$12,510 2021-2025 \$4,447 \$12,510 \$12,510 \$374 \$374 \$374 \$374 \$374 \$374 \$374 \$374	1,696 5,857 10,037 33,573 2025 \$1,193 \$3,220 \$1,573 \$1,907 \$3,266 \$2,548 \$2,548 \$2,648 \$2,548 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$2,648 \$14,000 \$2,014 \$1,907 \$2,014 \$1,907 \$	2,113 7,200 22,224 67,649 2030 \$1,886 \$7,495 \$5,888 \$4,034 \$5,904 \$27,158 2031-2035 \$7,684 \$27,158 2031-2035 \$7,684 \$29,348 \$41,803 \$130,201 \$25,646 \$76,937 \$27,618 2236	740 1.635 36.257 75,426 2035 \$1,455 \$4,406 \$4,425 \$4,405 \$4,252,283 \$2,4406 \$4,406	1,744 3,023 43,475 76,082 \$2,664 \$2,664 \$2,267 \$7,682 \$2,67 \$1,570 \$11,737 \$25,789



Residential Technical Potential (MWh)	2021	2025	2030	2035	204
Heating	25.544	27.607	30.316	33.083	36.23
Cooling	38,384	41,122	44,431	47,594	51,02
Ventilation	18,079	17,835	17.533	17.236	16,94
Water Heating	16,009	17,151	18,531	19.851	21.28
Lighting	58,594	57,855	56,942	56,043	55,15
Cooking	00,004 n/a	n/a	00,342 n/a	00,040 n/a	00,10
Office Equipment & Computing	n/a	n/a	n/a	n/a	n/
Refrigeration	14,481	14,726	15.019	15.294	15.60
Miscellaneous	69,383	74.332	80,315	86,032	92.23
Total Technical Potential (MWh)	240,472	250,627	263,087	275,134	288,47
Example Determine (ANA)	2021	2025	2030	2035	204
Economic Potential (MWh) Heating	12 936	13 432	14.031	14.600	15,22
Cooling	12,268	13,143	14,201	15,212	16,30
Ventilation		· · ·	· -	-	
Water Heating	-		-	-	
Lighting	7,672	7,582	56,942	56,043	55,15
Cooking	n/a	n/a	n/a	n/a	n/
Office Equipment & Computing	n/a	n/a	n/a	n/a	n/
Refrigeration	9,255	9,127	8,970	8,815	8,66
Miscellaneous	22,675	24,292	28,004	29,998	32,15
Total Economic Potential (MWh)	64,805	67,577	122,148	124,668	127,51
Achievable Potential (MWh)	2021	2025	2030	2035	204
Heating	417	3.233	8,831	10,961	11,47
Cooling	396	3,164	8,938	11,409	12,23
Ventilation	-	· · · -	-		
Water Heating	-		-	-	
Lighting	1.273	3.642	28.668	37.295	40.00
Cooking	n/a	n/a	n/a	n/a	n/
Office Equipment & Computing	n/a	n/a	n/a	n/a	n/
Refrigeration	298	2,197	3,448	989	
Miscellaneous	1,687	9,182	15,714	16,562	18,31
Total Achievable Potential (MWh)	4,071	21,418	65,599	77,215	82,02
Incremental Achievable Potential (MWh)	2021	2025	2030	2035	204
Heating	417	883	1,439	1,140	1,45
Cooling	396	881	1,479	1.202	1,56
Ventilation	-			· · · -	
Water Heating	-	-	-	-	
Lighting	1,273	407	12,405	9,530	8,04
Cooking	n/a	n/a	n/a	n/a	n/
Office Equipment & Computing	n/a	n/a	n/a	n/a	n/
Refrigeration	298	580	593	-	
Miscellaneous	1,687	2,001	1,444	1,873	1,92
Total Incremental Achievable Potential (MWh)	4,071	4,752	17,360	13,746	12,98
Total Achievable Incremental Costs (\$000s)	2021	2025	2030	2035	204
				A	\$1.44
	\$500	\$991	\$1,544	\$1,176	
Cooling	\$500 \$331	\$991 \$736	\$1,544 \$1,237	\$1,176 \$1,005	
Heating Cooling Ventilation					
Cooling Ventilation Water Heating	\$331	\$736	\$1,237	\$1,005	\$1,31
Cooling Ventilation Water Heating Lighting	\$331 - \$270	\$736 	\$1,237 - \$3,541	\$1,005 \$2,161	\$1,31
Cooling Ventilation Water Heating Lighting Cooking	\$331 - \$270 n/a	\$736 - \$66 n/a	\$1,237 - \$3,541 n/a	\$1,005 - \$2,161 n/a	\$1,31 \$1,32 n/
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing	\$331 - \$270 n/a n/a	\$736 \$66 n/a n/a	\$1,237 \$3,541 n/a n/a	\$1,005 \$2,161	\$1,31 \$1,32 n/
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration	\$331 - \$270 n/a *81	\$736 \$66 n/a n/a \$157	\$1,237 \$3,541 n/a \$161	\$1,005 \$2,161 n/a n/a	\$1,31 \$1,32 n/ n/
Cooling Ventilation Ughting Cooking Office Equipment & Computing Refrigeration Miscelianeous	\$331 \$270 n/a n/a \$81 \$274	\$736 \$66 n/a n/a \$157 \$334	\$1,237 \$3,541 n/a n/a \$161 \$238	\$1,005 \$2,161 n/a n/a \$307	\$1,31 \$1,32 n/ n/ \$36
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s)	\$331 - \$270 n/a \$81 \$274 \$1,456	\$736 - \$66 n/a \$157 \$334 \$2,285	\$1,237 	\$1,005 - \$2,161 n/a n/a - \$307 \$4,649	\$1,31 \$1,32 n/ n/ \$36
Cooling Ventilation Water Heating Liphing Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s)	\$331 - \$270 n/a \$81 \$274 \$1,456 2021-2025	\$736 \$66 n/a \$157 \$334 \$2,285 2026-2030	\$1,237 \$3,541 n/a \$161 \$238 \$6,720 2031-2035	\$1,005 \$2,161 n/a \$307 \$4,649 2036-2040	\$1,31 \$1,32 n/ n/ \$36
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incernental Costs (\$000s) Multi-Year Cumulative Costs (\$000s)	\$331 	\$736 \$66 n/a \$157 \$334 \$2,285 2026-2030 \$6,481	\$1,237 \$3,541 n/a \$161 \$238 \$6,720 2031-2035 \$6,227	\$1,005 \$2,161 n/a n/a \$307 \$4,649 2036-2040 \$6,847	\$1,31 \$1,32 n/ n/ \$36
Cooling Water Heating Lighting Cooking Noffice Equipment & Computing Office Equipment & Computing Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling	\$331 - \$270 n/a \$81 \$274 \$1,456 2021-2025	\$736 \$66 n/a \$157 \$334 \$2,285 2026-2030	\$1,237 \$3,541 n/a \$161 \$238 \$6,720 2031-2035	\$1,005 \$2,161 n/a \$307 \$4,649 2036-2040	\$1,31
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscelianeous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation	\$331 	\$736 \$66 n/a \$157 \$334 \$2,285 2026-2030 \$6,481	\$1,237 \$3,541 n/a \$161 \$238 \$6,720 2031-2035 \$6,227	\$1,005 \$2,161 n/a n/a \$307 \$4,649 2036-2040 \$6,847	\$1,31 \$1,32 n/ n/ \$36
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Reingeration Miscolaineous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating	\$331 \$270 n/a \$81 \$274 \$1,456 2021-2025 \$3,723 \$2,644	\$736 \$66 n/a \$157 \$334 \$2,285 2026-2030 \$6,481 \$5,157	\$1,237 \$3,541 n/a \$161 \$238 \$6,720 2031-2035 \$6,227 \$5,259	\$1,005 \$2,161 n/a n/a \$307 \$4,649 2036-2040 \$6,847 \$6,127	\$1,31 \$1,32 n/ n/ \$36
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Mitecellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting	\$331 \$270 n/a \$81 \$274 \$1,456 2021-2025 \$3,723 \$2,644 \$706	\$736 \$666 n/a n/a \$1577 \$334 \$2,285 2026-2030 \$6,481 \$5,157 \$3,517 \$3,147 \$1,1354	\$1,237 \$3,541 n/a \$161 \$238 \$6,720 2031-2035 \$6,227 \$5,259 \$10,646	\$1,005 \$2,161 n/a \$307 \$4,649 2036-2040 \$6,847 \$6,127 \$8,390	\$1,31 \$1,32 n/ n/ \$36
Cooling Vantar Heating Lighting Cooking Office Equipment & Computing Refrigeration Miccilianceus Total Incorrenental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Veniliation Vanilation Vater Heating Lighting Cooking	\$331 \$270 n/a \$81 \$274 \$1,456 \$3,723 \$2,644 \$706 \$706 n/a	\$736 	\$1,237 \$3,541 n/a \$161 \$238 \$6,720 2031-2035 \$6,227 \$5,259 \$10,646 n/a \$10,646 n/a	\$1,005 \$2,161 n/a n/a \$307 \$4,649 2036-2040 \$6,847 \$6,847 \$6,847	\$1,31 \$1,32 n/ n/ \$36
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Mitecellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing	\$331 - \$270 n/a \$81 \$274 \$1,456 2021-2025 \$3,723 \$2,644 - \$706 n/a n/a	\$736 \$66 n/a \$157 \$334 \$2,285 2026-2030 \$6,481 \$5,157 \$11,354 n/a n/a	\$1,237 	\$1,005 \$2,161 n/a \$307 \$4,649 2036-2040 \$6,847 \$6,127 \$8,390	\$1,31 \$1,32 n/ n/ \$36
Cooling Varier Heating Lighting Cooking Office Equipment & Computing Refrigeration Miccilianceus Total Incorrenental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Vaniliation Varier Heating Lighting Cooking Office Equipment & Computing Refrigeration	\$331 \$270 n/a \$81 \$274 \$1,456 2021-2025 \$3,723 \$2,644 \$2,644 \$2,644 \$2,644 \$2,644 \$2,644 \$2,644 \$3,026 \$706 n/a \$596	\$736 	\$1,237 	\$1,005 \$2,161 n/a n/a \$307 \$4,649 2036-2040 \$6,847 \$6,127 \$8,390 n/a n/a n/a	\$1,31 \$1,32 n/ n/ \$36
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miccellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous	\$331 \$270 n/a \$81 \$274 \$1,456 2021-2025 \$3,723 \$2,644 - \$706 n/a \$596 \$596	\$736 \$66 n/a \$157 \$334 \$2,285 2026-2030 \$6,481 \$5,157 \$11,354 n/a \$936 \$1,356	\$1,237 \$3,541 n/a \$161 \$238 \$6,720 2031-2035 \$6,227 \$5,259 \$10,646 n/a n/a n/a \$1,250 \$268 \$1,250	\$1,005 	\$1,31 \$1,32 n/ n/ \$36
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Ventilation Ventilation Ventilation Office Equipment & Computing Refrigeration Refrigeration Refrigeration Total 5-Year Costs (\$000s)	\$331 \$270 n/a \$81 \$274 \$1,456 2021-2025 \$3,723 \$3,723 \$3,723 \$3,723 \$3,723 \$3,723 \$3,723 \$3,723 \$3,723 \$3,723 \$3,723 \$3,725 \$3,756 \$1,509 \$1,5	\$736 \$666 n/a \$157 \$2,285 2026-2030 \$6,481 \$5,157 \$11,354 \$1,356 \$1,356 \$25,284	\$1,237 \$3,541 n/a \$161 \$238 \$6,720 2031-2035 \$6,720 2031-2035 \$5,259 \$10,646 n/a \$268 \$1,250 \$2,268 \$1,250 \$2,3,650	\$1,005 \$2,161 n/a n/a \$307 \$4,649 2036-2040 \$6,847 \$6,127 \$6,127 \$6,127 \$6,847 \$6,127 \$6,847 \$6,127 \$6,847 \$6,127 \$6,847 \$6,127 \$6,847 \$6,127 \$6,847 \$6,127 \$6,847 \$6,127 \$6,847 \$6,127 \$6,240 \$6,127 \$6,127 \$6,240 \$6,	\$1,31 \$1,32 n/ n/ \$36
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miccellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous	\$331 \$270 n/a \$81 \$274 \$1,456 2021-2025 \$3,723 \$2,644 - \$706 n/a \$596 \$596	\$736 \$66 n/a \$157 \$334 \$2,285 2026-2030 \$6,481 \$5,157 \$11,354 n/a \$936 \$1,356	\$1,237 \$3,541 n/a \$161 \$238 \$6,720 2031-2035 \$6,227 \$5,259 \$10,646 n/a n/a n/a \$1,250 \$268 \$1,250	\$1,005 	\$1,31 \$1,32 n/ n/ \$36

Commercial/Industrial Technical Potential (MWh)	2021	2025	2030	2035	2040
Heating	4,362	4,703	5,121	5,509	5,875
Cooling	140,331	151,300	164,753	177,225	189,018
Ventilation	15,850	15,268	14,677	14,189	13,799
Water Heating	n/a	n/a	n/a	n/a	n/a
Lighting	378,672	377,662	378,060	379,148	381,220
Cooking	33,850	36,496	39,741	42,749	45,594
Office Equipment & Computing	4,396	4,740	5,161	5,552	5,921
Refrigeration	69,442	74,870	81,527	87,699	93,535
Miscellaneous Total Technical Potential (MWh)	293,894 940,797	324,262 989,301	361,046 1,050,086	394,927 1,106,996	426,689
Economic Potential (MWh)	2021	2025	2030	2035	2040
Heating	3 629	3,912	4,260	4.583	4 888
Cooling	101.873	109.836	4,200	128.656	137.217
Ventilation	15.850	15.268	14.677	14,189	13,799
Water Heating	n/a	n/a	n/a	n/a	n/a
Lighting	140,429	148,231	165,897	176,971	179,314
Cooking	23,358	25,183	27,423	29,498	31,461
Office Equipment & Computing	23,330	25,105	21,423	20,400	51,40
Refrigeration	69,442	74,870	81,527	87,699	93,535
Miscellaneous	292,329	322,575	359,208	392,950	424,580
Total Economic Potential (MWh)	646,909	699,875	772,594	834,545	884,79
Achievable Potential (MWh)	2021	2025	2030	2035	2040
Heating	117	942	2,681	3,437	3.666
Cooling	477	9.344	51.628	89,250	102.009
Ventilation	28	565	3.371	7.638	8,992
Water Heating	n/a	n/a	n/a	n/a	n/a
Lighting	23,941	69,242	87,736	109,215	122,147
Cooking	753	6,062	17,260	19,080	15,297
Office Equipment & Computing	-	· -	· · -	· · ·	· · · ·
Refrigeration	2,389	18,346	50,818	62,896	50,192
Miscellaneous	4,609	29,964	77,213	146,920	193,328
Total Achievable Potential (MWh)	32,314	134,465	290,707	438,437	495,632
Incremental Achievable Potential (MWh)	2021	2025	2030	2035	2040
Heating	117	264	445	363	464
Cooling	477	4,120	10,402	5,464	2,164
Ventilation	28	231	796	718	116
Water Heating	n/a	n/a	n/a	n/a	n/a
Lighting	23,941	9,197	9,147	18,377	14,036
Cooking	753	1,696	2,113	740	1,744
Office Equipment & Computing		-			
Refrigeration	2,389	5,277	6,607	1,635	3,023
Miscellaneous	4,609	8,036	20,780	34,383	41,551
Total Incremental Achievable Potential (MWh)	32,314	28,821	50,289	61,680	63,097
Total Achievable Incremental Costs (\$000s)	2021	2025	2030	2035	2040
Heating	\$90	\$203	\$342	\$279	\$357
Cooling Ventilation	\$293 \$18	\$2,484 \$156	\$6,259 \$588	\$3,320 \$605	\$1,354 \$132
Water Heating	\$18 n/a	\$150 n/a	3086 n/a	\$605 n/a	\$13. n/a
Lighting	\$7.858	1/a \$4,100	53.341	n/a \$7.506	\$6.36
Cooking	\$1,030	\$4,100	\$368	\$106	\$0,30
Office Equipment & Computing	\$131	\$290	\$300	\$100	\$201
Refrigeration	\$1,383	\$3,109	\$3,874	\$643	\$1,510
Miscellaneous	\$1,383	\$2,214	\$5,666	\$9,368	\$11,372
Total Incremental Costs (\$000s)	\$1,282	\$2,214 \$12,561	\$20,437	\$21,827	\$21,353
Multi-Year Cumulative Costs (\$000s)	\$11,055 2021-2025 :	\$12,561 2026-2030	2031-2035	2036-2040	\$21,353
Multi-Year Cumulative Costs (\$000s) Heating	\$11,055 2021-2025 \$724	\$12,561 2026-2030 \$1,427	2031-2035 \$1,457	2036-2040 \$1,681	\$21,353
Multi-Year Cumulative Costs (\$000s) Heating Cooling	\$11,055 2021-2025 : \$724 \$5,684	\$12,561 2026-2030 \$1,427 \$25,886	2031-2035 \$1,457 \$23,851	2036-2040 \$1,681 \$9,544	\$21,35
Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation	\$11,055 2021-2025 \$724 \$5,684 \$374	\$12,561 2026-2030 \$1,427 \$25,886 \$2,014	2031-2035 \$1,457 \$23,851 \$3,376	2036-2040 \$1,681 \$9,544 \$1,475	\$21,35
Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating	\$11,055 2021-2025 : \$724 \$5,684 \$374 n/a	\$12,561 2026-2030 \$1,427 \$25,886 \$2,014 n/a	2031-2035 \$1,457 \$23,851 \$3,376 n/a	2036-2040 \$1,681 \$9,544 \$1,475 n/a	\$21,35
Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting	\$11,055 2021-2025 : \$724 \$5,684 \$374 n/a \$23,556	\$12,561 2026-2030 \$1,427 \$25,886 \$2,014 n/a \$16,704	2031-2035 \$1,457 \$23,851 \$3,376 n/a \$27,473	2036-2040 \$1,681 \$9,544 \$1,475 n/a \$29,002	\$21,35
Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking	\$11,055 2021-2025 : \$724 \$5,684 \$374 n/a	\$12,561 2026-2030 \$1,427 \$25,886 \$2,014 n/a	2031-2035 \$1,457 \$23,851 \$3,376 n/a	2036-2040 \$1,681 \$9,544 \$1,475 n/a	\$21,35
Multi-Year Cumulative Costs (\$000s) Heating Cooling Varillation Water Heating Liphing Cooking Office Equipment & Computing	\$11,055 2021-2025 \$724 \$5,684 \$374 n/a \$23,556 \$1,056	\$12,561 2026-2030 \$1,427 \$25,886 \$2,014 n/a \$16,704 \$1,950	2031-2035 \$1,457 \$23,851 \$3,376 n/a \$27,473 \$959	2036-2040 \$1,681 \$9,544 \$1,475 n/a \$29,002 \$989	\$21,35
Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration	\$11,055 2021-2025 \$724 \$5,684 \$374 n/a \$23,556 \$1,056 \$11,109	\$12,561 2026-2030 \$1,427 \$25,886 \$2,014 n/a \$16,704 \$1,950 \$20,506	2031-2035 \$1,457 \$23,851 \$3,376 n/a \$27,473 \$959 \$9,080	2036-2040 \$1,681 \$9,544 \$1,475 n/a \$29,002 \$989 \$5,337	\$21,35
Multi-Year Cumulative Costs (\$000s) Heating Cooling Vanilation Water Heating Cooking Office Equipment & Computing Refrigeration Miscellaneous	\$11,055 2021-2025 : \$724 \$5,684 \$374 n/a \$23,556 \$1,056 \$11,059 \$8,349	\$12,561 2026-2030 \$1,427 \$25,886 \$2,014 n/a \$16,704 \$16,704 \$1,950 \$20,506 \$20,330	2031-2035 \$1,457 \$23,851 \$3,376 n/a \$27,473 \$959 \$9,080 \$40,354	2036-2040 \$1,681 \$9,544 \$1,475 n/a \$29,002 \$989 \$5,337 \$52,752	\$21,35
Multi-Year Cumulative Costs (\$000s) Heating Cooling Venitation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total 5-Year Costs (\$000s)	\$11,055 2021-2025 : \$724 \$5,684 \$374 n/a \$23,556 \$1,056 \$11,056 \$11,109 \$8,349 \$50,852	\$12,561 2026-2030 \$1,427 \$25,886 \$2,014 n/a \$16,704 \$16,704 \$1,950 \$20,506 \$20,330 \$88,816	2031-2035 \$1,457 \$23,851 \$3,376 n/a \$27,473 \$959 \$9,080 \$40,354 \$106,550	2036-2040 \$1,681 \$9,544 \$1,475 n/a \$29,002 \$989 \$5,337 \$52,752 \$100,781	\$21,353
Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Office Equipment & Computing Refrigeration Miscellaneous Total 5-Year Costs (\$000s) Participant Costs	\$11,055 2021-2025 : \$724 \$5,684 \$374 n/a \$23,556 \$1,056 \$10,056 \$11,109 \$8,349 \$50,852 \$10,016	\$12,561 2026-2030 \$1,427 \$25,886 \$2,014 n/a \$16,704 \$16,704 \$1,950 \$20,506 \$20,330 \$20,330 \$88,816 \$17,494	2031-2035 \$1,457 \$23,851 \$3,376 n/a \$27,473 \$959 \$9,080 \$40,354 \$106,550 \$20,987	2036-2040 \$1,681 \$9,544 \$1,475 n/a \$29,002 \$989 \$5,337 \$52,752 \$100,781 \$19,851	\$21,35
Multi-Year Cumulative Costs (\$000s) Heating Cooling Venitation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total 5-Year Costs (\$000s)	\$11,055 2021-2025 : \$724 \$5,684 \$374 n/a \$23,556 \$1,056 \$11,056 \$11,109 \$8,349 \$50,852	\$12,561 2026-2030 \$1,427 \$25,886 \$2,014 n/a \$16,704 \$16,704 \$1,950 \$20,506 \$20,330 \$88,816	2031-2035 \$1,457 \$23,851 \$3,376 n/a \$27,473 \$959 \$9,080 \$40,354 \$106,550	2036-2040 \$1,681 \$9,544 \$1,475 n/a \$29,002 \$989 \$5,337 \$52,752 \$100,781	\$21,35

EE.Hourly.Med: Hourly Energy Efficiency Results, Medium Avoided Cost Scenario

	Winter	202	21	20	25	20	30	20	35	20	40
	12/19	Base Load (MW)	Total EE Curtailment								
8449	1	326.9	3.4	329.9	13.0	335.2	25.2	344.8	35.4	361.3	39.5
8450	2	318.4	3.4	321.3	13.0	326.5	25.2	335.8	35.4	351.9	39.5
8451	3	315.3	3.4	318.2	13.0	323.3	25.2	332.6	35.4	348.4	39.5
8452 8453	4 5	316.6 326.0	3.4 3.4	319.4 329.0	13.0 13.0	324.6 334.3	25.2 25.2	333.9 343.9	35.4 35.4	349.9 360.3	39.5 39.5
8454	6	348.9	3.9	352.1	16.1	357.8	37.2	368.0	49.7	385.6	54.0
8455	7	386.2	3.6	389.7	15.3	396.1	36.0	407.4	48.5	426.8	52.7
8456	8	405.2	5.0	408.9	20.6	415.5	43.4	427.4	61.0	447.8	68.4
8457	9	406.7	5.0	410.4	20.6	417.1	43.4	429.0	61.0	449.5	68.4
8458 8459	10 11	401.9 397.7	4.6 4.6	405.5 401.3	18.5 18.5	412.1 407.8	34.4 34.4	423.9 419.5	50.0 50.0	444.2 439.5	56.6 56.6
8460	12	393.9	4.6	397.5	18.5	407.8	34.4	419.5	50.0	439.3	56.6
8461	13	389.5	4.6	393.0	18.5	399.4	34.4	410.8	50.0	430.4	56.6
8462	14	386.5	4.6	390.0	18.5	396.3	34.4	407.7	50.0	427.1	56.6
8463	15	382.2	4.6	385.7	18.5	391.9	34.4	403.2	50.0	422.4	56.6
8464	16	384.2	5.0	387.8	20.6	394.0	43.4	405.3	61.0	424.7	68.4
8465 8466	17 18	408.1 447.0	7.1 7.1	411.8 451.1	26.2 26.2	418.5 458.4	50.3 50.3	430.5 471.5	68.1 68.1	451.1 494.1	75.6 75.6
8467	10	447.0	3.9	452.2	16.1	459.5	37.2	471.3	49.7	494.1	54.0
8468	20	441.3	3.9	445.4	16.1	452.6	37.2	465.5	49.7	487.8	54.0
8469	21	430.8	3.9	434.7	16.1	441.7	37.2	454.4	49.7	476.1	54.0
8470	22	408.1	3.7	411.8	15.1	418.5	34.2	430.4	46.4	451.0	51.3
8471	23 24	374.6	3.7 3.4	378.0	15.1	384.2	34.2 25.2	395.2	46.4	414.0	51.3
8472	24	344.7	3.4	347.8	13.0	353.5	25.2	363.6	35.4	381.0	39.5
	Spring/Fall	202 Base Load	21 Total EE	20 Base Load	25 Total EE	20 Base Load	30 Total EE	203 Base Load	35 Total EE	204 Base Load	10 Total EE
	09/15	(MW)	Curtailment								
6169	1	313.1	3.4	315.9	13.0	321.0	25.2	330.2	35.4	346.0	39.5
6170	2	298.0	3.4	300.8	13.0	305.6	25.2	314.4	35.4	329.4	39.5
6171 6172	3 4	289.5 284.7	3.4 3.4	292.1 287.3	13.0 13.0	296.9 291.9	25.2 25.2	305.4 300.3	35.4 35.4	320.0 314.6	39.5 39.5
6173	- 5	286.6	3.4	289.2	13.0	293.9	25.2	302.3	35.4	316.7	39.5
6174	6	302.0	3.9	304.8	16.1	309.7	37.2	318.6	49.7	333.8	54.0
6175	7	331.5	1.8	334.5	10.5	340.0	30.2	349.7	42.6	366.4	46.8
6176	8	349.7	5.0	352.9	20.6	358.7	43.4	368.9	61.0	386.5	68.4
6177 6178	9 10	370.4 391.3	5.0 4.6	373.8 394.9	20.6 18.5	379.8 401.3	43.4 34.4	390.7 412.8	61.0 50.0	409.4 432.5	68.4 56.6
6179	10	410.7	4.6	414.4	18.5	401.3	34.4	433.2	50.0	453.9	56.6
6180	12	426.4	4.6	430.3	18.5	437.2	34.4	449.8	50.0	471.2	56.6
6181	13	441.4	4.6	445.5	18.5	452.7	34.4	465.6	50.0	487.9	56.6
6182	14	457.2	4.6	461.4	18.5	468.8	34.4	482.2	50.0	505.3	56.6
6183	15	471.3	4.6	475.6	18.5	483.3	34.4	497.2	50.0	520.9	56.6
6184 6185	16 17	479.5 482.9	5.0 5.0	483.9 487.4	20.6 20.6	491.8 495.2	43.4 43.4	505.8 509.4	61.0 61.0	530.0 533.8	68.4 68.4
6186	18	475.4	5.0	479.7	20.6	487.5	43.4	501.4	61.0	525.4	68.4
6187	19	451.8	3.9	455.9	16.1	463.3	37.2	476.5	49.7	499.3	54.0
6188	20	444.8	3.9	448.9	16.1	456.2	37.2	469.2	49.7	491.6	54.0
6189	21	427.0	3.9	430.9	16.1	437.9	37.2	450.4	49.7	471.9	54.0
6190	22 23	392.5 354.1	3.7 3.7	396.1	15.1	402.5	34.2 34.2	414.0	46.4	433.8	51.3
6191 6192	23 24	319.9	3.7	357.3 322.8	15.1 13.0	363.1 328.1	34.2 25.2	373.5 337.5	46.4 35.4	391.4 353.6	51.3 39.5
	Summer	202	21	20	25	20	30	20	35	20	10
	07/10	Base Load	Total EE								
4561	4	(MW) 350.3	Curtailment 3.7	(MW) 353.5	Curtailment 18.1	(MW) 359.2	Curtailment 51.1	(MW) 369.5	Curtailment 79.4	(MW) 387.1	Curtailment 89.9
4562	2	327.3	3.7	330.3	18.1	335.6	51.1	345.2	79.4	361.7	89.9
4563	3	314.6	3.7	317.5	18.1	322.6	51.1	331.9	79.4	347.7	89.9
4564	4	308.1	3.7	310.9	18.1	316.0	51.1	325.0	79.4	340.5	89.9
4565	5	312.0	3.7	314.8	18.1	319.9	51.1	329.1	79.4	344.8	89.9
4566	6 7	323.5	2.1	326.4	15.6	331.7	56.2	341.2	86.5	357.5	97.2
4567 4568	7 8	342.0 375.8	2.1 5.3	345.1 379.2	15.6 25.7	350.7 385.3	56.2 69.3	360.8 396.4	86.5 104.9	378.0 415.3	97.2 118.8
	9	414.2	5.3	418.0	25.7	424.7	69.3	436.9	104.9	457.7	118.8
4569											
4570	10	455.7	5.0	459.8	23.6	467.3	60.3	480.6	93.9	503.6	107.0
4570 4571	10 11	494.4	5.0	498.9	23.6	507.0	60.3	521.5	93.9	546.4	107.0
4570	10										

4574

4575

4576 4577

4578

4579

4580 4581

4582

4583 4584

593.9

616.7

608.5 583.7

576.6

567.3

543.1 527.1

499.0

445.5 396.3

609.0

632.4

624.0 598.5

591.3

581.8

556.9 540.5

511.7

456.9 406.4

23.6

23.6 25.7 25.7 25.7

15.6 15.6 21.2 20.2 20.2 18.1

60.3 60.3 60.3 60.3 60.3 69.3 69.3 69.3

56.2 56.2 63.1

60.1

60.1

51.1

626.4

650.5

641.9 615.7

608.2

598.4

572.8 556.0

526.3

470.0 418.1

5.0 5.0 5.0 5.0 5.0 5.3 5.3 5.3 5.3 2.1 4.2 4.1 4.1 3.7

599.3

622.3

614.0 589.0

581.8

572.5

548.0 531.9

503.5

449.6 399.9

656.4

681.6

672.5 645.1

637.3

627.0

600.2 582.5

551.5

492.4 438.0

93.9

93.9

104.9 104.9

104.9

86.5

86.5 93.7

90.4

90.4

79.4

107.0

107.0

118.8 118.8

118.8

97.2

97.2 104.3

101.7

101.7

89.9

EE.Hourly.Med: Hourly Energy Efficiency Results, Medium Avoided Cost Scenario

	Winte	r 20	021	20	25	203	30	203	35	204	10
Peak Hours		Base Load (MW)	Load w/EE Curtailment	Base Load (MW)	Load w/EE Curtailment	Base Load (MW)	Load w/EE Curtailment	Base Load (MW)	Load w/EE Curtailment	Base Load (MW)	Load w/EE Curtailment
	20	1 327	324	330	317	335	310	345	309	361	322
		2 318		321	308	326	301	336	300	352	312
		3 315 4 317		318 319	305 306	323 325	298 299	333 334	297 298	348 350	309 310
		5 326		329	316	334	309	344	308	360	321
		6 349		352	336	358	321	368	318	386	332
		7 386 8 405		390 409	374 388	396 416	360 372	407 427	359 366	427 448	374 379
		9 407		400	390	417	374	429	368	450	381
	9 1			406	387	412	378	424	374	444	388
	10 1 ¹ 11 11			401 397	383 379	408 404	373 370	419 415	369 365	439 435	383 379
	12 1			393	375	399	365	415	361	430	379
	13 1·	4 386	382	390	371	396	362	408	358	427	371
	16 1			386	367	392	358	403	353	422	366
	15 10 5 1			388 412	367 386	394 419	351 368	405 430	344 362	425 451	356 375
	2 1			451	425	458	408	472	403	494	418
	1 1			452	436	460	422	473	423	495	441
	3 20 4 2			445 435	429 419	453 442	415 405	466 454	416 405	488 476	434 422
	6 2			412	397	418	384	430	384	451	400
	17 23	3 375		378	363	384	350	395	349	414	363
	19 24	4 345	341	348	335	353	328	364	328	381	341
	Spring/Fal		021	20		203		203		204	
Peak Hours		5 (MW)	Load w/EE Curtailment	Base Load (MW)	Load w/EE Curtailment	Base Load (MW)	Load w/EE Curtailment	Base Load (MW)	Load w/EE Curtailment	Base Load (MW)	Load w/EE Curtailment
Tiour	19	1 313		316	303	321	296	330	295	346	306
		2 298		301	288	306	280	314	279	329	290
		3 290 4 285		292 287	279 274	297 292	272 267	305 300	270 265	320 315	280 275
		5 287		289	274	292	269	302	203	313	273
	20	6 302	298	305	289	310	273	319	269	334	280
		7 332		335	324	340	310	350	307	366	320
		350 9 370		353 374	332 353	359 380	315 336	369 391	308 330	387 409	318 341
	13 1			395	376	401	367	413	363	433	376
	11 1			414	396	421	387	433	383	454	397
	10 11 8 11			430 445	412 427	437 453	403 418	450 466	400 416	471 488	415 431
	5 1			461	443	469	434	482	432	505	449
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	3 1				407	495	402				
	6 1		i 470	480		487	444	501	440		465 457
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	9 2	0 445 1 427	448 441 423	456 449 431	440 433 415	463 456 438	426 419 401	477 469 450	427 420 401	525 499 492 472	457 445 438 418
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	9 2 12 2 15 2	0 445 1 427 2 392 3 354 4 320	448 441 423 8 389 350	456 449 431 396 357	440 433 415 381 342 310	463 456 438 402 363	426 419 401 368 329 303	477 469 450 414 374	427 420 401 368 327 302	525 499 492 472 434 391	457 445 438 418 382 340 314
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Peak Hours	9 2 12 2: 15 2: 18 2: Summe	0 445 1 427 2 392 3 354 4 320 r 20 Base Load	448 441 423 389 350 317 021 Load w/EE Curtailment	456 449 431 396 357 323 20 2	440 433 415 381 342 310 25	463 456 438 402 363 328 20 3	426 419 401 368 329 303 30	477 469 450 414 374 337 20 3	427 420 401 368 327 302 35	525 499 492 472 434 391 354	457 445 438 418 382 340 314 10
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Base Load (MW)

Total EE Curtailment

Base Load (MW)

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Total EE Curtailment

Base Load (MW)

Base Load (MW)

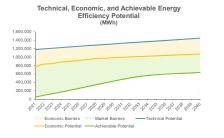
Total EE

Curtailment

Base Load (MW)

Total EE Curtailment

Total EE Curtailment



Combined Technical Potential (MWh)	2021	2025	2030	2035	204
Heating	29,905	32.310	35,437	38.592	42.10
Cooling	178,715	192,422	209,184	224,819	240,042
Ventilation	33,929	33,102	32,209	31,425	30,74
Water Heating	16,009	17,151	18,531	19,851	21,28
Lighting	437,265	435,517	435,002	435,191	436,37
Cooking	33,850	36,496	39,741	42,749	45,59
Office Equipment & Computing	4,396	4,740	5,161	5,552	5,92
Refrigeration	83,923	89,596	96,546	102,993	109,14
Miscellaneous	363,277	398,594	441,360	480,959	518,92
Total Technical Potential (MWh)	1,181,269	1,239,928		1,382,130	1,450,13
Economic Potential (MWh)	2021	2025	2030	2035	204
Heating	17,298	18,135	19,152	20.109	21,10
Cooling	118,480	127,638	138,849	149,281	159,31
Ventilation	15,850	15,268	14,677	14,189	13,79
Water Heating	10,000	10,200	14,011	14,100	10,10
Lighting	190.669	265.060	294.254	283.575	275.16
Cooking	33,850	36,496	39,741	42,749	45,59
Office Equipment & Computing			-		
Refrigeration	78,698	83,998	90,497	96,514	102,19
Miscellaneous	315,003	348,493	387,212	422,947	456,73
Total Economic Potential (MWh)	769,847	895,086		1,029,364	
Achievable Potential (MWh) Heating	2021 558	2025 4,365	2030 12,054	2035 15,092	204 15,88
Cooling	1,001	4,305	63,639	104,687	118,58
Ventilation	28	565	3.371	7.638	8.99
Water Heating	20	303	3,371	7,030	0,99
Lighting	32.276	120.833	173.176	195.711	201.92
Cooking	1.092	8,785	25.013	28,717	23.43
Office Equipment & Computing	1,002	0,100	20,010	20,111	20,40
Refrigeration	2.687	20.543	54.266	63.884	50,19
Miscellaneous	6,296	39,153	93,140	164,043	211,67
Total Achievable Potential (MWh)	43,937	207,799	424,658	579,773	630,68
Incremental Achievable Potential (MWh)	2021	2025	2030	2035	204
			1.071		
	558	1,200	1,974	1,576	2,00
Cooling	1,001	5,331	12,490	1,576 7,206	2,00 4,35
Cooling Ventilation				1,576	2,00 4,35
Cooling Ventilation Water Heating	1,001 28	5,331 231	12,490 796	1,576 7,206 718	2,00 4,35 11
Cooling Ventilation Water Heating Lightling	1,001 28 - 32,276	5,331 231 - 16,321	12,490 796 29,278	1,576 7,206 718 - 30,977	2,00 4,35 11 27,49
Cooling Ventilation Water Heating Lighting Cooking	1,001 28	5,331 231	12,490 796	1,576 7,206 718	2,00 4,35 11 27,49
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing	1,001 28 32,276 1,092	5,331 231 16,321 2,458	12,490 796 - 29,278 3,062	1,576 7,206 718 - 30,977 912	2,00 4,35 11 27,49 2,26
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration	1,001 28 - 32,276 1,092 - 2,687	5,331 231 16,321 2,458 - 5,857	12,490 796 - 29,278 3,062 - 7,200	1,576 7,206 718 - 30,977 912 - 1,635	2,00 4,35 11 27,49 2,26 3,02
Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh	1,001 28 32,276 1,092	5,331 231 16,321 2,458	12,490 796 - 29,278 3,062	1,576 7,206 718 - 30,977 912	2,00 4,35 11 27,49 2,26 3,02 43,41
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh;	1,001 28 32,276 1,092 - 2,687 6,296 43,937	5,331 231 - 16,321 2,458 - 5,857 10,044 41,442	12,490 796 29,278 3,062 7,200 22,302 77,101	1,576 7,206 718 30,977 912 1,635 36,285 79,309	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67
Cooling Ventilation Water Heating Liphing Cooking Office Equipment & Computing Refrigeration Miscelaineous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s)	1,001 28 32,276 1,092 - 2,687 6,296 43,937 2021	5,331 231 - 16,321 2,458 - 5,857 10,044 41,442 2025	12,490 796 - 29,278 3,062 - 7,200 22,302 77,101 2030	1,576 7,206 718 30,977 912 1,635 36,285 79,309 2035	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 204
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating	1,001 28 32,276 1,092 - 2,687 6,296 43,937 2021 \$638	5,331 231 16,321 2,458 5,857 10,044 41,442 2025 \$1,303	12,490 796 29,278 3,062 7,200 22,302 77,101 2030 \$2,071	1,576 7,206 718 - 30,977 912 - 1,635 36,285 79,309 2035 \$1,605	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 204 \$1,99
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscelaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s; Heating Cooling	1,001 28 32,276 1,092 - 2,687 6,296 43,937 2021 \$638 \$725	5,331 231 16,321 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484	12,490 796 29,278 3,062 7,200 22,302 77,101 2030 \$2,071 \$7,983	1,576 7,206 718 30,977 912 1,635 36,285 79,309 2035 \$1,605 \$4,741	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 204 \$1,99 \$3,14
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWH) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation	1,001 28 32,276 1,092 - 2,687 6,296 43,937 2021 \$638	5,331 231 16,321 2,458 5,857 10,044 41,442 2025 \$1,303	12,490 796 29,278 3,062 7,200 22,302 77,101 2030 \$2,071	1,576 7,206 718 - 30,977 912 - 1,635 36,285 79,309 2035 \$1,605	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 204 \$1,99 \$3,14
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Ventilation Water Heating	1,001 28 32,276 1,092 2,687 6,296 43,937 2021 \$638 \$725 \$18	5,331 231 16,321 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484 \$156	12,490 796 29,278 3,062 7,200 22,302 77,101 \$2,071 \$7,983 \$588	1,576 7,206 718 	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 204 \$1,99 \$3,14 \$13
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWH; Total Achievable Incremental Costs (\$000s; Heating Cooling Ventilation Water Heating Lighting	1,001 28 - 32,276 1,092 - 2,687 6,296 43,937 2021 \$638 \$725 \$18 - \$13,693	5,331 231 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484 \$156 \$8,914	12,490 796 29,278 3,062 7,200 22,302 77,101 2030 \$2,071 \$7,983 \$2,071 \$7,983 \$12,427	1,576 7,206 718 30,977 912 	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 204 \$1,99 \$3,14 \$13 \$11,37
Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Achievable Incremental Costs (\$000s; Total Achievable Incremental Costs (\$000s; Cooling Ventilation Water Heating Liphting Cooking	1,001 28 32,276 1,092 2,687 6,296 43,937 2021 \$638 \$725 \$18	5,331 231 16,321 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484 \$156	12,490 796 29,278 3,062 7,200 22,302 77,101 \$2,071 \$7,983 \$588	1,576 7,206 718 	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 204 \$1,99 \$3,14 \$13 \$11,37
Cooling Vactor Heating Uptiming Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWH; Total Achievable Incremental Costs (\$000s; Heating Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing	1,001 28 32,276 1,092 - 2,667 6,296 43,937 2021 \$638 \$18 \$13,693 \$43,993 -	5,331 231 16,321 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484 \$156 \$8,914 \$1,033	12,490 796 29,278 3,062 7,200 22,302 77,101 2030 \$2,071 \$7,983 \$588 \$12,427 \$1,286	1.576 7.206 718 30.977 912 - 1.635 36.285 79,309 2035 \$1.605 \$4.741 \$605 \$4.741 \$605 \$10.802 \$273	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 204 \$1,99 \$3,14 \$13 \$11,37 \$77
Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Achievable Incremental Costs (\$000s; Total Achievable Incremental Costs (\$000s; Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration	1,001 28 32,276 1,092 - 2,687 6,296 43,937 2021 \$638 \$725 \$18 \$13,693 \$459 \$13,644	5,331 231 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484 \$156 \$8,914 \$1,033 \$3,266	12,490 796 3,062 - 7,200 22,302 77,101 \$2,030 \$2,071 \$7,983 \$588 - \$12,427 \$1,286 \$12,427 \$1,286	1,576 7,206 718 30,977 912 36,285 36,285 79,309 2035 \$1,605 \$4,741 \$605 \$605 \$605 \$605 \$605 \$605 \$605 \$605	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 204 \$1,99 \$3,14 \$13 \$11,37 \$77 \$1,51
Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh; Total Achievable Incremental Costs (\$000s; Heating Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous	1,001 28 32,276 1,092 2,687 6,296 43,937 2021 \$638 \$725 \$18 - \$13,693 \$459 - \$14,644 \$1,556	5,331 231 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484 \$156 \$8,914 \$1,033 \$3,266 \$2,555	12,490 796 3,062 7,200 22,302 77,101 \$2,071 \$7,983 \$5,88 \$5,88 \$12,427 \$1,286 \$- \$12,85 \$5,956	1,576 7,206 718 30,977 912 	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 \$1,99 \$3,14 \$13 \$11,37 \$77. \$1,51 \$11,71
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous	1,001 28 32,276 1,092 - 2,687 6,296 43,937 2021 \$638 \$725 \$18 \$13,693 \$459 \$13,644	5,331 231 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484 \$156 \$8,914 \$1,033 \$3,266	12,490 796 3,062 - 7,200 22,302 77,101 \$2,030 \$2,071 \$7,983 \$588 - \$12,427 \$1,286 \$12,427 \$1,286	1,576 7,206 718 30,977 912 36,285 36,285 79,309 2035 \$1,605 \$4,741 \$605 \$605 \$605 \$605 \$605 \$605 \$605 \$605	2,000 4,35: 111 27,49 2,26 3,02 43,41 82,67 204 \$1,99 \$3,14 \$13; \$11,37 \$77; \$1,511 \$11,71 \$30,63
Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s)	1,001 28 32,276 1,092 2,687 6,296 43,937 2021 \$638 \$725 \$18 - \$13,693 \$459 - \$14,644 \$1,556	5,331 231 16,321 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484 \$156 \$8,914 \$1,033 \$3,266 \$2,555 \$20,710	12,490 796 29,278 3,062 22,302 77,200 22,302 77,101 2030 \$2,071 \$7,983 \$588 \$12,427 \$1,286 \$12,427 \$1,286 \$4,034 \$5,956 \$34,346	1,576 7,206 7,718 - 30,977 912 - 1,635 36,285 79,309 2035 \$1,605 \$4,741 \$605 \$10,802 \$273 \$10,805 \$4,741 \$665 \$6,275 \$6,	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 204 \$1,99 \$3,14 \$13 \$11,37 \$77 \$1,51 \$11,71
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh; Total Achievable Incremental Costs (\$0005) Heating Cooking Vater Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$0005) Hutli-Year Cumulative Costs (\$0005)	1,001 28 32,276 1,092 2,687 6,296 43,937 2021 \$6,296 \$13,693 \$459 \$13,693 \$459 \$1464 \$13,556 \$14,655 \$18,555 \$2021-2025	5,331 231 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484 \$156 - \$3,484 \$1,033 \$3,484 \$1,033 \$3,266 \$20,710 2026-2030 \$8,8078	12,490 796 29,278 3,062 22,302 77,200 22,302 77,101 \$2,071 \$7,983 \$5,983 \$5,888 \$5,983 \$12,427 \$1,286 \$12,427 \$1,286 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,956 \$356,9566 \$356,9566 \$356,9566 \$356,95666 \$356,956666666666666666666666666666666666	1,576 7,206 7,118 - 30,977 912 - 1,635 36,285 79,309 2035 \$1,605 \$1,605 \$4,741 \$605 \$4,741 \$605 \$2,73 \$4,741 \$605 \$2,73 \$4,741 \$605 \$2,73 \$6,285 79,309 2035 2035 2036 2046 2046 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 20 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 \$1,99 \$3,14 \$13 \$11,37 \$77. \$1,51 \$11,71
Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh; Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Refrigeration Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s)	1,001 28 32,276 1,092 - 2,687 6,296 43,937 2021 \$6296 \$18 \$638 \$725 \$18 \$439 - \$1,464 \$1,556 \$18,552 2021-2025 \$4,838 \$5,193	5,331 231 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484 \$156 \$2,555 \$20,710 2026-2030 \$8,678 \$33,049	12,490 796 3,062 7,200 22,302 77,101 2030 \$2,071 \$7,983 \$588 \$1,2427 \$1,286 \$5,956 \$34,346 2031-2035 \$84,71 \$31,308	1,576 7,206 718 912 912 	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 \$1,99 \$3,14 \$13 \$11,37 \$77. \$1,51 \$11,71
Cooling Vontilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh; Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Heating Cooling Ventilation	1,001 28 32,276 1,092 2,687 6,296 43,937 2021 \$6,296 \$13,693 \$459 \$13,693 \$459 \$1,464 \$13,556 \$14,655 \$18,555 \$2021-2025	5,331 231 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484 \$156 - \$3,484 \$1,033 \$3,484 \$1,033 \$3,266 \$20,710 2026-2030 \$8,8078	12,490 796 29,278 3,062 22,302 77,200 22,302 77,101 \$2,071 \$7,983 \$5,983 \$5,888 \$5,983 \$12,427 \$1,286 \$12,427 \$1,286 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,346 \$5,956 \$34,956 \$356,9566 \$356,9566 \$356,9566 \$356,95666 \$356,956666666666666666666666666666666666	1,576 7,206 7,118 - 30,977 912 - 1,635 36,285 79,309 2035 \$1,605 \$1,605 \$4,741 \$605 \$4,741 \$605 \$2,73 \$4,741 \$605 \$2,73 \$4,741 \$605 \$2,73 \$6,285 79,309 2035 2035 2036 2046 2046 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 20 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057 2057	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 \$1,99 \$3,14 \$13 \$11,37 \$77. \$1,51 \$11,71
Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation	1,001 28 32,276 1,092 2,687 6,296 43,937 2021 2021 \$13,693 \$459 \$1,464 \$1,556 \$18,552 2021-2025 \$4,838 \$9,193 \$374	5,331 231 2,458 5,857 10,044 41,442 2025 51,303 33,484 \$156 \$3,266 \$2,555 \$20,710 2026-2030 \$8,678 \$3,3049 \$3,3049 \$3,2014	12,490 796 3,062 7,200 22,302 77,101 2030 \$2,071 \$7,983 \$588 \$12,427 \$1,286 \$12,427 \$1,286 \$34,346 2031-2035 \$84,034 \$5,956 \$34,346	1,576 7,206 7,18 9,12 9,12 9,12 9,12 9,12 9,12 9,12 9,12	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 \$1,99 \$3,14 \$13 \$11,37 \$77. \$1,51 \$11,71
Cooling Vontilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooling Ventilation Water Heating Cooling Ventilation Water Heating Lighting	1,001 28 32,276 1,092 2,687 6,296 43,937 2021 \$538 \$13,693 \$459 \$13,693 \$459 \$13,693 \$459 \$13,693 \$459 \$13,693 \$459 \$13,693 \$3,555 \$2021-2025 \$4,838 \$3,744 \$1,555 \$4,838 \$3,744 \$1,555 \$4,838 \$3,744 \$1,555 \$4,838 \$3,744 \$1,555 \$4,838 \$3,744 \$1,555 \$4,838 \$3,744 \$1,555 \$4,838 \$3,744 \$1,555 \$1,454 \$1,454 \$1,555 \$1,454 \$1,454 \$1,555 \$1,454 \$1,454 \$1,555 \$1,454 \$1,555 \$1,454 \$1,555 \$1,454 \$1,555 \$1,454 \$1,555 \$1,454 \$1,555 \$1,454 \$1,555 \$1,454 \$1,555 \$1,454 \$1,555 \$1,454 \$1,555 \$1,454 \$1,555 \$1,454 \$1,555 \$1,555 \$1,454 \$1,555 \$1,454 \$1,555 \$1,454 \$1,555 \$1,454 \$1,555 \$1,454 \$1,555 \$1,555 \$1,454 \$1,555\$\$1,555\$	5,331 231 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484 \$156 \$3,3,484 \$156 \$3,3,484 \$156 \$3,3,484 \$1,033 \$3,484 \$1,033 \$3,3,486 \$2,555 \$20,710 2026-2030 \$8,678 \$33,049 \$2,014 \$33,049 \$2,014 \$2,015 \$2,014 \$2,014 \$2,014 \$2,014 \$2,014 \$2,014 \$2,014 \$2,014 \$2,014 \$2,014 \$2,014 \$2,014 \$2,014 \$2,014 \$2,014 \$2,014 \$2,014 \$2,015 \$2,014 \$2,014 \$2,016\$2,016 \$2,016\$2,	12,490 7,200 22,302 7,200 22,302 77,101 2030 \$2,071 \$7,983 \$5,986 \$12,427 \$1,286 \$34,346 2031-2035 \$34,346 \$3,376 \$3,3376 \$3,3376 \$3,3376	1,576 7,206 7,18 9 12 9 12 9 12 9 12 9 12 9 12 9 12 9	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 \$1,99 \$3,14 \$13 \$11,37 \$77. \$1,51 \$11,71
Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Ventilation Vater Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Liphting Cooling Ventilation	1,001 28 32,276 1,092 2,687 6,296 43,937 2021 2021 \$13,693 \$459 \$1,464 \$1,556 \$18,552 2021-2025 \$4,838 \$9,193 \$374	5,331 231 2,458 5,857 10,044 41,442 2025 51,303 33,484 \$156 \$3,266 \$2,555 \$20,710 2026-2030 \$8,678 \$3,3049 \$3,3049 \$3,2014	12,490 796 3,062 7,200 22,302 77,101 2030 \$2,071 \$7,983 \$588 \$12,427 \$1,286 \$12,427 \$1,286 \$34,346 2031-2035 \$84,034 \$5,956 \$34,346	1,576 7,206 7,18 9,12 9,12 9,12 9,12 9,12 9,12 9,12 9,12	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 204 \$1,99 \$3,14 \$13 \$11,37 \$77 \$1,51 \$11,71
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Heating Ventilation Water Heating Lighting Cooling Ventilation Water Heating Ventilation Water Heating Lighting Cooking Office Equipment & Computing Water Heating Lighting Cooking Office Equipment & Computing	1,001 28 32,276 6,296 6,296 6,296 43,937 \$638 \$725 \$18 \$52 \$18,552 \$11,464 \$13,653 \$18,552 \$2021-2025 \$4,838 \$19,193 \$374 \$19,193 \$374 \$19,193 \$10,193	5,331 231 2,458 5,857 10,044 41,442 2025 51,303 \$3,484 \$156 \$1,303 \$3,484 \$156 \$21,303 \$3,266 \$20,710 2026-2030 \$8,678 \$33,049 \$20,1100 \$20,110 \$20,110 \$20,1100\$20,10	12,490 7,200 22,302 7,200 22,302 77,101 2030 \$2,302 \$7,101 \$7,983 \$5,888 \$1,2427 \$1,286 \$1,286 \$34,346 \$5,956 \$5,9566 \$5,9566 \$5,9566 \$5,9566 \$5,9566 \$5,9566 \$5,9566 \$5,9566 \$5,9566 \$5,9566 \$5,95666 \$5,9566666666666666666666666666666666666	1,576 7,206 7,206 7,207 912 912 1,635 36,285 79,309 2035 \$1,605 \$4,741 \$605 \$4,741 \$6,43 \$4,741 \$6,43 \$4,741 \$6,43 \$4,741 \$6,43 \$4,741 \$6,285 \$4,741 \$6,285 \$4,741 \$6,285 \$4,741 \$2,036 \$2,036 \$4,741 \$2,036 \$4,741 \$2,036 \$2,036 \$4,741 \$2,036\$2,036\$2,036\$2,036\$2,036\$2,036\$2,036\$2,036\$2,036\$2,036\$2,036\$2,036\$2,036\$2,036	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 \$1,99 \$3,14 \$13 \$11,37 \$77. \$1,51 \$11,71
Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Ventilation Vater Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Ventilation Water Heating Liphting Cooking Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration	1,001 28 32,276 43,937 2021 \$6,296 43,937 2021 \$638 \$459 \$13,693 \$459 \$13,643 \$13,655 2021-2025 \$4,838 \$9,193 \$3,74 \$56,978 \$3,697 \$11,705	5,331 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484 \$156 \$8,914 \$1,033 \$3,484 \$156 \$2,555 \$20,710 2026-2030 \$8,678 \$3,3049 \$2,014 \$6,3,228 \$6,6317 \$2,21,441	12,490 796 29,278 3,062 22,302 77,101 \$7,983 \$2,071 \$7,983 \$2,071 \$7,983 \$2,071 \$7,983 \$2,071 \$7,983 \$2,071 \$1,286 \$3,276 \$1,2427 \$1,246 \$12,427 \$1,246 \$3,956 \$34,346 \$34,346 \$3,376 \$34,346 \$3,376 \$3,3109 \$44,898 \$3,109 \$9,348	1,576 7,206 7,206 7,18 7,207 7,207 7,207 7,207 9,207 7	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 \$1,99 \$3,14 \$13 \$11,37 \$77. \$1,51 \$11,71
Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Costs (\$000s) Heating Cooking Office Equipment & Computing Refrigeration Mater Heating Liphting Cooking Office Equipment & Computing Refrigeration	1,001 28 32,276 1,092 2,887 43,937 2021 5638 \$725 \$18 \$355 \$439 \$459 \$459 \$459 \$459 \$459 \$459 \$459 \$4652 2021-2025 \$4,838 \$3,74 \$3,56978 \$3,691 \$4,693\$4,693\$4,693\$4,693\$4,693\$4,693\$4,693\$4,693\$4,693	5,331 2,458 5,857 10,044 41,442 2025 51,303 \$3,484 \$156 5,8,914 \$1,033 \$3,266 \$20,710 2026-2030 \$8,678 \$33,049 \$20,110 2026-2030 \$8,678 \$33,049 \$20,110 2026-2030 \$8,678 \$33,049 \$20,110 2026-2030 \$8,678 \$33,049 \$20,110 2026-2030 \$2,014\$}\$2,014 \$2,014 \$2,014\$}\$2,014 \$2,014\$}\$2,014 \$2,014\$}\$2,014 \$2,014\$}\$2,014 \$2,014\$}\$2,014 \$2,014\$}\$2,014 \$2,014\$}\$2,014 \$2,014\$}\$2,014 \$2,014\$}\$2,014 \$2,014\$}\$2,014 \$2,014\$}\$2,014\$}\$2,014 \$2,014\$}\$2,014\$}\$2,014\$}\$2,014 \$2,014\$}\$2,015\$}\$2,015\$}\$2,015\$}\$2,016\$}\$2,0	12,490 796 3,062 29,278 3,062 22,302 77,101 77,101 \$2,071 \$1,286 \$20,71 \$1,286 \$12,427 \$1,286 \$34,346 2031-2035 \$34,346 \$33,376 \$34,346 \$33,376 \$34,346 \$3,3,376 \$3	1,576 7,206 7,206 7,18 7,207 912 912 1,635 36,285 79,309 2035 \$1,605 \$4,741 \$64,741 \$64,741 \$64,741 \$64,741 \$4,741 \$64,805 \$1,605 \$1,605 \$1,605 \$1,605 \$1,605 \$1,605 \$1,605 \$1,605 \$1,605 \$1,605 \$1,605 \$1,605 \$1,605 \$1,605 \$28,377 \$2035,2040 \$1,79,805 \$1,79,805 \$1,79,805 \$2035,2040 \$1,79,805 \$1,79,805 \$1,79,805 \$2035,2040 \$1,79,805 \$1,79,805 \$1,79,805 \$1,79,805 \$1,79,805 \$1,99,805 \$1,79,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805\$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805\$1,99,805 \$1,99,805 \$1,99,805\$1,99,805 \$1,99,805 \$1,99,805\$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805\$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805\$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99,805 \$1,99	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 \$1,99 \$3,14 \$13 \$11,37 \$77. \$1,51 \$11,71
Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Heating Ventilation Water Heating Lighting Cooling Ventilation Water Heating Ventilation Water Heating Lighting Cooking Office Equipment & Computing Water Heating Lighting Cooking Office Equipment & Computing	1,001 28 32,276 43,937 2021 \$6,296 43,937 2021 \$638 \$459 \$13,693 \$459 \$13,643 \$13,655 2021-2025 \$4,838 \$9,193 \$3,74 \$56,978 \$3,697 \$11,705	5,331 2,458 5,857 10,044 41,442 2025 \$1,303 \$3,484 \$156 \$8,914 \$1,033 \$3,484 \$156 \$2,555 \$20,710 2026-2030 \$8,678 \$3,3049 \$2,014 \$6,3,228 \$6,6317 \$2,21,441	12,490 796 29,278 3,062 22,302 77,101 \$7,983 \$2,071 \$7,983 \$2,071 \$7,983 \$2,071 \$7,983 \$2,071 \$7,983 \$2,071 \$1,286 \$3,276 \$1,2427 \$1,286 \$3,956 \$34,346 \$34,346 \$3,376 \$34,346 \$3,376 \$3,3109 \$44,898 \$3,109 \$9,348	1,576 7,206 7,206 7,18 7,207 7,207 7,207 7,207 9,207 7	2,00 4,35 11 27,49 2,26 3,02 43,41 82,67 \$1,99 \$3,14 \$13 \$11,37 \$77. \$1,51 \$11,71

\$19,035 \$30,936 \$28,033 \$28,397 \$57,106 \$92,809 \$84,098 \$85,191 \$20,500 \$33,316 \$30,189 \$30,581

	Residential Technical, Economic, and Achievable Energy Efficiency Potential (MWh)	
350,000		
300,000 -		
250,000		
200,000		
150,000		
100,000		
50,000		
0 =		
152 1	er we	5 ⁹ 10 ¹⁰

Economic Barriers	Market Barriers	
Economic Potential	Achievable Potential	

Residential Technical Potential (MWh)	2021	2025	2030	2035	2040
Heating	25 544	27.607	30,316	33 083	36 230
Cooling	38,384	41.122	44,431	47.594	51.024
Ventilation	18.079	17.835	17.533	17.236	16.945
Water Heating	16,009	17,151	18,531	19,851	21,281
Lighting	58,594	57,855	56,942	56,043	55,159
Cooking	n/a	n/a	n/a	n/a	n/a
Office Equipment & Computing	n/a	n/a	n/a	n/a	n/a
Refrigeration	14,481	14,726	15,019	15,294	15,609
Miscellaneous	69,383	74,332	80,315	86,032	92,231
Total Technical Potential (MWh)	240,472	250,627	263,087	275,134	288,478
Economic Potential (MWh)	2021	2025	2030	2035	2040
Heating	12,936	13,432	14,031	14,600	15,225
Cooling	15,200	16,284	17,594	18,847	20,205
Ventilation	-	-	-	-	-
Water Heating	-	-	-	-	-
Lighting	7,672	57,855	56,942	56,043	55,159
Cooking	n/a	n/a	n/a	n/a	n/a
Office Equipment & Computing	n/a	n/a	n/a	n/a	n/a
Refrigeration	9,255	9,127	8,970	8,815	8,663
Miscellaneous	22,675	25,918	28,004	29,998	32,159
Total Economic Potential (MWh)	67,737	122,616	125,542	128,303	131,411
Achievable Potential (MWh)	2021	2025	2030	2035	2040
Heating	417	3.233	8.831	10.961	11.479
Cooling	490	3,920	11,074	14,135	15,154
Ventilation	-			· -	
Water Heating	-	-	-	-	-
Lighting	1,273	25,026	36,189	40,137	40,808
Cooking	n/a	n/a	n/a	n/a	n/a
Office Equipment & Computing	n/a	n/a	n/a	n/a	n/a
Refrigeration	298	2,197	3,448	989	-0
Miscellaneous	1,687	9,189	15,926	17,123	18,350
Total Achievable Potential (MWh)	4,165	43,565	75,469	83,344	85,790
Incremental Achievable Potential (MWh)	2021	2025	2030	2035	2040
Heating	417	883	1,439	1,140	1,451
Cooling	490	1,092	1,833	1,490	1,941
Ventilation	-	-	-	-	-
Water Heating	-	-	-	-	-
Lighting	1,273	3,500	13,894	10,008	8,158
Cooking	n/a	n/a	n/a	n/a	n/a
Office Equipment & Computing	n/a	n/a	n/a	n/a	n/a
Refrigeration	298	580	593	-	
Miscellaneous Total Incremental Achievable Potential (MWh)	1,687	2,008	1,522 19.281	1,902 14,539	1,861 13,411
Total Incremental Achievable Potential (MWM	4,105	8,062	19,201	14,555	13,411
Total Achievable Incremental Costs (\$000s)	2021	2025	2030	2035	2040
Heating	\$500	\$991	\$1,544	\$1,176	\$1,441
Cooling	\$410	\$912	\$1,532	\$1,245	\$1,623
Ventilation	-	-	-	-	-
Water Heating	-	-	-	-	
Lighting	\$270	\$1,326	\$3,998	\$2,272	\$1,341
Cooking	n/a	n/a	n/a	n/a	n/a
Office Equipment & Computing	n/a	n/a	n/a	n/a	n/a
Refrigeration	\$81	\$157	\$161	-	
Miscellaneous Total Incremental Costs (\$000s)	\$274 \$1,535	\$340 \$3,727	\$290 \$7,525	\$320 \$5,014	\$342 \$4,747
	φ1,000	<i>\$3,121</i>	<i>41,</i> 525	45,014	<i>4</i> 4,141
Multi-Year Cumulative Costs (\$000s)	2021-2025 :	2026-2030	2031-2035	2036-2040	

2021-2025 2026-2030 2031-2035 2036-2040						
\$3,723	\$6,481	\$6,227	\$6,847			
\$3,276	\$6,390	\$6,516	\$7,591			
-	-	-	-			
-	-	-	-			
\$10,437	\$14,977	\$11,729	\$8,622			
n/a	n/a	n/a	n/a			
n/a	n/a	n/a	n/a			
\$596	\$936	\$268	-			
\$1,515	\$1,504	\$1,455	\$1,671			
\$19,548	\$30,287	\$26,195	\$24,731			
\$3,850	\$5,966	\$5,160	\$4,871			
\$11,551	\$17,897	\$15,479	\$14,614			
\$4,146	\$6,425	\$5,557	\$5,246			
	\$3,723 \$3,276 \$10,437 n/a \$596 \$11,515 \$19,548 \$3,850 \$11,551	\$3,723 \$6,481 \$3,276 \$6,390 	\$3,723 \$6,481 \$6,227 \$3,276 \$5,390 \$6,516 	\$3,273 \$6,481 \$6,227 \$6,847 \$3,276 \$6,390 \$6,516 \$7,591 \$10,437 \$14,977 \$11,729 \$8,622 n/a n/a n/a n/a n/a n/a n/a n/a s596 \$306 \$5,656 \$1,671 \$19,548 \$302 \$26,802 \$16,711 \$19,548 \$302 \$26,802 \$24,871 \$11,551 \$1,650 \$5,160 \$4,871 \$11,551 \$17,897 \$16,479 \$14,471		

Technical Potential (MWh)	2021	2025	2030	2035	2040
Heating	4,362	4,703	5,121	5,509	5,875
Cooling	140,331	151,300	164,753	177,225	189,018
Ventilation Water Heating	15,850 n/a	15,268 n/a	14,677 n/a	14,189 n/a	13,799 n/a
Lighting	378,672	377,662	378,060		
Cooking	33,850	36,496	39,741	42,749	45.594
Office Equipment & Computing	4,396	4,740	5,161	5,552	5,921
Refrigeration	69,442	74,870	81,527	87,699	93,535
Miscellaneous	293,894	324,262	361,046	394,927	426,689
Total Technical Potential (MWh)	940,797	989,301	1,050,086	1,106,996	1,161,652
Economic Potential (MWh)	2021	2025	2030	2035	2040
Heating	4,362	4,703	5,121	5,509	5,875
Cooling	103,281	111,354	121,255	130,434	139,114
Ventilation	15,850 n/a	15,268 n/a	14,677 n/a	14,189 n/a	13,799 n/a
Water Heating Lighting	n/a 182.997	n/a 207,205	n/a 237.312	n/a 227.532	n/a 220.002
Cooking	33,850	207,205	39,741	42,749	45,594
Office Equipment & Computing	33,030	30,430	33,741	42,743	40,004
Refrigeration	69.442	74.870	81.527	87.699	93.535
Miscellaneous	292,329	322,575	359,208	392,950	424,580
Total Economic Potential (MWh)	702,111	772,470	858,840	901,061	942,500
Achievable Potential (MWh)	2021	2025	2030	2035	2040
Heating	141	1,132	3,223	4,132	4,407
Cooling	510	9,635	52,565	90,552	103,428
Ventilation	28	565	3,371	7,638	8,992
Water Heating	n/a	n/a	n/a	n/a	n/a
Lighting	31,003	95,806	136,986	155,574	161,115
Cooking Office Equipment & Computing	1,092	8,785	25,013	28,717	23,432
Refrigeration	2,389	18,346	50,818	62,896	50,192
Miscellaneous	4,609	29,964	77,213	146,920	193,328
Total Achievable Potential (MWh)	39,771	164,234	349,189	496,428	544,893
Incremental Achievable Potential (MWh)	2021	2025	2030	2035	2040
Heating	141	317	535	436	558
Cooling	510	4,239	10,657	5,716	2,411
Ventilation	28	231	796	718	116
Water Heating	n/a 31.003	n/a 12.821	n/a 15.384	n/a 20.969	n/a 19.337
Lighting Cooking	1,003	2,458	3,062	20,969 912	2,269
Office Equipment & Computing		2,400	3,002	912	2,208
	2.389	5.277	6.607	1.635	3.023
Refrigeration	2,389 4,609	5,277 8,036	6,607 20,780	1,635 34,383	3,023 41,551
	2,389 4,609 39,771	5,277 8,036 33,380	6,607 20,780 57,820	1,635 34,383 64,770	3,023 41,551 69,263
Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh)	4,609 39,771	8,036 33,380	20,780 57,820	34,383 64,770	41,551 69,263
Refrigeration Miscellaneous	4,609	8,036	20,780	34,383	41,551 69,263 2040
Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s) Heating	4,609 39,771 2021	8,036 33,380 2025	20,780 57,820 2030	34,383 64,770 2035	41,551 69,263 2040 \$549 \$1,518
Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation	4,609 39,771 2021 \$138 \$315 \$18	8,036 33,380 2025 \$312	20,780 57,820 2030 \$527	34,383 64,770 2035 \$429	41,551 69,263 2040 \$549 \$1,518 \$132
Refrigeration Miscellancoux Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s) Cooling Ventilation Water Heating	4,609 39,771 2021 \$138 \$315 \$18 n/a	8,036 33,380 2025 \$312 \$2,571 \$156 n/a	20,780 57,820 \$527 \$6,451 \$588 n/a	34,383 64,770 2035 \$429 \$3,496 \$605 n/a	41,551 69,263 2040 \$549 \$1,518 \$132 n/a
Refrigeration Miscellaneous Total Anchievable Potential (MWh Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Liphting	4,609 39,771 2021 \$138 \$315 \$18 n/a \$13,423	8,036 33,380 2025 \$312 \$2,571 \$156 n/a \$7,588	20,780 57,820 2030 \$527 \$6,451 \$588 n/a \$8,429	34,383 64,770 2035 \$429 \$3,496 \$605 n/a \$8,529	41,551 69,263 2040 \$549 \$1,518 \$132 n/a \$10,034
Refrigeration Miscellancoux Total Incremental Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) Cooling Vantilation Water Heating Lighting Cooking	4,609 39,771 2021 \$138 \$315 \$18 n/a	8,036 33,380 2025 \$312 \$2,571 \$156 n/a	20,780 57,820 \$527 \$6,451 \$588 n/a	34,383 64,770 2035 \$429 \$3,496 \$605 n/a	41,551 69,263 2040 \$549 \$1,518 \$132 n/a \$10,034
Refrigeration Miscellaneous Total Achievable Potential (MWh Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Liphting Cooking Office Equipment & Computing	4,609 39,771 2021 \$138 \$315 \$18 n/a \$13,423 \$459	8,036 33,380 2025 \$312 \$2,571 \$156 n/a \$7,588 \$1,033	20,780 57,820 2030 \$527 \$6,451 \$588 n/a \$8,429 \$1,286	34,383 64,770 2035 \$429 \$3,496 \$605 n/a \$8,529 \$273	41,551 69,263 2040 \$549 \$1,518 \$132 n/a \$10,034 \$774
Refrigeration Miscellaneous Total Incremental Achievable Potential (WWh) Total Achievable Incremental Costs (\$000s) Cooling Vantilation Vantilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration	4,609 39,771 \$138 \$315 \$18 n/a \$13,423 \$459 \$1,383	8,036 33,380 2025 \$312 \$2,571 \$156 n/a \$7,588 \$1,033 \$3,109	20,780 57,820 2030 \$527 \$6,451 \$588 n/a \$8,429 \$1,286 - \$3,874	34,383 64,770 2035 \$429 \$3,496 \$605 n/a \$8,529 \$8,529 \$273 - \$643	41,551 69,263 2040 \$549 \$1,518 \$132 n/a \$10,034 \$774 \$1,510
Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$900e) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous	4,609 39,771 2021 \$138 \$315 \$18 n/a \$13,423 \$459	8,036 33,380 2025 \$312 \$2,571 \$156 n/a \$7,588 \$1,033	20,780 57,820 2030 \$527 \$6,451 \$588 n/a \$8,429 \$1,286	34,383 64,770 2035 \$429 \$3,496 \$605 n/a \$8,529 \$273	41,551
Refrigeration Miscellaneous Total Achievable Incremental Costs (\$9005) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$9005)	4,609 39,771 \$138 \$315 \$18 \$13,423 \$459 \$1,383 \$1,282 \$17,018	8,036 33,380 2025 \$2,571 \$156 n/a \$7,588 \$1,033 - \$3,109 \$2,214 \$16,983	20,780 57,820 2030 \$5,27 \$6,451 \$588 \$1,286 \$3,874 \$5,666 \$26,820	34,383 64,770 2035 \$429 \$429 \$429 \$605 \$605 \$273 \$8,529 \$273 \$643 \$9,368 \$23,343	41,551 69,263 2040 \$549 \$1,518 \$13,21 \$10,034 \$774 \$15,10 \$11,372 \$25,890
Refrigeration Miscellancoux Total Incremental Achievable Potential (WWh Total Achievable Incremental Costs (\$000s) Cooling Ventilation Ventilation Ventilation Ventilation Cooking Office Equipment & Computing Refrigeration Miscellaneoux Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s)	4,609 39,771 \$138 \$315 \$18 n/a \$13,423 \$459 \$1,383 \$1,282	8,036 33,380 2025 \$2,571 \$156 n/a \$7,588 \$1,033 - \$3,109 \$2,214 \$16,983	20,780 57,820 2030 \$5,27 \$6,451 \$588 \$1,286 \$3,874 \$5,666 \$26,820	34,383 64,770 2035 \$429 \$429 \$429 \$605 \$605 \$273 \$8,529 \$273 \$643 \$9,368 \$23,343	41,551 69,263 2040 \$549 \$1,518 \$13,21 \$10,034 \$774 \$15,10 \$11,372 \$25,890
Refrigeration Miscellaneous Total Incormental Achievable Potential (MWh) Total Achievable Incremental Costs (\$0005) Heating Cooling Varinitation Water Heating Liphting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$0005) Multi-Year Cumulative Costs (\$0005)	4,609 39,771 \$138 \$315 \$18 n/a \$13,423 \$423 \$13,843 \$1,282 \$1,383 \$1,282 \$17,018	8,036 33,380 2025 \$312 \$2,571 \$156 n/a \$7,588 \$1,033 - \$3,109 \$2,214 \$16,983 2026-2030 \$2,197 \$26,659	20,780 57,820 2030 \$527 \$6,451 \$588 n/a \$3,874 \$5,666 \$26,820 2031-2035 \$2,244 \$24,791	34,383 64,770 2035 \$429 \$3,496 \$605 n/a \$6,529 \$273 - \$643 \$9,368 \$23,343 2036-2040 \$2,590 \$2,590	41,551 69,263 2040 \$549 \$1,518 \$13,21 \$10,034 \$774 \$15,10 \$11,372 \$25,890
Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s) Heating Cooling Ventlation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation	4,609 39,771 2021 \$138 \$315 \$18 \$13,423 \$459 \$1,383 \$1,282 \$17,018 2021-2025 \$1,114 \$5,916 \$374	8.036 33,380 2025 \$312 \$2,571 \$156 n/a \$7,588 \$1,03 \$2,214 \$16,983 2026-2030 \$2,197 \$26,659 \$2,014	20,780 57,820 2030 \$527 \$6,451 \$588 n/a \$8,429 \$1,286 \$26,820 2031-2035 \$2,244 \$24,791 \$3,376	34,383 64,770 2035 \$429 \$3,496 \$6,529 \$2,73 - \$643 \$9,368 \$23,343 2036-2040 \$2,590 \$10,395 \$1,475	41,551 69,263 2040 \$549 \$1,518 \$13,21 \$10,034 \$774 \$15,10 \$11,372 \$25,890
Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Cooling Gooling Ventilation Water Heating Uptimg Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation	4,609 39,771 \$138 \$138 \$15 \$18 n/a \$13,423 \$459 \$1,383 \$1,282 \$1,144 \$5,916 \$374 n/a	8,036 33,380 2025 \$312 \$2,571 \$156 n/a \$7,588 \$1,033 \$2,214 \$16,983 2026-2030 \$2,197 \$26,659 \$2,057 \$26,659	20,780 57,820 2030 \$527 \$6,451 \$588 n/a \$8,429 \$1,286 \$26,820 2031-2035 \$2,244 \$2,4791 \$3,376 n/a	34,383 64,770 2035 \$429 \$429 \$429 \$429 \$429 \$429 \$429 \$429	41,551 69,263 2040 \$549 \$1,518 \$13,21 \$10,034 \$774 \$15,10 \$11,372 \$25,890
Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s) Heating Cooling Ventlation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting	4,609 39,771 \$138 \$138 \$13,423 \$1,3423 \$1,3423 \$1,343 \$1,383 \$1,282 \$1,383 \$1,282 \$1,201 \$201-2025 \$1,114 \$5,916 \$374 \$374 \$1,344	8,036 33,380 2025 \$312 \$156 n/a \$7,588 \$1,03 \$2,214 \$16,983 \$2,214 \$16,983 \$2,214 \$2,214 \$2,6659 \$2,197 \$26,659 \$2,014 n/a \$48,250	20,780 57,820 2030 \$527 \$6,451 \$588 n/a \$8,429 \$1,286 \$2,682 2031-2035 \$2,824 \$2,4791 \$3,376 n/a \$33,169	34,383 64,770 2035 \$429 \$3,496 \$605 \$605 \$605 \$643 \$9,368 \$23,343 2036-2040 \$2,590 \$10,395 \$1,475 rda \$44,163	41,551 69,263 2040 \$549 \$1,518 \$13,21 \$10,034 \$774 \$15,10 \$11,372 \$25,890
Refrigeration Miscellaneous Total Incremental Achievable Potential (WWh Total Achievable Incremental Costs (\$000s; Heating Cooling Ordine Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking	4,609 39,771 \$138 \$138 \$15 \$18 n/a \$13,423 \$459 \$1,383 \$1,282 \$1,144 \$5,916 \$374 n/a	8,036 33,380 2025 \$312 \$2,571 \$156 n/a \$7,588 \$1,033 \$2,214 \$16,983 2026-2030 \$2,197 \$26,659 \$2,057 \$26,659	20,780 57,820 2030 \$527 \$6,451 \$588 n/a \$8,429 \$1,286 \$26,820 2031-2035 \$2,244 \$2,4791 \$3,376 n/a	34,383 64,770 2035 \$429 \$429 \$429 \$429 \$429 \$429 \$429 \$429	41,551 69,263 2040 \$549 \$1,518 \$13,21 \$10,034 \$774 \$15,10 \$11,372 \$25,890
Refrigeration Miscellaneous Total Incremental Achievable Potential (WWh Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing	4,609 39,771 \$138 \$135 \$138 \$13,423 \$13,423 \$13,423 \$13,423 \$13,423 \$13,423 \$13,423 \$13,833 \$1,282 \$17,018 \$2021-2025 \$1,114 \$5,916 \$3,74 \$5,916 \$3,74 \$5,916 \$3,77 \$1,018 \$2,019 \$1,019\$1,019\$1,019\$1,019\$1,019\$1,019\$1,019\$1,019\$1,019\$1,019\$1,019\$1,019\$1,019\$1,019\$1,019\$1,019\$1,019\$1,019\$1,	8,036 33,380 2025 \$312 \$1,568 \$1,033 \$1,033 \$2,214 \$16,983 2026-2030 \$2,197 \$26,659 \$2,047 \$26,659 \$2,057 \$26,659 \$2,017 \$26,659 \$	20,780 57,820 2030 \$527 \$6,451 \$588 n/a \$5,429 \$1,286 \$2,424 \$26,820 2031-2035 \$2,2,44 \$24,791 \$3,376 n/a \$3,3169 \$3,319 \$3,319	34,383 64,770 2035 \$429 \$3,496 \$8,529 \$273 \$643 \$9,368 \$23,343 2036-2040 \$10,395 \$1,475 rda \$44,163 \$2,726	41,551 69,263 2040 \$549 \$1,518 \$13,21 \$10,034 \$774 \$15,10 \$11,372 \$25,890
Refrigeration Miscellaneous Total Incremental Achievable Potential (MWh Total Achievable Incremental Costs (\$000s; Heating Cooling Verifiation Water Heating Lighting Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs	4.609 39,771 2021 \$138 \$315 \$18 \$13,423 \$459 \$1,383 \$1,282 \$17,018 2021-2025 \$1,114 \$5,916 \$374 \$1,383 \$1,282 \$1,7018 2021-2025 \$1,114 \$3,691 \$1,385 \$1,516 \$1,	8,036 33,380 2025 \$2,571 \$156 n/a \$1,033 52,214 \$16,983 2026-2030 \$2,197 \$26,659 \$2,014 n/a \$48,250 \$6,817 - \$20,506	20,780 57,820 2030 \$5,27 \$6,451 \$588 n/a \$5,888 \$1,286 \$26,820 2031-2035 \$26,820 2031-2035 \$22,244 \$3,376 n/a \$3,376 n/a \$3,3169 \$3,109 \$4,100 \$4	34,383 64,770 2035 \$429 \$3,496 \$605 n/a \$8,529 \$22,33 \$9,368 \$23,343 2036-2040 \$2,590 \$10,395 \$1,475 n/a \$10,395 \$1,475 n/a \$2,726 \$1,475 \$1,575 \$1,475\$\$1,4	41,551 69,263 2040 \$549 \$1,518 \$13,21 \$10,034 \$774 \$15,10 \$11,372 \$25,890
Refrigeration Miscellaneous Total Incremental Achievable Potential (WWh Total Achievable Incremental Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Mutil-Year Cumulative Costs (\$000s) Heating Cooling Ventilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous Cooking Office Equipment & Computing Refrigeration	4,609 39,771 2021 \$138 \$15 \$18 %12 \$13,423 \$459 \$1,383 \$1,282 \$1,383 \$1,282 \$1,383 \$1,282 \$1,114 \$5,916 \$374 \$1,54 \$1,114 \$3,6541 \$3,65541 \$3	8,036 33,380 2025 \$2,571 \$156 n/a \$7,588 \$1,033 \$1,09 \$2,214 \$16,983 \$1,09 \$2,214 \$16,983 \$2,214 \$16,983 \$2,214 \$16,983 \$2,214 \$16,8659 \$2,217 \$26,659 \$2,217 \$26,659 \$2,2014 \$1,255 \$2,257 \$2,255 \$2,257 \$2,255 \$2,257 \$2,255 \$2,257 \$2,255 \$2,257 \$2,255 \$2,257 \$2,255 \$2,257 \$2,257 \$2,255 \$2,257 \$2,255 \$2,257 \$2,255 \$2,257 \$2,255 \$2,	20,780 57,820 2030 \$527 \$6,451 \$588 n/a \$3,874 \$5,666 \$26,820 \$26,820 \$26,820 \$26,820 \$26,820 \$26,820 \$26,820 \$26,820 \$3,874 \$3,874 \$26,451 \$3,874 \$26,451 \$3,874 \$26,451 \$3,874 \$26,451 \$3,874 \$26,820 \$20,820	34,383 64,770 2035 54,496 \$8,605 %14 \$8,529 \$23,436 \$23,543 \$23,543 \$23,543 \$23,543 \$23,543 \$23,543 \$23,543 \$23,550 \$10,395 \$1,075 \$1,075 \$1,475 \$2,550 \$1,035 \$1,476 \$2,550 \$1,035 \$1,476 \$2,550 \$1,035 \$1,476 \$2,550 \$1,035 \$1,476 \$2,550 \$1,035 \$1,476 \$2,550 \$1,035\$\$1,035\$\$1,0	41,551 69,263 2040 \$549 \$1,518 \$13,21 \$10,034 \$774 \$15,10 \$11,372 \$25,890
Refrigeration Miscellaneous Total Incremental Achievable Potential (WWh Total Achievable Incremental Costs (\$000s) Heating Cooling Verillation Water Heating Uptime Cooking Querter & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Verillation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration Miscellaneous	4.609 39,771 2021 \$138 \$13,423 \$13,423 \$13,423 \$1,282 \$17,018 2021-2025 \$17,018 2021-2025 \$17,018 2021-2025 \$17,018 \$3,744 \$5,916 \$3,744 \$5,916 \$3,769 \$1,114 \$5,916 \$3,769 \$3,769 \$1,114 \$5,916 \$3,769 \$1,114 \$5,916 \$3,769 \$1,114 \$5,916 \$3,769 \$1,114 \$5,916 \$3,769 \$1,114 \$5,916 \$3,769 \$1,114 \$5,916 \$3,769 \$1,114 \$5,916 \$3,769 \$1,114 \$5,916 \$3,769 \$1,114 \$5,916 \$3,769 \$1,114 \$5,916 \$3,769 \$1,114 \$5,916 \$1,114 \$5,916 \$3,769 \$1,114 \$5,916 \$3,769 \$1,114 \$5,916 \$3,769 \$1,114 \$5,916 \$3,769 \$1,114 \$5,916 \$3,779 \$1,114 \$5,916 \$3,779 \$1,114 \$5,916 \$3,779 \$1,116 \$3,779 \$1,116 \$3,779 \$1,114 \$5,916 \$3,779 \$1,114 \$5,916 \$3,779 \$1,114 \$5,916 \$3,779 \$1,114 \$5,916 \$3,779 \$1,114 \$5,916 \$3,779 \$1,114 \$5,916 \$3,779 \$1,114 \$5,916 \$3,779 \$1,114 \$5,916 \$3,779 \$1,114 \$5,916 \$3,779 \$1,114 \$5,916 \$3,779 \$1,114 \$5,916 \$3,779 \$1,114 \$5,916 \$3,779 \$1,216 \$3,779 \$1,114 \$3,699 \$1,216 \$3,779 \$1,114 \$3,699 \$1,216 \$3,779 \$1,114 \$3,699 \$1,216 \$3,779 \$1,116 \$1,216 \$1,216 \$1,216\$\$1,21	8,036 33,380 2025 \$2,571 \$156 n/a \$7,588 \$1,033 \$2,214 \$16,983 2026-2030 \$2,197 \$26,659 \$2,014 n/a \$48,250 \$2,214 \$26,565 \$2,2197 \$26,659 \$2,014 n/a \$48,250 \$2,014 n/a \$48,250 \$2,056 \$2,0506 \$2,030	20,780 57,820 2030 \$527 \$6,451 \$588 n/a \$8,429 \$1,286 \$26,820 2031-2035 \$2,244 \$3,376 \$3,376 \$3,3169 \$3,3109 \$3,3109 \$3,109 \$40,354 \$16,124	34,383 64,770 2035 \$429 \$3,496 \$605 n/a \$8,529 \$23,343 \$9,368 \$23,343 2036-2040 \$2,590 \$10,395 \$1,475 n/a \$1,475 n/a \$4,163 \$2,726 \$14,253 \$52,752 \$119,438	41,551 69,263 2040 \$549 \$1,518 \$13,21 \$10,034 \$774 \$15,10 \$11,372 \$25,890
Refrigeration Missellaneous Total Incremental Achievable Potential (WWh Total Achievable Incremental Costs (\$000s; Heating Cooling Verillation Water Heating Ughting Office Equipment & Computing Refrigeration Miscellaneous Total Incremental Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Multi-Year Cumulative Costs (\$000s) Heating Cooling Vertilation Water Heating Lighting Cooking Office Equipment & Computing Refrigeration	4,609 39,771 2021 \$138 \$15 \$18 %12 \$13,423 \$459 \$1,383 \$1,282 \$1,383 \$1,282 \$1,383 \$1,282 \$1,114 \$5,916 \$374 \$1,54 \$1,114 \$3,6541 \$3,65541 \$3	8,036 33,380 2025 \$2,571 \$156 n/a \$7,588 \$1,033 \$1,09 \$2,214 \$16,983 \$1,09 \$2,214 \$16,983 \$2,214 \$16,983 \$2,214 \$16,983 \$2,214 \$16,8659 \$2,217 \$26,659 \$2,217 \$26,659 \$2,2014 \$1,255 \$2,257 \$2,255 \$2,257 \$2,255 \$2,257 \$2,255 \$2,257 \$2,255 \$2,257 \$2,255 \$2,257 \$2,255 \$2,257 \$2,257 \$2,255 \$2,257 \$2,255 \$2,257 \$2,255 \$2,257 \$2,255 \$2,	20,780 57,820 2030 \$527 \$6,451 \$588 n/a \$3,874 \$5,666 \$26,820 \$26,820 \$26,820 \$26,820 \$26,820 \$26,820 \$26,820 \$26,820 \$3,874 \$3,874 \$26,451 \$3,874 \$26,451 \$3,874 \$26,451 \$3,874 \$26,451 \$3,874 \$26,820 \$20,820	34,383 64,770 2035 54,496 \$8,605 %14 \$8,529 \$23,436 \$23,543 \$23,543 \$23,543 \$23,543 \$23,543 \$23,543 \$23,543 \$23,550 \$10,395 \$1,075 \$1,075 \$1,475 \$2,550 \$1,035 \$1,476 \$2,550 \$1,035 \$1,476 \$2,550 \$1,035 \$1,476 \$2,550 \$1,035 \$1,476 \$2,550 \$1,035 \$1,476 \$2,550 \$1,035\$\$1,035\$\$1,0	41,551 69,263 2040 \$549 \$1,518 \$13,22 \$15,18 \$10,034 \$774 \$15,10 \$11,372 \$25,890

Participant Cost Utility Incentives Utility Administrative Costs

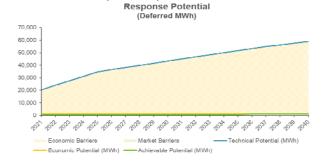
EE.Hourly.High: Hourly Energy Efficiency Results, Medium Avoided Cost Scenario

	Winter	202	21	203	25	203	30	20	35	20	40
	12/19	Base Load	Total EE								
8449	1	(MW) 326.9	Curtailment 3.4	(MW) 329.9	Curtailment 13.0	(MW) 335.2	Curtailment 25.3	(MW) 344.8	Curtailment 35.6	(MW) 361.3	Curtailment 39.6
8450	2	318.4	3.4	329.9	13.0	326.5	25.3	335.8	35.6	351.9	39.6
8451	3	315.3	3.4	318.2	13.0	323.3	25.3	332.6	35.6	348.4	39.6
8452	4	316.6	3.4	319.4	13.0	324.6	25.3	333.9	35.6	349.9	39.6
8453	5	326.0	3.4	329.0	13.0	334.3	25.3	343.9	35.6	360.3	39.6
8454	6 7	348.9	3.9	352.1	21.5	357.8	40.3	368.0	52.1	385.6	55.6
8455 8456	8	386.2 405.2	3.6 6.9	389.7 408.9	20.6 32.6	396.1 415.5	39.2 58.8	407.4 427.4	50.9 74.9	426.8 447.8	54.4 79.8
8457	9	406.7	6.9	410.4	32.6	417.1	58.8	429.0	74.9	449.5	79.8
8458	10	401.9	6.5	405.5	25.6	412.1	48.1	423.9	63.3	444.2	67.8
8459	11	397.7	6.5	401.3	25.6	407.8	48.1	419.5	63.3	439.5	67.8
8460	12	393.9	6.5	397.5	25.6	403.9	48.1	415.5	63.3	435.3	67.8
8461 8462	13 14	389.5 386.5	6.5 6.5	393.0 390.0	25.6 25.6	399.4 396.3	48.1 48.1	410.8 407.7	63.3 63.3	430.4 427.1	67.8 67.8
8463	14	382.2	6.5	385.7	25.6	390.3	48.1	407.7	63.3	427.1	67.8
8464	16	384.2	6.9	387.8	32.6	394.0	58.8	405.3	74.9	424.7	79.8
8465	17	408.1	8.9	411.8	38.2	418.5	65.7	430.5	82.1	451.1	87.0
8466	18	447.0	8.9	451.1	38.2	458.4	65.7	471.5	82.1	494.1	87.0
8467	19	448.1	3.9	452.2	21.5	459.5	40.3	472.7	52.1	495.2	55.6
8468 8469	20 21	441.3 430.8	3.9 3.9	445.4 434.7	21.5 21.5	452.6 441.7	40.3 40.3	465.5 454.4	52.1 52.1	487.8 476.1	55.6 55.6
8470	21	430.8	3.9	434.7	21.3	441.7	40.3 36.0	434.4	47.2	470.1	51.6
8471	23	374.6	3.7	378.0	20.0	384.2	36.0	395.2	47.2	414.0	51.6
8472	24	344.7	3.4	347.8	13.0	353.5	25.3	363.6	35.6	381.0	39.6
S	Spring/Fall	202		202		2030		203		204	
	09/15	Base Load (MW)	Total EE Curtailment								
6169	1	313.1	3.4	315.9	13.0	321.0	25.3	330.2	35.6	346.0	39.6
6170	2	298.0	3.4	300.8	13.0	305.6	25.3	314.4	35.6	329.4	39.6
6171	3	289.5	3.4	292.1	13.0	296.9	25.3	305.4	35.6	320.0	39.6
6172	4	284.7	3.4	287.3	13.0	291.9	25.3	300.3	35.6	314.6	39.6
6173 6174	5 6	286.6 302.0	3.4 3.9	289.2 304.8	13.0 21.5	293.9 309.7	25.3 40.3	302.3 318.6	35.6 52.1	316.7 333.8	39.6 55.6
6175	7	331.5	1.8	334.5	15.9	340.0	33.4	349.7	45.0	366.4	48.5
6176	8	349.7	6.9	352.9	32.6	358.7	58.8	368.9	74.9	386.5	79.8
6177	9	370.4	6.9	373.8	32.6	379.8	58.8	390.7	74.9	409.4	79.8
6178	10	391.3	6.5	394.9	25.6	401.3	48.1	412.8	63.3	432.5	67.8
6179	11	410.7	6.5	414.4	25.6	421.2	48.1	433.2	63.3	453.9	67.8
6180 6181	12 13	426.4 441.4	6.5 6.5	430.3 445.5	25.6 25.6	437.2 452.7	48.1 48.1	449.8 465.6	63.3 63.3	471.2 487.9	67.8 67.8
6182	13	441.4	6.5	461.4	25.6	468.8	48.1	482.2	63.3	505.3	67.8
6183	15	471.3	6.5	475.6	25.6	483.3	48.1	497.2	63.3	520.9	67.8
6184	16	479.5	6.9	483.9	32.6	491.8	58.8	505.8	74.9	530.0	79.8
6185	17	482.9	6.9	487.4	32.6	495.2	58.8	509.4	74.9	533.8	79.8
6186	18	475.4	6.9	479.7	32.6	487.5	58.8	501.4	74.9	525.4	79.8
6187 6188	19 20	451.8 444.8	3.9 3.9	455.9 448.9	21.5 21.5	463.3 456.2	40.3 40.3	476.5 469.2	52.1 52.1	499.3 491.6	55.6 55.6
6189	20	427.0	3.9	430.9	21.5	437.9	40.3	450.4	52.1	471.9	55.6
6190	22	392.5	3.7	396.1	20.0	402.5	36.0	414.0	47.2	433.8	51.6
6191	23	354.1	3.7	357.3	20.0	363.1	36.0	373.5	47.2	391.4	51.6
6192	24	319.9	3.4	322.8	13.0	328.1	25.3	337.5	35.6	353.6	39.6
	Summer	202	21	202	25	203	30	203	35	20	
	07/10	Base Load	Total EE								
4561	1	(MW) 350.3	Curtailment 3.7	(MW) 353.5	Curtailment 18.5	(MW) 359.2	Curtailment 52.6	(MW) 369.5	Curtailment 81.5	(MW) 387.1	Curtailment 91.9
4562	2	327.3	3.7	330.3	18.5	335.6	52.6	345.2	81.5	361.7	91.9
4563	3	314.6	3.7	317.5	18.5	322.6	52.6	331.9	81.5	347.7	91.9
4564	4	308.1	3.7	310.9	18.5	316.0	52.6	325.0	81.5	340.5	91.9
4565	5	312.0	3.7	314.8	18.5	319.9	52.6	329.1	81.5	344.8	91.9
4566 4567	6 7	323.5 342.0	2.2 2.2	326.4 345.1	21.4 21.4	331.7 350.7	60.7 60.7	341.2 360.8	90.9 90.9	357.5 378.0	100.8 100.8
4568	8	342.0	7.2	379.2	38.1	385.3	86.1	396.4	120.9	415.3	132.1
4569	9	414.2	7.2	418.0	38.1	424.7	86.1	436.9	120.9	457.7	132.1
4570	10	455.7	6.8	459.8	31.1	467.3	75.4	480.6	109.2	503.6	120.1
4571	11	494.4	6.8	498.9	31.1	507.0	75.4	521.5	109.2	546.4	120.1
4572	12	535.6	6.8	540.5	31.1	549.2	75.4	564.9	109.2	591.9	120.1
4573	13	566.6	6.8	571.7	31.1	581.0	75.4	597.6	109.2	626.2	120.1

_	8450 8451	2	318.4 315.3	3.4 3.4	321.3 318.2	13.0 13.0	326.5 323.3	25.3 25.3	335.8 332.6	35.6 35.6	351.9 348.4	39.6 39.6
	8449	1	326.9	3.4	329.9	13.0	335.2	25.3	344.8	35.6	361.3	39.6
		12/19	(MW)	Curtailment	(MW)	Curtailment	(MW)	Curtailment	(MW)	Curtailment	(MW)	Curtailment
		12/19	Base Load	Total EE	Base Load	Total EE	Base Load	Total EE	Base Load	Total EE	Base Load	Total EE
		Winter										
	4579	19	567.3	2.2	572.5	21.4	581.8	60.7	598.4	90.9	627.0	100.8
	4578	18	576.6	7.2	581.8	38.1	591.3	86.1	608.2	120.9	637.3	132.1
	4577	17	583.7	7.2	589.0	38.1	598.5	86.1	615.7	120.9	645.1	132.1
	4576	16	608.5	7.2	614.0	38.1	624.0	86.1	641.9	120.9	672.5	132.1
	4575	15	616.7	6.8	622.3	31.1	632.4	75.4	650.5	109.2	681.6	120.1
	4574	14	593.9	6.8	599.3	31.1	609.0	75.4	626.4	109.2	656.4	120.1
	4573	13	566.6	6.8	571.7	31.1	581.0	75.4	597.6	109.2	626.2	120.1
	4572	12	535.6	6.8	540.5	31.1	549.2	75.4	564.9	109.2	591.9	120.1
	4571	11	494.4	6.8	498.9	31.1	507.0	75.4	521.5	109.2	546.4	120.1
	4370	10		0.0	-00.0	51.1	-01.5	10.4	+00.0	100.2	505.0	120.1

EE.Hourly.High: Hourly Energy Efficiency Results, Medium Avoided Cost Scenario

	Winter	202	21	202	25	203	30	20	35	20	40
Peak Hours	12/19	Base Load	Load w/EE Curtailment	Base Load	Load w/EE						
20	12/19	(MW) 327	S24	(MW) 330	Curtailment 317	(MW) 335	Curtailment 310	(MW) 345	Curtailment 309	(MW) 361	Curtailment 322
22	2	318	315	321	308	326	301	336	300	352	312
24 23	3 4	315 317	312 313	318 319	305 306	323 325	298 299	333 334	297 298	348 350	309 310
21	5	326	323	329	316	334	309	344	308	360	321
18	6 7	349	345	352	331	358	317	368	316	386	330
14 8	8	386 405	383 398	390 409	369 376	396 416	357 357	407 427	357 352	427 448	372 368
7	9	407	400	410	378	417	358	429	354	450	370
9 10	10 11	402 398	395 391	406 401	380 376	412 408	364 360	424 419	361 356	444 439	376 372
11	12	394	387	397	372	400	356	415	352	435	368
12	13	389	383	393	367	399	351	411	348	430	363
13 16	14 15	386 382	380 376	390 386	364 360	396 392	348 344	408 403	344 340	427 422	359 355
15	16	384	377	388	355	394	335	405	330	425	345
5 2	17 18	408 447	399 438	412 451	374 413	419 458	353 393	430 472	348 389	451 494	364 407
1	10	447	436	452	413	458	419	472	421	494	407
3	20	441	437	445	424	453	412	466	413	488	432
4	21 22	431 408	427 404	435 412	413 392	442 418	401 382	454 430	402 383	476 451	420 399
17	22	375	371	378	358	384	348	395	348	414	362
19	24	345	341	348	335	353	328	364	328	381	341
s	Spring/Fall	202	21	202	25	203	30	20	35	20-	40
Peak Hours	09/15	Base Load (MW)	Load w/EE Curtailment								
19	1	313	310	316	303	321	296	330	295	346	306
21 22	2 3	298 290	295 286	301 292	288 279	306 297	280 272	314 305	279 270	329 320	290 280
22	3	290	280	292	279 274	297	272	305	270 265	320	280
23	5	287	283	289	276	294	269	302	267	317	277
20 17	6 7	302 332	298 330	305 335	283 319	310 340	269 307	319 350	266 305	334 366	278 318
16	8	350	343	353	320	359	300	369	294	387	307
14	9	370	364	374	341	380	321	391	316	409	330
13 11	10 11	391 411	385 404	395 414	369 389	401 421	353 373	413 433	349 370	433 454	365 386
10	12	426	420	430	405	437	389	450	386	471	403
8	13	441	435	445	420	453	405	466	402	488	420
5 4	14 15	457 471	451 465	461 476	436 450	469 483	421 435	482 497	419 434	505 521	437 453
2	16	480	473	484	451	492	433	506	431	530	450
1	17 18	483 475	476 469	487 480	455 447	495 487	436 429	509 501	434 426	534 525	454 446
6	10	475	409	456	447	463	429	477	420	499	440
7	20	445	441	449	427	456	416	469	417	492	436
9 12	21 22	427 392	423 389	431 396	409 376	438 402	398 366	450 414	398 367	472 434	416 382
15	22	354	350	357	337	363	327	374	326	391	340
18	24	320	317	323	310	328	303	337	302	354	314
	Summer	202		202		203		20		20	
Peak Hours	07/10	Base Load (MW)	Load w/EE Curtailment								
18	1	350	347	353	335	359	307	369	288	387	295
20 22	2 3	327 315	324 311	330 317	312 299	336 323	283 270	345 332	264 250	362 348	270 256
24	4	308	304	311	292	316	263	325	244	341	249
23	5	312	308	315	296	320	267	329	248	345	253
21 19	6 7	323 342	321 340	326 345	305 324	332 351	271 290	341 361	250 270	357 378	257 277
17	8	376	369	379	341	385	299	396	275	415	283
15	9	414	407	418	380	425	339	437	316	458	326 384
13 12	10 11	456 494	449 488	460 499	429 468	467 507	392 432	481 522	371 412	504 546	384 426
	12	536	529	540	509	549	474	565	456	592	472
9 7 3	13 14	567 594	560 587	572 599	541 568	581 609	506 534	598 626	488 517	626 656	506 536
1	14	617	610	622	508	632	557	651	517	682	562
	16	608	601	614	576	624	538	642	521	673	540
2 4 5 6 8	17 18	584 577	576 569	589 582	551 544	599 591	512 505	616 608	495 487	645 637	513 505
6	19	567	565	573	551	582	521	598	508	627	526
	20	543	541	548	527	557	496	573	482	600	499
10 11	21 22	527 499	523 495	532 504	505 478	540 512	473 448	556 526	458 433	583 551	475 448
14	23	446	441	450	424	457	394	470	377	492	389
16	24	396	393	400	381	406	354	418	337	438	346



Technical, Economic, and Achievable Demand

Combined

Combined					
Technical Potential (MWh)	2021	2025	2030	2035	2040
HVAC	3,533	3,813	4,152	4,475	4,820
Water Heating	508	624	765	901	1,048
Batteries	12,944	26,272	33,523	40,601	46,750
Industrial Processes	657	796	963	1,116	1,259
Lighting	2,291	2,828	3,463	4,040	4,571
Refrigeration	7	7	8	9	9
Voltage Reduction	424	427	434	447	468
Total Technical Potential (MWh)	20,363	34,767	43,308	51,588	58,925
Economic Potential (MWh)	2021	2025	2030	2035	2040
HVAC	124	135	150	163	175
Water Heating	-	-	-	-	-
Batteries	-	-	-	-	-
Industrial Processes	332	392	464	531	593
Lighting	-	-	-	-	-
Refrigeration	-	-	-	-	-
Voltage Reduction	424	427	434	447	468
Total Economic Potential (MWh)	879	955	1,048	1,140	1,236
Achievable Potential (MWh)	2021	2025	2030	2035	2040
HVAC	0	10	55	97	108
Water Heating	-	-	-	-	-
Batteries		_	-	-	_
Industrial Processes	1	28	172	302	339
Lighting	1				
Refrigeration	-	-	-	-	-
Voltage Reduction	424	427	434	447	468
Total Achievable Potential (MWh		465	661	846	914
· · · ·					
Total Achievable Incremental	1				
Costs (\$000s)	2021	2025	2030	2035	2040
HVAC	\$6	\$55	\$144	\$77	\$81
Water Heating	-	-	-	-	-
Batteries	-	-	-	-	-
Industrial Processes	\$1	\$11	\$31	\$29	\$36
Lighting	-	-	-	-	-
Refrigeration	-	-	-	-	-
Voltage Reduction	\$2,280	-	-	-	-
Total Incremental Costs (\$000s)	\$2,287	\$66	\$175	\$106	\$118
Multi Varan Ormulativa Orat					
Multi-Year Cumulative Cost (\$000s)	2024 2025 6		024 2025	026 2042	
(1)	2021-20252				
HVAC	\$125	\$593	\$548	\$330	
Water Heating		-	-	-	
Batteries Industrial Processes		- 0101	- 6147	e167	
	\$23	\$121	\$147	\$167	
Lighting		-		-	
Refrigeration	+0.000	-	-	-	
Voltage Reduction	\$2,280	6744	-	\$497	
Total 5-Year Costs (\$000s)	\$2,428	\$714	\$695		
Participant Cost	\$27	\$130 \$391	\$127	\$91	
Utility Incentives			\$381		
Utility Administrative Costs	\$2,361 \$40	\$192	\$187	\$272 \$134	

Technical, Economic, and Achievable Demand Response Potential (Deferred MW)



Combined					
Technical Potential (MW)	2021	2025	2030	2035	2040
HVAC	49.1	53.0	57.7	62.1	66.9
Water Heating	3.5	4.3	5.3	6.3	7.3
Batteries	14.3	28.6	37.3	45.7	53.2
Industrial Processes	4.6	5.5	6.7	7.8	8.7
Lighting	15.9	19.6	24.0	28.1	31.7
Refrigeration	0.0	0.1	0.1	0.1	0.1
Voltage Reduction	2.9	3.0	3.0	3.1	3.3
Total Technical Potential (MW)	90.4	114.1	134.1	153.1	171.2
Economic Potential (MW)	2021	2025	2030	2035	2040
HVAC	1.7	1.9	2.1	2.3	2.4
Water Heating	-	-	-	-	-
Batteries	-	-	-	-	-
Industrial Processes	2.3	2.7	3.2	3.7	4.1
Lighting	-	-	-	-	-
Refrigeration	-	-	-	-	-
Voltage Reduction	2.9	3.0	3.0	3.1	3.3
Total Economic Potential (MW)	7.0	7.6	8.3	9.0	9.8
· · ·					
Achievable Potential (MW)	2021	2025	2030	2035	2040
HVAC	0.0	0.1	0.8	1.4	1.5
Water Heating	-	-	-	-	-
Batteries	-	-	-	-	-
Industrial Processes	0.01	0.2	1.2	2.1	2.4
Lighting	-	-	-	-	-
Refrigeration	-	-	-	-	-
Voltage Reduction	2.9	3.0	3.0	3.1	3.3
Total Achievable Potential (MW)	3.0	3.3	5.0	6.6	7.1
Incremental Achievable Potential	l				
(MW)	2021	2025	2030	2035	2040
HVAC	0.0	0.1	0.2	0.1	0.1
Water Heating	-	-	-	-	-
Batteries	-	-	-	-	-
Industrial Processes	0.01	0.1	0.3	0.2	0.3
Lighting	-	-	-	-	-
Refrigeration	-	-	-	-	-
Voltage Reduction	2.9	0.0	0.0	0.0	0.0
Total Achievable Potential (MW)	3.0	0.2	0.4	0.3	0.4
Incremental Cost per Unit Capacity	\$773.74	\$424.70	\$414.00	\$309.85	\$278.52

DR.Low: Demand Response Low Avoided Cost Scenario Results

Residential Technical Potential (MWh)	2021	2025	2030	2035	2040
HVAC	3,267	3,522	3,831	4,126	4,445
Water Heating	508	624	765	901	1,048
Batteries Industrial Processes	11,608 n/a	23,803 n/a	29,732 n/a	35,619 n/a	40,687 n/a
Lighting	n/a	n/a	n/a	n/a	n/a
Refrigeration	n/a	n/a	n/a	n/a	n/a
Voltage Reduction	n/a	n/a	n/a	n/a	n/a
Total Technical Potential (MWh)	15,383	27,949	34,328	40,646	46,180
Economic Potential (MWh)	2021	2025	2030	2035	2040
HVAC Water Heating	-	-	-	-	-
Batteries	-	-	-	-	-
Industrial Processes	n/a	n/a	n/a	n/a	n/a
Combined	2024	2025	2020	2025	20.40
Technical Potential (MWh) HVAC	2021 3,533	2025 3,813	2030 4,152	2035 4,475	2040 4,820
Water Heating	508	624	765	901	1,048
Batteries	12,944	26,272	33,523	40,601	46,750
Industrial Processes	657	796	963	1,116	1,259
Lighting Refrigeration	2,291 7	2,828 7	3,463 8	4,040 9	4,571 9
Voltage Reduction	424	427	434	447	468
Total Technical Potential (MWh)	20,363	34,767	43,308	51,588	58,925
Economic Potential (MWh)	2021	2025	2030	2035	2040
HVAC Water Heating	124	135	150	163	175
Water Heating Batteries	-	-	-	-	-
Industrial Processes	332	392	464	531	593
Lighting Refrigeration	-	-	-	-	-
Voltage Reduction	424	427	434	447	468
Total Economic Potential (MWh)	879	955	1,048	1,140	1,236
Achievable Potential (MWh)	2021	2025	2030	2035	2040
HVAC Water Heating	0	10	55	97	108
Batteries		-	-	-	-
Industrial Processes	1	28	172	302	339
Lighting	-	-	-	-	-
Refrigeration Voltage Reduction	424	- 427	434	- 447	468
Total Achievable Potential (MWh)	425	465	661	846	914
Total Achievable Incremental					
Costs (\$000s)	2021	2025	2030	2035	2040
HVAC Water Heating	\$6	\$55	\$144	\$77	\$81
Batteries	-	-	-	-	
Industrial Processes	\$1	\$11	\$31	\$29	\$36
Lighting Refrigeration	-	-	-	-	-
Voltage Reduction	\$2,280	-	-	-	-
Total Incremental Costs (\$000s)	\$2,287	\$66	\$175	\$106	\$118
Multi-Year Cumulative Cost (\$000s)	2021-20252		0004 00057	0.96 90.40	
HVAC	\$125	\$593	\$548	\$330	
Water Heating	-	-	-	-	
Batteries	- \$23	- \$121	- \$147	- \$167	
Industrial Processes Lighting	\$23	φι∠I -	φ147 -	φ10/ -	
Refrigeration	-	-	-	-	
Voltage Reduction	\$2,280	-	-	-	
Total 5-Year Costs (\$000s)	\$2,428	\$714	\$695	\$497	
Participant Cost Utility Incentives	\$27 \$2,361	\$130 \$391	\$127 \$381	\$91 \$272	
Utility Administrative Costs	\$40	\$192	\$187	\$134	
Residential	1				
Technical Potential (MWh)	2021	2025	2030	2035	2040
HVAC	3,267	3,522	3,831	4,126	4,445
Water Heating Batteries	508 11 608	624 23.803	765	901 35,619	1,048
Industrial Processes	11,608 n/a	23,803 n/a	29,732 n/a	35,619 n/a	40,687 n/a
Lighting	n/a	n/a	n/a	n/a	n/a
Refrigeration	n/a	n/a	n/a	n/a	n/a
Voltage Reduction Total Technical Potential (MWh)	n/a 15,383	n/a 27,949	n/a 34,328	n/a 40,646	n/a 46,180
					40,100

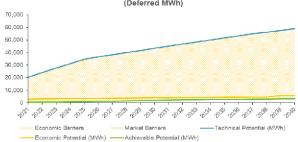
Technical Potential (MW)	2021	2025	2030	2035	2040
HVAC	45.4	48.9	53.2	57.3	61.7
Water Heating Batteries	3.5 11.8	4.3 23.9	5.3 30.0	6.3 36.2	7.3 41.5
Industrial Processes	n/a	20.0 n/a	n/a	n/a	
Lighting	n/a	n/a	n/a	n/a	n/a
Refrigeration	n/a	n/a	n/a	n/a	n/a
Voltage Reduction Total Technical Potential (MW)	n/a 60.7	n/a 77.1	n/a 88.6	n/a 99.7	n/a 110.
Economic Potential (MW)	2021	2025	2030	2035	2040
HVAC	-	-	-	-	
Water Heating	-	-	-	-	
Batteries Industrial Processes	-	- n/a	-	-	-
industrial Flocesses	n/a	11/d	n/a	n/a	n/a
Combined					
Technical Potential (MW)	2021	2025	2030	2035	2040
HVAC	49.1	53.0	57.7	62.1	66.9
Water Heating Batteries	3.5 14.3	4.3 28.6	5.3 37.3	6.3 45.7	7.3 53.3
Industrial Processes	4.6	20.0	6.7	45.7	- 55. 8.
Lighting	15.9	19.6	24.0	28.1	31.
Refrigeration	0.0	0.1	0.1	0.1	0.
Voltage Reduction Total Technical Potential (MW)	2.9 90.4	3.0 114.1	3.0 134.1	3.1 153.1	3. 171.
Economic Potential (MW)	2021	2025	2030	2035	204
HVAC	1.7	1.9	2.1	2.3	2.
Water Heating Batteries	-	-	-	-	
Industrial Processes	2.3	2.7	3.2	3.7	4.
Lighting	-	-	-	-	
Refrigeration	-	-	-	-	
Voltage Reduction Total Economic Potential (MW)	2.9 7.0	3.0 7.6	3.0 8.3	3.1 9.0	3. 9.
Achievable Potential (MW)	2021	2025	2030	2035	204
HVAC	0.0	0.1	0.8	1.4	1.
Water Heating Batteries	-	-	-	-	
Industrial Processes	- 0.01	0.2	1.2	2.1	2.4
Lighting	-	-	-	-	
Refrigeration	-	-	-	-	
Voltage Reduction Total Achievable Potential (MW)	2.9 3.0	3.0 3.3	3.0 5.0	3.1 6.6	3. 7.
Incremental Achievable Potential					
(MW)	2021	2025	2030	2035	204
HVAC Water Heating	0.0	0.1	0.2	0.1	0.1
Batteries	-	-	-	-	0
Industrial Processes Lighting	0.01	0.1	0.3	0.2	0.
Refrigeration	-	-	-	-	
Voltage Reduction	2.9	0.0	0.0	0.0	0.
Total Achievable Potential (MW) Incremental Cost per Unit Capacity	3.0 \$773.74	0.2 \$424.70	0.4 \$414.00	0.3 \$309.85	0. \$278.5
incremental Cost per Unit Capacity	\$773.74	φ424.7U	\$414.00	\$309.65	⊅ 270.3
Technical Potential (MW)	2021	2025	2030	2035	
Technical Potential (MW) HVAC	45.4	48.9	53.2	57.3	61.
Residential Technical Potential (MW) HVAC Water Heating Batteries					61. 7.
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes	45.4 3.5 11.8 n/a	48.9 4.3 23.9 n/a	53.2 5.3 30.0 n/a	57.3 6.3 36.2 n/a	61. 7. 41. n/
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting	45.4 3.5 11.8 n/a n/a	48.9 4.3 23.9 n/a n/a	53.2 5.3 30.0 n/a n/a	57.3 6.3 36.2 n/a n/a	61. 7. 41. n/
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes	45.4 3.5 11.8 n/a	48.9 4.3 23.9 n/a	53.2 5.3 30.0 n/a	57.3 6.3 36.2 n/a	204 61. 7. 41. n/ n/

DR.Hourly.Low: Demand Response Low Avoided Cost Scenario Results

	Winter	202	1	202	25	20	30	20	35	2	040
	12/19	Base Load (MW)	Total Deferral Available	Base Load	Total Deferral						
8449	1	326.9	Available 0.0	329.9	-0.3	335.2	Available -2.0	344.8	-3.5	(MW) 361.3	Available -3.8
8450	2	318.4	0.0	321.3	0.0	326.5	0.0	335.8			
8451	3	315.3	0.0	318.2	0.0	323.3	0.0	332.6			
8452 8453	4 5	316.6 326.0	0.0 0.0	319.4 329.0	0.0 0.0	324.6 334.3	0.0 0.0	333.9 343.9	0.0 0.0		
8454	6	348.9	0.0	352.1	0.0	357.8	0.0	368.0	0.0		
8455	7	386.2	0.0	389.7	0.0	396.1	0.0	407.4	0.0		
8456	8	405.2	0.0	408.9	0.0	415.5	0.0	427.4	0.0		
8457	9 10	406.7	0.0 0.0	410.4	0.0 0.0	417.1	0.0 0.0	429.0	0.0		
8458 8459	10	401.9 397.7	0.0	405.5 401.3	0.0	412.1 407.8	0.0	423.9 419.5	0.0 0.0		
8460	12	393.9	0.0	397.5	0.0	403.9	0.0	415.5			
8461	13	389.5	0.0	393.0	0.0	399.4	0.0	410.8	0.0		
8462	14	386.5	0.0	390.0	0.0	396.3	0.0	407.7	0.0		
8463 8464	15 16	382.2 384.2	0.0 0.0	385.7 387.8	0.0 0.0	391.9 394.0	0.0 0.0	403.2 405.3			
8465	17	408.1	2.9	411.8	3.2	418.5	4.9	430.5			
8466	18	447.0	2.9	451.1	3.2	458.4	4.9	471.5			
8467	19	448.1	2.9	452.2	3.2	459.5	4.9	472.7	6.4	495.2	
8468 8469	20 21	441.3 430.8	2.9 2.9	445.4 434.7	3.2 3.2	452.6 441.7	4.9 4.9	465.5 454.4	6.4 6.4		
8409	21	430.8	2.9	434.7	3.2	441.7	4.9	434.4	6.4		
8471	23	374.6	0.0	378.0	-0.3	384.2	-2.0	395.2			
8472	24	344.7	0.0	347.8	-0.3	353.5	-2.0	363.6			
	L	448.1 MW	2.9 MW	452.2 MW	3.2 MW	459.5 MW	4.9 MW	472.7 MW	6.4 MW	495.2 MW	6.7 MW
S	Spring/Fall	202		202		20			35		040
	09/15	Base Load (MW)	Total Deferral Available								
6169	1	313.1	0.0	315.9	0.0	321.0	0.0	330.2		346.0	
6170 6171	2 3	298.0 289.5	0.0 0.0	300.8 292.1	0.0 0.0	305.6 296.9	0.0 0.0	314.4 305.4	0.0 0.0		
6172	4	289.5	0.0	292.1	0.0	290.9	0.0	300.3	0.0		
6173	5	286.6	0.0	289.2	0.0	293.9	0.0	302.3	0.0		
6174	6	302.0	0.0	304.8	0.0	309.7	0.0	318.6	0.0		
6175	7	331.5	0.0	334.5	0.0	340.0	0.0	349.7	0.0		
6176 6177	8 9	349.7 370.4	0.0 0.0	352.9 373.8	0.0 0.0	358.7 379.8	0.0 0.0	368.9 390.7	0.0 0.0		
6178	10	391.3	0.0	394.9	0.0	401.3	0.0	412.8			
6179	11	410.7	0.0	414.4	0.0	421.2	0.0	433.2			
6180	12	426.4	0.0	430.3	0.0	437.2	0.0	449.8			
6181	13	441.4	0.0	445.5	0.0	452.7	0.0	465.6	0.0		
6182 6183	14 15	457.2 471.3	0.0 2.9	461.4 475.6	0.0 3.2	468.8 483.3	0.0 4.9	482.2 497.2		505.3 520.9	
6184	16	479.5	2.9	483.9	3.2	491.8	4.9	505.8	6.4		
6185	17	482.9	2.9	487.4	3.2	495.2	4.9	509.4	6.4		
6186	18	475.4	2.9	479.7	3.2	487.5	4.9	501.4	6.4		
6187	19 20	451.8	2.9 2.9	455.9	3.2 3.2	463.3	4.9 4.9	476.5	6.4		
6188 6189	20	444.8 427.0	2.9	448.9 430.9	-0.3	456.2 437.9	4.9 -2.0	469.2 450.4	6.4 -3.5		
6190	22	392.5	0.0	396.1	-0.3	402.5	-2.0	414.0			
6191	23	354.1	0.0	357.3	-0.3	363.1	-2.0	373.5			
6192	24	319.9 482.9 MW	0.0 2.9 MW	322.8 487.4 MW	0.0 3.2 MW	328.1 495.2 MW	0.0 4.9 MW	337.5 509.4 MW	0.0 6.4 MW		
	- I										
	Summer	202 Base Load	Total Deferral	202 Base Load	Z5 Total Deferral	203 Base Load	30 Total Deferral	Base Load	35 Total Deferral	Base Load	040 Total Deferral
1501	07/10	(MW)	Available								
4561 4562	1	350.3 327.3	0.0 0.0	353.5 330.3	0.0 0.0	359.2 335.6	0.0 0.0	369.5 345.2			
4563	2 3	314.6	0.0	317.5	0.0	322.6	0.0	331.9			
4564	4	308.1	0.0	310.9	0.0	316.0	0.0	325.0	0.0	340.5	5 0.0
4565	5	312.0	0.0	314.8	0.0	319.9	0.0	329.1	0.0		
4566	6 7	323.5	0.0	326.4	0.0 0.0	331.7	0.0	341.2			
4567 4568	8	342.0 375.8	0.0 0.0	345.1 379.2	0.0	350.7 385.3	0.0 0.0	360.8 396.4			
4569	9	414.2	0.0	418.0	0.0	424.7	0.0	436.9			· 0.0
4570	10	455.7	0.0	459.8	0.0	467.3	0.0	480.6	0.0	503.6	6 0.0
4571	11	494.4	0.0	498.9	0.0	507.0	0.0	521.5			
4572 4573	12 13	535.6 566.6	0.0 0.0	540.5 571.7	0.0 0.0	549.2 581.0	0.0 0.0	564.9 597.6			
4573 4574	13	566.6 593.9	0.0 2.9	571.7 599.3	0.0	581.0 609.0	0.0 4.9	597.6 626.4	0.0 6.4		
4575	15	616.7	2.9	622.3	3.2	632.4	4.9	650.5			
4576	16	608.5	2.9	614.0	3.2	624.0	4.9	641.9	6.4	672.5	6.7
4577	17	583.7	2.9	589.0	3.2	598.5	4.9	615.7	6.4		
4578	18	576.6	2.9	581.8	3.2	591.3	4.9	608.2			
4579 4580	19 20	567.3 543.1	2.9 0.0	572.5 548.0	3.2 -0.3	581.8 556.9	4.9 -2.0	598.4 572.8	6.4 -3.5		
4580	20	527.1	0.0	531.9	-0.3	540.5	-2.0	556.0			
4582	22	499.0	0.0	503.5	-0.3	511.7	-2.0	526.3	-3.5	551.5	-3.8
4583	23	445.5	0.0	449.6	0.0	456.9	0.0	470.0			
4584	24	396.3	0.0 2.9 MW	399.9 622.3 MW	0.0 3.2 MW	406.4 632.4 MW	0.0 4.9 MW	418.1 650.5 MW	0.0		
4004	1	616.7 MW							6.4 MW	681.6 MW	6.7 MW

DR.Hourly.Low: Demand Response Low Avoided Cost Scenario Results

	Winter	202	21	202	25	203	30	20	35	20	40
Peak Hours	12/19	Base Load	Load w/DR								
20	1	(MW) 327	Curtailment 327	(MW) 330	Curtailment 330	(MW) 335	Curtailment 337	(MW) 345	Curtailment 348	(MW) 361	Curtailment 365
22	2	318	318	321	321	326	326	336	336	352	352
24 23	3	315 317	315 317	318 319	318 319	323 325	323 325	333 334	333 334	348 350	348 350
21	5	326	326	329	329	334	334	344	344	360	360
18	6	349	349	352	352	358	358	368	368	386	386
14 8	7 8	386 405	386 405	390 409	390 409	396 416	396 416	407 427	407 427	427 448	427 448
7	9	407	407	410	410	417	417	429	429	450	450
9	10	402	402 398	406	406	412 408	412	424 419	424 419	444	444 439
10 11	11 12	398 394	398 394	401 397	401 397	408	408 404	419	419	439 435	439
12	13	389	389	393	393	399	399	411	411	430	430
13 16	14 15	386 382	386 382	390 386	390 386	396 392	396 392	408 403	408 403	427 422	427 422
15	15	384	384	388	388	394	392	403	403	422	422
5	17	408	405	412	409	419	414	430	424	451	444
2	18 19	447 448	444 445	451 452	448 449	458 460	454 455	472 473	465 466	494 495	487 488
3	20	441	438	445	442	453	448	466	400	488	481
4	21	431	428	435	431	442	437	454	448	476	469
6 17	22 23	408 375	405 375	412 378	409 378	418 384	414 386	430 395	424 399	451 414	444 418
19	23	345	345	348	348	353	355	364	367	381	385
	Spring/Fall	202	24	202	25	203	20	20	25	20	40
Peak	pring/r an	Base Load	Load w/DR								
Hours	09/15	(MW)	Curtailment								
19 21	1	313 298	313 298	316 301	316 301	321 306	321 306	330 314	330 314	346 329	346 329
22	3	290	290	292	292	297	297	305	305	320	320
24	4	285	285	287	287	292	292	300	300	315	315
23 20	5 6	287 302	287 302	289 305	289 305	294 310	294 310	302 319	302 319	317 334	317 334
17	7	332	332	335	335	340	340	350	350	366	366
16	8 9	350	350	353	353	359	359	369	369	387	387
14 13	9 10	370 391	370 391	374 395	374 395	380 401	380 401	391 413	391 413	409 433	409 433
11	11	411	411	414	414	421	421	433	433	454	454
10	12	426	426	430	430	437	437	450	450	471	471
8	13 14	441 457	441 457	445 461	445 461	453 469	453 469	466 482	466 482	488 505	488 505
4	15	471	468	476	472	483	478	497	491	521	514
2	16 17	480 483	477 480	484 487	481 484	492 495	487 490	506 509	499 503	530 534	523 527
3	18	403	400	480	404	493	490	501	495	525	519
6	19	452	449	456	453	463	458	477	470	499	493
7	20 21	445 427	442 427	449 431	446 431	456 438	451 440	469 450	463 454	492 472	485 476
12	21	392	392	396	396	402	440	430	434	472	470
15	23	354	354	357	358	363	365	374	377	391	395
18	24	320	320	323	323	328	328	337	337	354	354
	Summer	202		202		203		20		20	
Peak Hours	07/10	Base Load (MW)	Load w/DR Curtailment								
18	1	350	350	353	353	359	359	369	369	387	387
20 22	2 3	327 315	327 315	330 317	330 317	336 323	336 323	345 332	345 332		362 348
22	4	308	308	311	317	316	323	325	325	340	340
23	5	312	312	315	315	320	320	329	329	345	345
21 19	6 7	323 342	323 342	326 345	326 345	332 351	332 351	341 361	341 361	357 378	357 378
17	8	342	376	345	345	385	385	396	396	415	415
15	9	414	414	418	418	425	425	437	437	458	458
13 12	10 11	456 494	456 494	460 499	460 499	467 507	467 507	481 522	481 522	504 546	504 546
9	12	494 536	494 536	499 540	499 540	549	507	522	522	540	546 592
9 7	13	567	567	572	572	581	581	598	598	626	626
3	14	594	591	599	596	609	604	626	620	656	650 675
1	15 16	617 608	614 606	622 614	619 611	632 624	628 619	651 642	644 636	682 673	675 666
2 4 5 6	17	584	581	589	586	599	594	616	609	645	638
5	18	577	574	582	579	591	586	608	602	637	631 620
6 8	19 20	567 543	564 543	573 548	569 548	582 557	577 559	598 573	592 576	627 600	620 604
10	21	527	527	532	532	540	542	556	559	583	586
11	22	499	499	504	504	512	514	526	530	551	555
14 16	23 24	446 396	446 396	450 400	450 400	457 406	457 406	470 418	470 418	492 438	492 438
10	24	390	290	400	+00	400	+00	410	410	400	430



Technical, Economic, and Achievable Demand Response Potential (Deferred MWh)

Combined

Compined					
Technical Potential (MWh)	2021	2025	2030	2035	2040
HVAC	3,533	3,813	4,152	4,475	4,820
Water Heating	508	624	765	901	1,048
Batteries	12,944	26,272	33,523	40,601	46,750
Industrial Processes	657	796	963	1,116	1,259
Lighting	2.291	2.828	3.463	4,040	4,571
Refrigeration	7	-,7	8	.,	9
Voltage Reduction	424	427	434	447	468
Total Technical Potential (MWh)	20,363	34,767	43.308	51,588	58,925
	20,000	• 1,1 • 1	.0,000	01,000	00,020
Economic Potential (MWh)	2021	2025	2030	2035	2040
HVAC	1.382	1.501	1.644	1.781	1,928
Water Heating	508	624	765	901	1,048
Batteries					1,077
Industrial Processes	657	796	963	1,116	1,259
Lighting	007	730	303	1,110	1,200
Refrigeration	-	-	-	-	-
	404	-	-	-	-
Voltage Reduction Total Economic Potential (MWh)	424 2.970	427 3.348	434 3.807	447 4,246	468 5,778
Total Economic Potential (MWM)	2,970	3,340	3,007	4,240	5,776
Achievable Potential (MWh)	2021	2025	2030	2035	2040
HVAC	36	294	851	1.047	1,103
Water Heating	2	44	283	514	602
Batteries	-		200		263
Industrial Processes	2	57	356	653	769
Lighting	-	57	550	000	103
Refrigeration	-	-	-	-	-
	424	427	434	447	460
Voltage Reduction Total Achievable Potential (MWh)	424	823	1.925	2.661	468
	405	025	1,325	2,001	3,200
Total Achievable Incremental	I .				
Costs (\$000s)	2021	2025	2030	2035	2040
HVAC	\$464	\$1.098	\$1.662	\$1.305	\$1,772
Water Heating	\$12	\$133	\$404	\$389	\$525
Batteries	φιΖ	φ155	φ 4 04	4309	\$146
Industrial Processes	\$8	- \$89	¢075	- *204	
	\$Ø	\$89	\$275	\$294	\$357
Lighting	-	-	-	-	-
Refrigeration		-	-	-	-
Voltage Reduction	\$2,280	-	-	-	-
Total Incremental Costs (\$000s)	\$2,764	\$1,320	\$2,341	\$1,989	\$2,800
Multi-Year Cumulative Cost					
(\$000s)	2021-2025				
HVAC	\$3,839	\$7,717	\$7,054	\$8,252	
Water Heating	\$289	\$1,567	\$1,983	\$2,353	
Batteries		-		\$336	
Industrial Processes	\$194	\$1,056	\$1,417	\$1,705	
Lighting		-	-	-	
Refrigeration		-	-	-	
Voltage Reduction	\$2,280	-	-	-	
Total 5-Year Costs (\$000s)	\$6,602	\$10,339	\$10,453	\$12,646	
Participant Cost	\$790	\$1,889	\$1,910	\$2,310	
Litility Incentives	\$4 649	\$5.667	\$5 720	\$6.031	

\$4,649

\$1,164

\$5,667

\$2,784

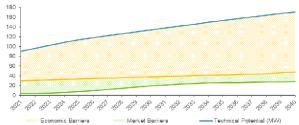
\$5,729

\$2,814

\$6,931

\$3,405

Technical, Economic, and Achievable Demand Response Potential (Deferred MW)



Economic Potential (MW) Achievable Potential (MW)

Combined					
Technical Potential (MW)	2021	2025	2030	2035	2040
HVAC	49.1	53.0	57.7	62.1	66.9
Water Heating	3.5	4.3	5.3	6.3	7.3
Batteries	14.3	28.6	37.3	45.7	53.2
Industrial Processes	4.6	5.5	6.7	7.8	8.7
Lighting	15.9	19.6	24.0	28.1	31.7
Refrigeration	0.0	0.1	0.1	0.1	0.1
Voltage Reduction	2.9	3.0	3.0	3.1	3.3
Total Technical Potential (MW)	90.4	114.1	134.1	153.1	171.2
Economic Potential (MW)	2021	2025	2030	2035	2040
HVAC	19.2	20.8	22.8	24.7	26.8
Water Heating	3.5	4.3	5.3	6.3	7.3
Batteries	-	-	-	-	1.5
Industrial Processes	4.6	5.5	6.7	7.8	8.7
Lighting	-	-	-	-	-
Refrigeration	-	-	-	-	-
Voltage Reduction	2.9	3.0	3.0	3.1	3.3
Total Economic Potential (MW)	30.2	33.7	37.9	41.9	47.6
Achievable Potential (MW)	2021	2025	2030	2035	2040
HVAC	0.5	4.1	11.8	14.5	15.3
Water Heating	0.01	0.3	2.0	3.6	4.2
Batteries	-	-	-	-	0.4
Industrial Processes	0.02	0.4	2.5	4.5	5.3
Lighting	-	-	-	-	
Refrigeration	-	-	-	-	-
Voltage Reduction	2.9	3.0	3.0	3.1	3.3
Total Achievable Potential (MW)	3.5	7.8	19.3	25.7	28.5
Incremental Achievable Potential					
(MW)	2021	2025	2030	2035	2040
HVAC	0.5	1.2	1.8	1.4	1.9
Water Heating	0.01	0.1	0.4	0.4	0.6
Batteries	-	-	-	-	0.2
Industrial Processes	0.02	0.2	0.5	0.5	0.7
Lighting	-	-	-	-	
Refrigeration	-	-	-	-	
Voltage Reduction	2.9	0.0	0.0	0.0	0.0
Total Achievable Potential (MW)	3.5	1.5	2.8	2.4	3.3
Incremental Cost per Unit Capacity	\$797.83	\$880.56	\$849.91	\$837.73	\$843.51

Utility Incentives

Utility Administrative Costs

DR.Med: Demand Response Low Avoided Cost Scenario Results

Residential Technical Potential (MWh)	2021	2025	2030	2035	2040
HVAC	834	1.097	1,416	1,724	2,053
Nater Heating	508	624	765	901	1,048
Batteries	11,608	23,803	29,732	35,619	40,687
Industrial Processes Lighting	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
Refrigeration	n/a	n/a	n/a	n/a	n/a
Voltage Reduction	n/a	n/a	n/a	n/a	n/a
Total Technical Potential (MWh)	15,383	27,949	34,328	40,646	46,180
Economic Potential (MWh)	2021	2025	2030	2035	2040
HVAC	1,258	1,365	1,495	1,619	1,753
Water Heating Batteries	508	624	765	901	1,048 1,077
Industrial Processes	n/a	n/a	n/a	n/a	n/a
Lighting	n/a	n/a	n/a	n/a	n/a
Refrigeration	n/a	n/a	n/a	n/a	n/a
Voltage Reduction Total Economic Potential (MWh)	n/a 1,766	n/a 1,989	n/a 2,260	n/a 2,520	n/a 3,877
Achievable Potential (MWh) HVAC	2021 35	2025 285	2030 796	2035 949	2040 996
Water Heating	2	44	283	514	602
Batteries	-	-	-	-	263
Industrial Processes	n/a	n/a	n/a	n/a	n/a
Lighting Refrigeration	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
Voltage Reduction	n/a	n/a	n/a	n/a	n/a
Total Achievable Potential (MWh)	37	329	1,079	1,463	1,861
Total Achievable Incremental					
Costs (\$000s)	2021	2025	2030	2035	2040
HVAC	\$459	\$1,042	\$1,518	\$1,228	\$1,69
Water Heating	\$12	\$133	\$404	\$389	\$525
Batteries Industrial Processes		-	-	-	\$146
Lighting	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
				n/a	n/a
Refrigeration	n/a	n/a	n/a	II/a	
	n/a \$470	\$1,175	1/a \$1,922	\$1,617	
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh)	\$470	\$1,175 2025	\$1,922 2030	\$1,617 2035	\$2,362 2040
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC	\$470 2021 265	\$1,175 2025 290	\$1,922 2030 321	\$1,617 2035 349	\$2,362 2040 375
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating	\$470 2021 265 n/a	\$1,175 2025 290 n/a	\$1,922 2030 321 n/a	\$1,617 2035 349 n/a	\$2,362 2040 375 n/a
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC	\$470 2021 265	\$1,175 2025 290	\$1,922 2030 321	\$1,617 2035 349	\$2,362 2040 375 n/a 6,063
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting	\$470 2021 265 n/a 1,336 657 2,291	\$1,175 2025 290 n/a 2,469 796 2,828	\$1,922 2030 321 n/a 3,791 963 3,463	\$1,617 2035 349 n/a 4,982 1,116 4,040	\$2,362 2040 375 n/a 6,063 1,255 4,57
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration	\$470 2021 265 n/a 1,336 657 2,291 7	\$1,175 2025 290 n/a 2,469 796 2,828 7	\$1,922 2030 321 n/a 3,791 963 3,463 8	\$1,617 2035 349 n/a 4,982 1,116 4,040 9	\$2,362 204(375 n/a 6,063 1,255 4,57
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction	\$470 2021 265 n/a 1,336 657 2,291	\$1,175 2025 290 n/a 2,469 796 2,828	\$1,922 2030 321 n/a 3,791 963 3,463	\$1,617 2035 349 n/a 4,982 1,116 4,040	\$2,365 2044 375 n/a 6,065 1,255 4,57
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh)	\$470 2021 265 n/a 1,336 657 2,291 7 424 4,980	\$1,175 2025 290 n/a 2,469 796 2,828 7 427 6,818	\$1,922 2030 321 n/a 3,791 963 3,463 8 434 8,980	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 447 10,942	\$2,365 2044 375 0,665 1,255 4,57 9 466 12,74
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) Economic Potential (MWh)	\$470 2021 265 n/a 1,336 657 2,291 7 424	\$1,175 2025 290 n/a 2,469 796 2,828 7 427	\$1,922 2030 321 n/a 3,791 963 3,463 8 434	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 447	\$2,362 204(375 n/z 6,063 1,255 4,57 5 466 12,744 204(175
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating	\$470 2021 265 n/a 1,336 657 2,291 7 424 4,980 2021	\$1,175 2025 2900 n/a 2,469 796 2,828 7 427 6,818 2025	\$1,922 2030 321 n/a 3,791 963 3,463 8 434 8,980 2030	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 447 10,942 2035	\$2,362 204(375 n/z 6,063 1,255 4,57 5 466 12,744 204(175
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) Economic Potential (MWh) HVAC Water Heating Batteries	\$470 2021 265 n/a 1,336 657 2,291 7 424 4,980 2021 124 n/a 124 n/a	\$1,175 2025 290 n/a 2,469 796 2,489 796 2,489 796 2,484 796 2,484 796 2,484 796 2,484 796 2,484 796 2,484 796 2,484 796 2,484 796 2,485 796 2,857 7,457 2,455 7,457 2,455 7,457 2,455 7,457 2,455 7,457 2,455 7,457 7,457 2,455 7,457 2,455 7,457 2,455 7,457 2,455 7,457 2,455 7,457 7,577 7,577 7,457 7	\$1,922 2030 321 n/a 3,791 963 3,463 8,980 2030 150 n/a 	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 447 10,942 2035 163 n/a -	\$2,362 2044 375 n/a 6,065 1,255 4,57 5 4,65 12,744 2044 175 n/a
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes	\$470 2021 265 n/a 1,366 657 2,291 7 424 4,980 2021 124	\$1,175 2025 290 n/a 2,469 796 2,828 7 427 6,818 2025 135	\$1,922 2030 321 n/a 3,791 963 3,463 8 434 8,980 2030 150	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 9 447 10,942 2035 163	\$2,362 2044 375 n/a 6,065 1,255 4,57 5 4,65 12,744 2044 175 n/a
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Cotlage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration	\$470 2021 265 n/a 1,336 657 7 424 4,980 2021 124 n/a 657 -	\$1,175 2025 290 n/a 2,469 796 2,828 7 427 6,818 2025 135 n/a - 796 - -	\$1,922 2030 321 n/a 3,791 963 8 434 8,980 2030 150 n/a - 963 - 963	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 4,040 9 4,040 10,942 2035 163 n/a - 1,116 - - 1,116	\$2,362 204(377 n/a 6,06 1,255 4,57 \$ 468 12,74 204(17; n/a 1,255
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction	\$470 2021 265 n/a 1,336 657 2,291 7 424 4,980 2021 124 n/a 124 n/a	\$1,175 2025 2900 n/a 2,469 796 2,869 7 427 6,818 2025 n/a 135 n/a - 7 -	\$1,922 2030 321 n/a 3,791 963 3,463 8,980 2030 150 n/a -	\$1,617 2035 349 n/a 4,982 1,116 4,982 1,116 4,982 1,116 4,947 2035 163 n/a 1,116 -	\$2,362 2044 377 n/a 6,065 1,255 4,577 2044 12,744 12,744 1,255 1,255 4,56 2044 1,255 2044 1,255 2044
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Cotlage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh)	\$470 2021 265 n/a 1,336 657 2,291 7 424 4,980 2021 124 n/a 67 67 244 124 124 124 124 124 124 124	\$1,175 2025 290 n/a 2,469 7/96 2,828 7 427 6,818 2025 135 n/a - - - 427	\$1,922 2030 321 n/a 3,791 963 3,463 8,980 8,980 150 n/a - 963 3,463 - 2030 150 n/a 434	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 447 10,947 2035 163 n/a 1,116 1,116 447	\$2,362 2044 377 n/4 6,063 1,255 4,60 1,255 464 12,744 1,255 1,255 466 1,902
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) Achievable Potential (MWh) HVAC	\$470 2021 2055 n/a 1,336 657 2,291 7 424 4,980 2021 124 n/a - 657 - - - 424 1,204 2021 0	\$1,175 2025 2900 n/a 2,469 796 2,459 1,427 4,277 6,818 2,969 2,969 2,969 1,427 2,025 1,427 1,427 2,459 1,427 1,45	\$1,922 2030 321 n/a 3,791 963 3,463 8,980 2030 150 n/a 8,980 2030 150 152 1,547 2030 55	\$1,617 2035 349 n/a 4,982 1,116 4,982 1,116 4,982 1,116 4,982 1,116 1,0942 2035 163 n/a 1,1726 2035 97	\$2,362 \$2,362 2044 377 //(6,063 1,255 4,57 4,57 1,255 4,66 12,744 177 1,255 4,66 12,744 1,255 4,66 12,744 1,255 4,66 1,255 4,57 1,255
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) Notage Reduction Notage Reduction Total Economic Potential (MWh) Notage Reduction	\$470 2021 265 n/a 1,336 657 2,291 7 424 4,980 2021 124 n/a 67 - 424 1,204 2021	\$1,175 2025 290 n/a 2,469 796 2,828 2,828 2,828 7 427 6,818 135 n/a - - 427 1,359 2025	\$1,922 2030 321 n/a 3,791 963 3,463 8,980 150 n/a - 434 1,547 2030	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 447 10,994 2035 163 n/a 1,116 1,116 447 1,726 2035	\$2,362 \$2,362 2044 377 //(6,063 1,255 4,57 4,57 1,255 4,66 12,744 177 1,255 4,66 12,744 1,255 4,66 12,744 1,255 4,66 1,255 4,57 1,255
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh)	\$470 2021 265 n/a 1,336 657 2,291 7 424 4,980 2021 124 n/a 657 - 424 1,204 0 n/a -	\$1,175 2025 2900 n/a 2,469 796 2,828 2,828 7 427 6,818 2025 135 n/a - 427 1,359 2025 10 n/a	\$1,922 2030 321 n/a 3,791 963 3,463 8,980 150 n/a - 434 1,547 2030 55 n/a - 55 n/a	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 447 10,942 2035 163 n/a 1,116 1,116 447 1,726 2035 97 n/a	\$2,362 \$2,362 2044 377 1,254 4,577 4,60,063 1,254 4,577 4,60 12,744 1,254 1,254 4,60 1,254 1,254 4,60 1,254 1,
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Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Water Heating Batteries Industrial Processes Lighting Refrigeration Kerfigeration Kerfigeration	\$470 2021 265 n/a 1,336 657 2,291 7 424 4,980 2021 124 n/a 657 - 424 1,204 2021 0 n/a - 2 - - - - - - - - - - - - -	\$1,175 2025 290 n/a 2,469 796 2,828 7 427 6,818 2025 1/2 1,359 2025 10 n/a 57 - 57 -	\$1,922 2030 321 n/a 3,791 963 3,463 8,980 150 n/a - 434 1,547 2030 55 n/a 356 - 356 -	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 447 10,942 2035 163 n/a 1,116 1,116 447 1,726 2035 97 n/a 653 -	\$2,362 \$2,362 377 4,07 4,07 4,07 4,07 4,07 4,07 4,07 4,
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction	\$470 2021 205 n/a 1,336 657 7 424 4,980 2021 124 n/a 657 - 424 1,204 2021 0 0 n/a 4,24 2021 - 4,24 - 4,24 - 4,24 - 4,24 - 4,24 - - - - - - - - - - - - -	\$1,175 2025 290 n/a 2,469 76,818 2025 135 n/a - 796 - 2,228 7427 6,818 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 2025 1,359 2025	\$1,922 2030 321 n/a 3,791 963 8,980 2030 150 n/a - 963 - 963 - 963 - 963 - 1,50 n/a 1,50 n/a - 336 - - - - - - - - - - - - -	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 447 10,942 2035 163 n/a 1,116 - 1,116 - 1,116 2035 97 n/a 447 447 447	\$2,362 \$2,362 2044 37? 1,256 46,6 4,57' 4,57' 12,744 1,256 46,4 12,744 1,256 46,4 1,257 1,256 46,4 1,257 1,256 46,4 1,257 1,256 1
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Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) Achievable Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MWh)	\$470 2021 265 n/a 1,336 657 7 424 4,980 2021 124 n/a 657 - 424 1,204 2021 0 0 n/a 4,24 4,264 2021 - - - - - - - - - - - - -	\$1,175 2025 290 n/a 2,469 7 427 6,818 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 2027 2025 2027 2025 2027 2025 2027 2025 2027 2025 2027 2027 2025 2027 2025 2027 2027 2027 2025 2027 2027 2027 2027 2027 2027 2027 2027 2025 2027 2027 2027 2027 2025 2027 2027 2027 2027 2027 2025 2027 2	\$1,922 2030 321 n/a 3,791 963 434 8,980 2030 150 n/a - 963 - 963 - 963 - 963 - 963 - 963 - 1,50 n/a 434 8,464 8,980 - 2030 - 150 n/a - 434 - 434 - 434 - 434 - 434 - 434 - - - - - - - - - - - - -	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 447 10,942 2035 163 n/a 1,116 447 1,726 2035 9 7 n/a 447 1,726 2035 - 447 1,726 2035 - 447 1,726 - 447 - 1,116 - - - - - - - - - - - - -	\$2,362 \$2,362 2044 37? 1,256 4,57' 4,57' 12,744 1,256 4,66 1,256 4,57' 12,744 1,256 4,57' 1,256 1,
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MWh) HVAC Voltage Reduction Total Achievable Potential (MWh) Total Achievable Potential (MWh)	\$470 2021 265 n/a 1,336 657 2,291 7 424 4,980 2021 124 n/a 657 - 424 1,204 2021 0 n/a 424 424 2021 202	\$1,175 2025 290 n/a 2,469 7 427 1,359 2025 10 n/a - 796 - 1,359 2025 10 n/a - 2025 135 n/a - 2025 135 135 135 135 135 135 135 13	\$1,922 2030 321 n/a 3,791 963 3,463 8,980 2030 150 n/a - 963 - 963 - 963 - 963 - 963 - 150 n/a - 963 - - - - - - - - - - - - -	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 447 10,942 2035 163 n/a 1,116 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 1,726 2035 97 1,726 2035 97 1,726 2035 97 1,726 2035 97 1,726 2035 97 1,726 2035 97 1,726 2035 97 1,726 2035 97 1,726 2035 97 1,726 2035 97 1,726 2035	\$2,362 \$2,362 2044 374 7/4 6,065 1,256 12,744 1,257 12,744 1,257 12,744 1,257 1,256 12,744 1,257 1,256 1,257 1,256 1,257 1,256 1,257 1,256 1,257 1,256 1,257 1,256 1,257 1,256 1,257 1,256 1,257 1,256 1,257 1,256 1,257 1,256 1,257 1,256 1,257 1,257 1,257 1,257 1,256 1,257 1,257 1,257 1,257 1,257 1,257 1,257 1,257 1,257 1,257 1,257 1,257 1,257 1,257 1,257 1,257 1,257 1,256 1,257 1,256 1,257 1
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MWh) Total Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) HVAC	\$470 2021 265 n/a 1,336 657 7 424 4,980 2021 124 n/a 657 - 424 1,204 2021 0 0 n/a 4,24 4,264 2021 - - - - - - - - - - - - -	\$1,175 2025 290 n/a 2,469 7 427 6,818 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 1,359 2025 2027 2025 2027 2025 2027 2025 2027 2025 2027 2025 2027 2027 2025 2027 2025 2027 2027 2027 2025 2027 2027 2027 2027 2027 2027 2027 2027 2025 2027 2027 2027 2027 2025 2027 2027 2027 2027 2027 2025 2027 2	\$1,922 2030 321 n/a 3,791 963 434 8,980 2030 150 n/a - 963 - 963 - 963 - 963 - 963 - 963 - 1,50 n/a 434 8,464 8,980 - 2030 - 150 n/a - 434 - 434 - 434 - 434 - 434 - 434 - - - - - - - - - - - - -	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 447 10,942 2035 163 n/a 1,116 447 1,726 2035 9 7 n/a 447 1,726 2035 - 447 1,726 2035 - 447 1,726 - 447 - 1,116 - - - - - - - - - - - - -	\$2,362 \$2,362 204(377 n/a 6,063 1,255 4,57 12,744 12,744 12,744 12,744 12,744 1,255 204(100 1,255 204(100 1,255 12,744 1,255 12,744 1,255 12,744 1
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) HVAC Water Heating Batteries	\$470 2021 265 n/a 1,336 657 2,291 7 4,28 4,980 2021 124 n/a 657 - 424 4,980 2021 0 n/a - 22 - 424 4,980 0 n/a - 22 - - 22 - - - - - - - - - - - - -	\$1,175 2025 290 n/a 2,469 7 427 6,828 2,828 7 427 1,359 2025 10 n/a - - - - - - - - - - - - -	\$1,922 2030 321 n/a 3,791 963 3,463 8,980 150 n/a - 963 - 963 - 963 - 963 - 963 - 150 n/a - 963 - - - - - - - - - - - - -	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 447 10,942 2035 163 n/a 1,116 1,116 1,116 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2,747 1,726 2,747 1,726 2,77 1,727 1,727 1,726 2,77 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,727 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,777 1,776 2,777 1,777	\$2,362 \$2,362 374 375 46,065 4,571 4,571 1,255 468 1,2744 1,2744 1,2744 1,2744 1,2744 1,2744 1,255 1,900 1,255 1,900 1,255 1,2
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Incremental Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Incremental Costs (\$000s) HVAC	\$470 2021 265 n/a 1,336 657 2,291 7 424 4,980 2021 124 n/a n/a 1,204 2021 0 n/a 1,204 2021 0 n/a 2 2 2 2 2 2 2 2 2 2 2 2 2	\$1,175 2025 290 n/a 2,469 796 2,828 7 427 6,818 2025 105 n/a - 427 1,359 2025 10 n/a 427 1,359 2025 10 n/a 427 427 555	\$1,922 2030 321 n/a 3,791 963 3,463 8,980 150 n/a - 434 1,547 2030 55 n/a - 356 - 356 - 356 - 356 - 356 - 355 n/a 346 846 846 846 2030 \$144	\$1,617 2035 349 n/a 4,982 1,116 4,982 1,116 4,982 1,116 4,982 1,116 4,982 1,016 4,982 1,016 4,982 1,016 1,016 1,016 1,016 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 \$77	\$2,362 \$2,362 \$2,362 \$2,362 \$2,362 \$2,362 \$2,362 \$2,362 \$2,362 \$2,362 \$2,362 \$2,362 \$2,362 \$2,362 \$2,362 \$2,362 \$3,257 \$2,362 \$2,362 \$3,257 \$2,362 \$2,362 \$3,257 \$2,362 \$2,362 \$3,257 \$2,362 \$3,257 \$2,362 \$3,257 \$2,362 \$3,257 \$4,577
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MWh) Total Achievable Incremental Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Incremental Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Incremental Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Incremental Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Batteries IndustrialProcesses Lighting Batteries IndustrialProces	\$470 2021 265 n/a 1,336 657 2,291 7 4,28 4,980 2021 124 n/a 657 - 424 4,980 2021 0 n/a - 22 - 424 4,980 0 n/a - 22 - - 22 - - - - - - - - - - - - -	\$1,175 2025 290 n/a 2,469 7 427 6,828 2,828 7 427 1,359 2025 10 n/a - - - - - - - - - - - - -	\$1,922 2030 321 n/a 3,791 963 3,463 8,980 150 n/a - 963 - 963 - 963 - 963 - 963 - 150 n/a - 963 - - - - - - - - - - - - -	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 447 10,942 2035 163 n/a 1,116 1,116 1,116 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2035 97 n/a 447 1,726 2,747 1,726 2,747 1,726 2,77 1,726 2,777 1,727 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,726 2,777 1,777 1,776 2,777 1,776 2,777 1,777	\$2,362 \$2,362 374 375 46,065 4,571 4,571 1,255 468 1,2744 1,2744 1,2744 1,2744 1,2744 1,2744 1,255 1,900 1,255 1,900 1,255 1,2
Total Incremental Costs (\$000s) Commercial Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MWh) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Incremental Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Incremental Costs (\$000s) HVAC	\$470 2021 265 n/a 1,336 657 2,291 7 4,28 4,980 2021 124 n/a 657 - 424 4,980 2021 0 n/a - 22 - 424 4,980 0 n/a - 22 - - 22 - - - - - - - - - - - - -	\$1,175 2025 2900 n/a 2,469 796 2,828 7 427 6,818 2025 1,359 2025 1,427 1,427 2025 1,427 1,4	\$1,922 2030 321 n/a 3,791 963 3,463 8,980 2030 150 n/a - 963 - 963 - 963 - 963 - 963 - 1,50 n/a - 963 - - 963 - - - - - - - - - - - - -	\$1,617 2035 349 n/a 4,982 1,116 4,040 9 4,040 9 4,040 9 4,040 9 4,040 10,942 2035 163 n/a 1,116 1,116 2035 1,116 1,117 1,117 1,117 1,117 1,117 1,117 1,117 1,1197 1,118 1,118 1,118 1,118 1,1197 1,118 1,11	\$2,362 \$2,362 1,256 4,60 1,257 4,60 1,257 4,60 1,257 4,60 1,257 4,60 1,257 4,60 1,257 4,60 1,257 4,60 1,2541

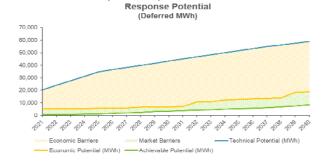
Residential					
Technical Potential (MW)	2021	2025	2030	2035	2040
HVAC	45.4	48.9	53.2	57.3	61.7
Water Heating Batteries	3.5 11.8	4.3 23.9	5.3 30.0	6.3 36.2	7.3 41.5
Industrial Processes	n/a	23.9 n/a	n/a	50.2 n/a	41.5 n/a
Lighting	n/a	n/a	n/a	n/a	n/a
Refrigeration	n/a	n/a	n/a	n/a	n/a
Voltage Reduction Total Technical Potential (MW)	n/a 60.7	n/a 77.1	n/a 88.6	n/a 99.7	n/a 110.5
	00.1		00.0	00.1	110.0
Economic Potential (MW)	2021	2025	2030	2035	2040
HVAC	17.5	19.0	20.8	22.5	24.3
Water Heating Batteries	3.5	4.3	5.3	6.3	7.3 1.5
Industrial Processes	n/a	n/a	n/a	n/a	n/a
Lighting	n/a	n/a	n/a	n/a	n/a
Refrigeration	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
Voltage Reduction Total Economic Potential (MW)	21.0	23.3	26.1	28.7	33.1
()					
Achievable Potential (MW)	2021	2025	2030	2035	2040
HVAC Water Heating	0.5	4.0 0.3	11.1 2.0	13.2 3.6	13.8 4.2
Water Heating Batteries	0.0	0.5	2.0	3.0	4.2 0.4
Industrial Processes	n/a	n/a	n/a	n/a	n/a
Lighting	n/a	n/a	n/a	n/a	n/a
Refrigeration Voltage Reduction	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
Total Achievable Potential (MW)	0.5	4.3	13.0	1/a 16.8	18.4
Multi-Year Cumulative Cost					
(\$000s) HVAC	2021-20252 \$3,714	\$7,125	\$6,506	\$7,923	041-2045
Water Heating	\$289	\$1,567	\$1,983	\$2,353	
Batteries	-	-	-	\$336	
Industrial Processes	n/a	n/a	n/a	n/a	
Lighting Refrigeration	n/a n/a	n/a n/a	n/a n/a	n/a n/a	
Total 5-Year Costs (\$000s)	\$4,003	\$8,691	\$8,489	\$10,611	
Participant Cost	\$731	\$1,588	\$1,551	\$1,939	
Utility Incentives	\$2,194	\$4,763	\$4,652	\$5,816	
Utility Administrative Costs	\$1,078	\$2,340	\$2,285	\$2,857	
Commercial					
Technical Potential (MW)	2021	2025	2030	2035	2040
Technical Potential (MW) HVAC	3.7	4.0	4.5	4.8	5.2
Technical Potential (MW) HVAC Water Heating	3.7 n/a	4.0 n/a	4.5 n/a	4.8 n/a	5.2 n/a
Technical Potential (MW) HVAC	3.7	4.0	4.5	4.8	5.2
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting	3.7 n/a 2.6 4.6 15.9	4.0 n/a 4.7 5.5 19.6	4.5 n/a 7.3 6.7 24.0	4.8 n/a 9.6 7.8 28.1	5.2 n/a 11.7 8.7 31.7
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration	3.7 n/a 2.6 4.6 15.9 0.0	4.0 n/a 4.7 5.5 19.6 0.1	4.5 n/a 7.3 6.7 24.0 0.1	4.8 n/a 9.6 7.8 28.1 0.1	5.2 n/a 11.7 8.7 31.7 0.1
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction	3.7 n/a 2.6 4.6 15.9 0.0 2.9	4.0 n/a 4.7 5.5 19.6 0.1 3.0	4.5 n/a 7.3 6.7 24.0 0.1 3.0	4.8 n/a 9.6 7.8 28.1 0.1 3.1	5.2 n/a 11.7 8.7 31.7 0.1 3.3
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration	3.7 n/a 2.6 4.6 15.9 0.0	4.0 n/a 4.7 5.5 19.6 0.1	4.5 n/a 7.3 6.7 24.0 0.1	4.8 n/a 9.6 7.8 28.1 0.1	5.2 n/a 11.7 8.7 31.7 0.1
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) Economic Potential (MW)	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035	5.2 n/a 11.7 8.7 31.7 0.1 <u>3.3</u> 60.7 2040
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) Economic Potential (MW) HVAC	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 1.7	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 2.3	5.2 n/a 11.7 8.7 31.7 0.1 3.3 60.7 2040 2.4
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) Economic Potential (MW) HVAC Water Heating	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035	5.2 n/a 11.7 8.7 31.7 0.1 <u>3.3</u> 60.7 2040
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) Economic Potential (MW) HVAC	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 1.7	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 2.3	5.2 n/a 11.7 8.7 31.7 0.1 3.3 60.7 2040 2.4
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 1.7 n/a	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 n/a	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 2.3 n/a	5.2 n/a 11.7 8.7 31.7 0.1 3.3 60.7 2040 2.4 n/a
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 1.7 n/a - 4.6	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 n/a 5.5 -	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a 6.7	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 2.3 n/a 7.8	5.2 n/a 11.7 8.7 0.1 3.3 60.7 2040 2.4 n/a 8.7
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 1.7 n/a 4.6 - 2.9	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 n/a - 5.5 - 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a 6.7 3.0 3.0	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 2.3 n/a 7.8 - 7.8 - 3.1	5.2 n/a 11.7 8.7 31.7 0.1 <u>3.3</u> 60.7 2040 2.4 n/a 8.7 - 3.3
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 1.7 n/a - 4.6	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 n/a 5.5 -	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a 6.7	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 2.3 n/a 7.8	5.2 n/a 11.7 8.7 0.1 3.3 60.7 2040 2.4 n/a 8.7 -
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) Achievable Potential (MW)	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 1.7 n/a 4.6 4.6 5.9 0.0 2.9 29.7 2021 2021 2.9 9.2 2.9 2.9 2.9 2.9 2.9 2.9	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 n/a 5.5 3.0 10.4 2025	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a - 6.7 - 3.0 11.8 2030	4.8 n/a 9.6 7.8 28.1 0.1 53.4 2035 2.3 n/a 7.8 - 7.8 3.1 13.1 2035	5.2 n/a 11.7 8.7 3.1.7 0.1 <u>3.3</u> 60.7 2040 2.4 n/a 8.7 3.3 14.4 2040
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC	3.7 n/a 2.6 4.6 4.6 15.9 0.0 2.9 29.7 2021 1.7 n/a 4.6 - 2.9 9.2 2021 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 n/a 5.5 5.5 5.5 0.1 2025 0.1	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a 6.7 -	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 2.3 n/a - 7.8 2.3 n/a 3.1 53.4 2035	5.2 n/a 11.7 8.7 31.7 0.1 3.3 60.7 2040 2.4 n/a 8.7 - 3.3 14.4 2040 1.5
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) Achievable Potential (MW) HVAC Water Heating	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 1.7 n/a 4.6 4.6 5.9 0.0 2.9 29.7 2021 2021 2.9 9.2 2.9 2.9 2.9 2.9 2.9 2.9	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 n/a 5.5 3.0 10.4 2025	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a - 6.7 - 3.0 11.8 2030	4.8 n/a 9.6 7.8 28.1 0.1 53.4 2035 2.3 n/a 7.8 - 7.8 3.1 13.1 2035	5.2 n/a 11.7 8.7 3.1.7 0.1 <u>3.3</u> 60.7 2040 2.4 n/a 8.7 3.3 14.4 2040
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Mutha Mathematical (MW) HVAC Water Heating Batteries Industrial Processes	3.7 n/a 2.6 4.6 4.6 15.9 0.0 2.9 29.7 2021 1.7 n/a 4.6 - 2.9 9.2 2021 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 n/a 5.5 5.5 5.5 0.1 2025 0.1	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a 6.7 -	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 2.3 n/a - 7.8 2.3 n/a 3.1 53.4 2035	5.2 n/a 11.7 8.7 31.7 0.1 3.3 60.7 2040 2.4 n/a 8.7 - 3.3 14.4 2040 1.5
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW)	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 29.7 2021 1.7 n/a 4.6 6 - - - - - - - - - - - - -	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 5.5 - - - - - - - - - - - - -	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.3 0.8 0.8 n/a - 0.8 n/a	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 7.8 2.3 n/a 7.8 2.3 n/a 7.8 2.3 1.1 13.1 2035 1.4 n/a	5.2 n/a 11.7 8.7 31.7 0.1 3.3 60.7 2040 2.4 n/a .7 8.7 3.3 14.4 2040 1.5 n/a
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Achievable Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 1.7 n/a 4.6 6 - 2.9 9.2 2021 0.01 n/a - 0.02 - 0.02 - 0.02 - 0.02 - 0.02 - 0.02 - 0.02 - 0.02 - 0.0 - 0.02 - 0.0 - 0.0 - 0.0 - 0.0 - 0.0 - 0.0 - 0.0 - 0.0 - 0.0 - 0.0 - 0.0 - 0.0 - 0.0 - 0.0 - 0.0 - 0.0 - 0.0 - - - - - - - - - - - - -	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 1.9 1.9 1.0 2025 0.1 n/a - 5.5 - - - - - - - - - - - - -	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2030 2.3	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 7.8 2.3 n/a 7.8 2.3 1.4 n/a 4.5 -	5.2 n/a 11.7 8.7 31.7 0.1 3.3 60.7 2040 2.4 n/a - 3.3 14.4 2040 1.5 n/a - 5.3 -
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW)	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 29.7 2021 1.7 n/a 4.6 6 - - - - - - - - - - - - -	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 5.5 - - - - - - - - - - - - -	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a 6.7 - 3.0 11.8 2030 0.8 n/a 2.5	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 7.8 2.3 n/a 7.8 2.3 n/a 7.8 2.3 1.1 13.1 2035 1.4 n/a	5.2 n/a 11.7 8.7 31.7 0.1 3.3 60.7 2040 2.4 n/a .7 8.7 3.3 14.4 2040 1.5 n/a
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MW)	3.7 n/a 2.6 4.6 15.9 0.0 2.9 28.7 2021 1.7 n/a 4.6 - 2.9 9.2 2021 0.01 n/a - 2.9 9.2 2.9 2.2 2021 0.0 0.0 0.0 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 n/a - 5.5 5.5 - 3.0 10.4 2025 0.1 n/a - 3.0 37.0 2025 3.0 37.0 2025 3.0 37.0 2025 3.0 37.0 2025 3.0 37.0 2025 3.0 37.0 2025 3.0 37.0 2025 3.0 37.0 2025 3.0 37.0 2025 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a - 3.0 11.8 2030 0.8 n/a - 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 7.8 2.3 n/a 7.8 3.1 53.4 2035 1.4 n/a 4.5 - 3.1 3.1 3.1 3.1 3.1 53.4 2035 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.	5.2 n/a 11.7 8.7 3.3 60.7 2040 2.4 n/a 8.7 2040 1.5 n/a 3.3 60.7 2040 1.5 n/a 3.3 60.7 2040 2.4 1.4 1.4 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7
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Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Achievable Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MW) HVAC	3.7 n/a 2.6 4.6 15.9 0.0 2.9 28.7 2021 1.7 n/a 4.6 4.6 2.9 9.2 2021 0.01 n/a 0.02 2.9 3.0	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 n/a - 5.5 5.5 - 3.0 37.0 2025 0.1 n/a - - 3.0 37.0 2025 0.1 n/a - - 3.0 37.0 2025 37.0 2025 37.0 2025 37.0 2025 37.0 2025 37.0 2025 37.0 2025 3.0 37.0 2025 3.0 37.0 2025 3.0 37.0 2025 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3. 3.0 3. 3	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a - 3.0 11.8 2030 0.8 n/a - 3.0 6.3	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 7.8 2.3 n/a 7.8 3.1 53.4 2035 1.4 n/a 4.5 3.1 9.0	5.2 n/a 11.7 8.7 3.3 60.7 2040 2.4 n/a 8.7 2040 1.5 n/a 3.3 14.4 2040 1.5 n/a 3.3 10.1
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MW) Multi-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Batteries	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 2021 0.01 n/a - 2.9 9.2 2021 0.01 n/a - 0.02 2.9 9.2 2021 0.01 n/a 2.9 9.2 2021 2021 0.01 n/a - 2.9 9.2 2021 202	4.0 n/a 4.7 5.5 19.6 0.1 37.0 2025 - - - - - - - - - - - - -	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a - 6.7 - 3.0 11.8 2030 0.8 n/a	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 7.8 2.3 n/a 7.8 2.3 1.4 n/a 3.1 2035 1.4 n/a 3.1 2035 1.4 n/a	5.2 n/a 11.7 8.7 3.3 60.7 2040 2.4 n/a 8.7 2040 1.5 n/a 3.3 14.4 2040 1.5 n/a 3.3 10.1
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MW) Mutti-Year Cumulative Cost (\$000s) HVAC Water Heating<	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 2021 0.01 n/a - 0.02 2.9 9.2 2021 0.01 n/a 2.9 9.2 2021 2025 2021 2021 2025 2025 20	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 n/a - 5.5 5.5 5.5 3.0 10.4 2025 0.1 n/a - 0.1 n/a - 0.3 0 10.4 2025 0.1 0.4 - 0.3 0 10.4 2025 0 10.5 10.6 10.6 10.7 10.6 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.4 2025 10.1 10.4 2025 10.1 10.4 2025 10.1 10.4 2025 10.1 10.4 2025 10.1 10.4 2025 10.1 10.4 2025 20.1 10.4 2025 20.1 10.4 2025 20.1 10.4 2025 20.1 10.4 2025 20.1 10.4 2025 20.1 10.4 2025 20.1 10.4 2025 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a - 6.7 - 3.0 11.8 2030 0.8 n/a - 2.5 - 3.0 0.8 n/a - - - 3.0 0.1 - - - - - - - - - - - - -	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 2.3 n/a 7.8 2.3 n/a 1.4 n/a 4.5 1.4 n/a 9.0 2035 2.3 1.4 1.4 1.4 1.4 1.5 2.1 2.3 1.0 2.3 1.1 2.3 1.4 1.4 1.4 1.4 1.4 2.3 2.3 2.3 1.4 1.4 2.3 2.3 2.3 2.3 1.4 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3	5.2 n/a 11.7 8.7 3.3 60.7 2040 2.4 n/a 8.7 2040 1.5 n/a 3.3 14.4 2040 1.5 n/a 3.3 10.1
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MW) Multi-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting <td>3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 2021 0.01 n/a - 2.9 9.2 2021 0.01 n/a - 0.02 2.9 9.2 2021 0.01 n/a 2.9 9.2 2021 2021 0.01 n/a - 2.9 9.2 2021 202</td> <td>4.0 n/a 4.7 5.5 19.6 0.1 37.0 2025 - - - - - - - - - - - - -</td> <td>4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a - 6.7 - 3.0 11.8 2030 0.8 n/a</td> <td>4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 7.8 2.3 n/a 7.8 2.3 1.4 n/a 3.1 2035 1.4 n/a 3.1 2035 1.4 n/a</td> <td>5.2 n/a 11.7 8.7 3.3 60.7 2040 2.4 n/a 8.7 2040 1.5 n/a 3.3 14.4 2040 1.5 n/a 3.3 10.1</td>	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 2021 0.01 n/a - 2.9 9.2 2021 0.01 n/a - 0.02 2.9 9.2 2021 0.01 n/a 2.9 9.2 2021 2021 0.01 n/a - 2.9 9.2 2021 202	4.0 n/a 4.7 5.5 19.6 0.1 37.0 2025 - - - - - - - - - - - - -	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a - 6.7 - 3.0 11.8 2030 0.8 n/a	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 7.8 2.3 n/a 7.8 2.3 1.4 n/a 3.1 2035 1.4 n/a 3.1 2035 1.4 n/a	5.2 n/a 11.7 8.7 3.3 60.7 2040 2.4 n/a 8.7 2040 1.5 n/a 3.3 14.4 2040 1.5 n/a 3.3 10.1
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MW) Mutti-Year Cumulative Cost (\$000s) HVAC Water Heating<	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 2021 0.01 n/a - 2.9 9.2 2021 0.01 n/a - 0.02 2.9 9.2 2021 0.01 n/a 2.9 9.2 2021 2021 0.01 n/a - 2.9 9.2 2021 202	4.0 n/a 4.7 5.5 19.6 0.1 37.0 2025 - - - - - - - - - - - - -	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 n/a - 6.7 - 3.0 11.8 2030 0.8 n/a	4.8 n/a 9.6 7.8 28.1 0.1 53.4 2035 2.3 n/a - 7.8 2035 2.3 n/a - 3.1 2035 1.4 n/a - 4.5 - 3.1 2035 2.3 n/a - 2.3 n/a - 2.3 n/a - 2.3 n/a - 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3	5.2 n/a 11.7 8.7 3.3 60.7 2040 2.4 n/a 8.7 2040 1.5 n/a 3.3 14.4 2040 1.5 n/a 3.3 10.1
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MW) MUAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MW) Mutti-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MW) Mutti-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total 5-Year Costs (\$000s)	3.7 n/a 2.6 4.6 15.9 0.0 2.9 28.7 2021 1.7 n/a 4.6 - 2.9 9.2 2021 2021 0.01 n/a - 2.9 3.0 2021-20252 \$125 n/a \$100 \$2,98 3.0 \$2,98 3.0 \$2,98 3.0 \$2,98 3.0 \$2,98 3.0 \$2,98 3.0 \$2,99 \$2,99 \$3,00 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$3,00 \$2,99 \$3,00 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$3,00 \$2,99 \$2,598 \$2,597 \$2,597 \$2,597 \$2,598 \$2,598 \$2,598 \$2,597 \$2,597 \$2,59	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 n/a 5.5 5.5 3.0 10.4 2025 0.1 n/a 3.0 10.4 2025 0.1 n/a 3.0 3.0 3.0 3.0 3.0 3.0 3.0	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 3.0 11.8 2030 0.8 n/a 3.0 11.8 2030 0.8 n/a 3.0 0.3 3.0	4.8 n/a 9.6 7.8 28.1 3.1 53.4 2035 1.4 n/a - 3.1 13.1 2035 1.4 n/a - 3.1 2035 1.4 n/a - 3.1 9.0 2035 1.4 n/a - 3.1 9.0 2035 1.4 n/a - 3.1 9.0 2035 - 3.1 9.0 2035 - - - - - - - - - - - - -	5.2 n/a 11.7 8.7 3.3 60.7 2040 2.4 n/a 8.7 2040 1.5 n/a 3.3 14.4 2040 1.5 n/a 3.3 10.1
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Valtage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MW) Multi-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries	3.7 n/a 2.6 4.6 15.9 0.0 2.9 29.7 2021 1.7 n/a - 4.6 4.6 - - - - - - - - - - - - -	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 5.5 - - - - - - - - - - - - -	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1	4.8 n/a 9.6 7.8 28.1 0.1 3.1 53.4 2035 2.3 7.8 2.3 1.4 n/a -	5.2 n/a 11.7 8.7 3.3 60.7 2040 2.4 n/a 8.7 2040 1.5 n/a 3.3 14.4 2040 1.5 n/a 3.3 10.1
Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Technical Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Economic Potential (MW) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Achievable Potential (MW) Mutti-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting <td>3.7 n/a 2.6 4.6 15.9 0.0 2.9 28.7 2021 1.7 n/a 4.6 - 2.9 9.2 2021 2021 0.01 n/a - 2.9 3.0 2021-20252 \$125 n/a \$100 \$2,98 3.0 \$2,98 3.0 \$2,98 3.0 \$2,98 3.0 \$2,98 3.0 \$2,98 3.0 \$2,99 \$2,99 \$3,00 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$3,00 \$2,99 \$3,00 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$3,00 \$2,99 \$2,598 \$2,597 \$2,597 \$2,597 \$2,598 \$2,598 \$2,598 \$2,597 \$2,597 \$2,59</td> <td>4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 n/a 5.5 5.5 3.0 10.4 2025 0.1 n/a 3.0 10.4 2025 0.1 n/a 3.0 3.0 3.0 3.0 3.0 3.0 3.0</td> <td>4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 3.0 11.8 2030 0.8 n/a 3.0 11.8 2030 0.8 n/a 3.0 0.3 3.0</td> <td>4.8 n/a 9.6 7.8 28.1 3.1 53.4 2035 1.4 n/a - 3.1 13.1 2035 1.4 n/a - 3.1 2035 1.4 n/a - 3.1 9.0 2035 1.4 n/a - 3.1 9.0 2035 1.4 n/a - 3.1 9.0 2035 - 3.1 9.0 2035 - - - - - - - - - - - - -</td> <td>5.2 n/a 11.7 8.7 3.3 60.7 2040 2.4 n/a 8.7 2040 1.5 n/a 3.3 14.4 2040 1.5 n/a 3.3 10.1</td>	3.7 n/a 2.6 4.6 15.9 0.0 2.9 28.7 2021 1.7 n/a 4.6 - 2.9 9.2 2021 2021 0.01 n/a - 2.9 3.0 2021-20252 \$125 n/a \$100 \$2,98 3.0 \$2,98 3.0 \$2,98 3.0 \$2,98 3.0 \$2,98 3.0 \$2,98 3.0 \$2,99 \$2,99 \$3,00 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$3,00 \$2,99 \$3,00 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$2,99 \$3,00 \$2,99 \$2,598 \$2,597 \$2,597 \$2,597 \$2,598 \$2,598 \$2,598 \$2,597 \$2,597 \$2,59	4.0 n/a 4.7 5.5 19.6 0.1 3.0 37.0 2025 1.9 n/a 5.5 5.5 3.0 10.4 2025 0.1 n/a 3.0 10.4 2025 0.1 n/a 3.0 3.0 3.0 3.0 3.0 3.0 3.0	4.5 n/a 7.3 6.7 24.0 0.1 3.0 45.6 2030 2.1 3.0 11.8 2030 0.8 n/a 3.0 11.8 2030 0.8 n/a 3.0 0.3 3.0	4.8 n/a 9.6 7.8 28.1 3.1 53.4 2035 1.4 n/a - 3.1 13.1 2035 1.4 n/a - 3.1 2035 1.4 n/a - 3.1 9.0 2035 1.4 n/a - 3.1 9.0 2035 1.4 n/a - 3.1 9.0 2035 - 3.1 9.0 2035 - - - - - - - - - - - - -	5.2 n/a 11.7 8.7 3.3 60.7 2040 2.4 n/a 8.7 2040 1.5 n/a 3.3 14.4 2040 1.5 n/a 3.3 10.1

DR.Hourly.Med: Demand Response Low Avoided Cost Scenario Results

8449	Winter		1	20/	25	203	30	20	35	20	
	12/19	Base Load (MW)	Total Deferral Available	Base Load (MW)	Total Deferral Available		Total Deferral Available	Base Load (MW)	Total Deferral Available	Base Load (MW)	Total Deferral Available
	1	326.9	-0.5	329.9	-4.8	335.2	-16.3	344.8	-22.6	361.3	
8450	2	318.4	0.0	321.3	0.0	326.5	0.0	335.8	0.0	351.9	
8451	3	315.3	0.0	318.2	0.0	323.3	0.0	332.6	0.0	348.4	
8452	4	316.6	0.0	319.4	0.0	324.6	0.0	333.9	0.0	349.9	0.0
8453	5	326.0	0.0	329.0	0.0	334.3	0.0	343.9	0.0	360.3	0.0
8454	6	348.9	0.0	352.1	0.0	357.8	0.0	368.0	0.0	385.6	
8455	7	386.2	0.0	389.7	0.0	396.1	0.0	407.4	0.0	426.8	
8456	8	405.2	0.0	408.9	0.0	415.5	0.0	427.4	0.0	447.8	
8457	9	406.7	0.0	410.4	0.0	417.1	0.0	429.0	0.0	449.5	
8458	10	401.9	0.0	405.5	0.0	412.1	0.0	423.9	0.0	444.2	
8459	11 12	397.7	0.0	401.3 397.5	0.0 0.0	407.8	0.0	419.5	0.0 0.0	439.5	
8460 8461	12	393.9 389.5	0.0 0.0	397.5	0.0	403.9 399.4	0.0 0.0	415.5 410.8	0.0	435.3 430.4	
8462	13	386.5	0.0	390.0	0.0	396.3	0.0	410.8	0.0	430.4	
8463	15	382.2	0.0	385.7	0.0	391.9	0.0	407.7		422.4	
8464	16	384.2	0.0	387.8	0.0	394.0	0.0	405.3	0.0	424.7	
8465	17	408.1	2.9	411.8	3.7	418.5	8.1	430.5	12.4	451.1	
8466	18	447.0	2.9	451.1	3.7	458.4	8.1	471.5	12.4	494.1	
8467	19	448.1	2.9	452.2	3.7	459.5	8.1	472.7	12.4	495.2	
8468	20	441.3	2.9	445.4	3.7	452.6	8.1	465.5	12.4	487.8	
8469	21	430.8	2.9	434.7	3.7	441.7	8.1	454.4	12.4	476.1	14.3
8470	22	408.1	2.9	411.8	3.7	418.5	8.1	430.4	12.4	451.0	
8471	23	374.6	-0.5	378.0	-4.8	384.2	-16.3	395.2	-22.6	414.0	
8472	24	344.7	-0.5	347.8	-4.8	353.5	-16.3	363.6	-22.6	381.0	
		448.1 MW	2.9 MW	452.2 MW	3.7 MW	459.5 MW	8.1 MW	472.7 MW	12.4 MW	495.2 MW	14.3 MW
Sp	ring/Fall	202		202		203			35		040
	09/15	Base Load (MW)	Total Deferral Available								
6169	1	313.1	0.0	315.9	0.0	321.0	0.0	330.2	0.0	346.0	0.0
6170	2	298.0	0.0	300.8	0.0	305.6	0.0	314.4	0.0	329.4	
6171	3	289.5	0.0	292.1	0.0	296.9	0.0	305.4	0.0	320.0	
6172	4	284.7	0.0	287.3	0.0	291.9	0.0	300.3	0.0	314.6	
6173	5	286.6	0.0	289.2	0.0	293.9	0.0	302.3	0.0	316.7	
6174	6	302.0	0.0	304.8	0.0	309.7	0.0	318.6	0.0	333.8	
6175	7	331.5	0.0	334.5	0.0	340.0	0.0	349.7	0.0	366.4	
6176	8 9	349.7	0.0	352.9	0.0	358.7	0.0	368.9	0.0	386.5	
6177	9 10	370.4 391.3	0.0 0.0	373.8 394.9	0.0 0.0	379.8	0.0 0.0	390.7	0.0 0.0	409.4	
6178 6179	10	410.7	0.0	414.4	0.0	401.3 421.2	0.0	412.8 433.2		432.5 453.9	
6180	12	410.7	0.0	430.3	0.0	437.2	0.0	449.8	0.0	433.8	
6181	13	441.4	0.0	445.5	0.0	452.7	0.0	465.6	0.0	487.9	
6182	14	457.2	0.0	461.4	0.0	468.8	0.0	482.2		505.3	
6183	15	471.3	2.9	475.6	3.7	483.3	8.1	497.2		520.9	
6184	16	479.5	2.9	483.9	3.7	491.8	8.1	505.8	12.4	530.0	
6185	17	482.9	2.9	487.4	3.7	495.2	8.1	509.4	12.4	533.8	
6186	18	475.4	2.9	479.7	3.7	487.5	8.1	501.4	12.4	525.4	14.3
6187	19	451.8	2.9	455.9	3.7	463.3	8.1	476.5	12.4	499.3	
6188	20	444.8	2.9	448.9	3.7	456.2	8.1	469.2	12.4	491.6	
6189	21	427.0	-0.5	430.9	-4.8	437.9	-16.3	450.4	-22.6	471.9	
6190	22	392.5	-0.5	396.1	-4.8	402.5	-16.3	414.0	-22.6	433.8	
6191	23	354.1	-0.5	357.3	-4.8	363.1	-16.3	373.5	-22.6	391.4	
6192	24	319.9 482.9 MW	0.0 2.9 MW	322.8 487.4 MW	0.0 3.7 MW	328.1 495.2 MW	0.0 8.1 MW	337.5 509.4 MW	0.0 12.4 MW	353.6 533.8 MW	
	Summer	202 Base Load	1 Total Deferral	202 Base Load	25 Total Deferral	203 Base Load	30 Total Deferral	20 Base Load	35 Total Deferral	20 Base Load	040 Total Deferral
	07/10	(MW)	Available								
4561	1	350.3	0.0	353.5	0.0	359.2	0.0	369.5		387.1	
4562	2	327.3	0.0	330.3	0.0	335.6	0.0	345.2		361.7	
4563	3	314.6	0.0	317.5	0.0	322.6	0.0	331.9		347.7	
4564	4	308.1	0.0	310.9	0.0	316.0	0.0	325.0		340.5	
4565	5	312.0	0.0	314.8	0.0	319.9	0.0	329.1	0.0	344.8	
4566	6 7	323.5	0.0	326.4	0.0	331.7	0.0	341.2 360.8		357.5	
4567 4568	8	342.0 375.8	0.0 0.0	345.1 379.2	0.0 0.0	350.7 385.3	0.0 0.0	360.8 396.4		378.0 415.3	
4568	8 9	375.8 414.2	0.0	418.0	0.0	424.7	0.0	396.4 436.9		415.3 457.7	
4569	9 10	414.2	0.0	418.0	0.0	424.7 467.3	0.0	430.9	0.0	457.7 503.6	
4570	10	455.7 494.4	0.0	459.8 498.9	0.0	467.3 507.0	0.0	480.8 521.5		503.6	
4572	12	535.6	0.0	498.9 540.5	0.0	549.2	0.0	564.9		540.4	
4573	13	566.6	0.0	571.7	0.0	581.0	0.0	597.6		626.2	
4574	14	593.9	3.4	599.3	7.7	609.0	19.2	626.4	25.5	656.4	
4575	15	616.7	3.4	622.3	7.7	632.4	19.2	650.5		681.6	
4576	16	608.5	3.4	614.0	7.7	624.0	19.2	641.9		672.5	
4577	17	583.7	3.4	589.0	7.7	598.5	19.2	615.7	25.5	645.1	
4578	18	576.6	3.4	581.8	7.7	591.3	19.2	608.2	25.5	637.3	28.1
4579	19	567.3	3.4	572.5	7.7	581.8	19.2	598.4	25.5	627.0	28.1
	20	543.1	-0.5	548.0	-4.8	556.9	-16.3	572.8		600.2	
4580	21	527.1	-0.5	531.9	-4.8	540.5	-16.3	556.0		582.5	
4581			-0.5	503.5	-4.8	511.7	-16.3	526.3	-22.6	551.5	-25.2
4581 4582	22	499.0									
4581 4582 4583	22 23	445.5	0.0	449.6	0.0	456.9	0.0	470.0	0.0	492.4	-0.4
4581 4582	22										-0.4

DR.Hourly.Med: Demand Response Low Avoided Cost Scenario Results

	Winter	202	21	202	25	203	30	20	35	20	40
Peak Hours	12/19	Base Load (MW)	Load w/DR Curtailment								
20	1	327	327	330	335	335	351	345	367	361	386
22 24	2 3	318	318 315	321 318	321 318	326 323	326 323	336 333	336 333	352	352 348
24	3	315 317	315	319	318	325	323 325	333	333	348 350	348
21	5	326	326	329	329	334	334	344	344	360	360
18	6 7	349 386	349 386	352 390	352 390	358 396	358 396	368 407	368 407	386 427	386 427
8	8	405	405	409	409	416	416	407	407	427	427
7	9	407	407	410	410	417	417	429	429	450	450
9 10	10 11	402 398	402 398	406 401	406 401	412 408	412 408	424 419	424 419	444 439	444 439
11	12	394	394	397	397	400	404	415	415	435	435
12	13	389	389	393	393	399	399	411	411	430	430
13 16	14 15	386 382	386 382	390 386	390 386	396 392	396 392	408 403	408 403	427 422	427 422
15	16	384	384	388	388	394	394	405	405	425	425
5	17 18	408 447	405 444	412 451	408 447	419 458	410 450	430 472	418 459	451 494	437 480
1	10	448	444	452	447	458	450	472	459	494	480
3	20	441	438	445	442	453	444	466	453	488	473
4	21 22	431 408	428 405	435 412	431 408	442 418	434 410	454 430	442 418	476 451	462 437
17	23	375	375	378	383	384	400	395	418	414	439
19	24	345	345	348	353	353	370	364	386	381	406
	Spring/Fall	202		202		203		20		20	
Peak Hours	09/15	Base Load (MW)	Load w/DR Curtailment								
19	1	313	313	316	316	321	321	330	330	346	346
21 22	2 3	298 290	298 290	301 292	301 292	306 297	306 297	314 305	314 305	329 320	329 320
24	4	285	285	292	282	297	292	300	300	315	315
23	5	287	287	289	289	294	294	302	302	317	317
20 17	6 7	302 332	302 332	305 335	305 335	310 340	310 340	319 350	319 350	334 366	334 366
16	8	350	350	353	353	359	359	369	369	387	387
14	9	370	370	374	374	380	380	391	391	409	409 433
13 11	10 11	391 411	391 411	395 414	395 414	401 421	401 421	413 433	413 433	433 454	433 454
10	12	426	426	430	430	437	437	450	450	471	471
8	13 14	441 457	441 457	445 461	445 461	453 469	453 469	466 482	466 482	488 505	488 505
4	14	471	468	401	401	409	409	402	485	521	505
2	16	480	477	484	480	492	484	506	493	530	516
1	17 18	483 475	480 472	487 480	484 476	495 487	487 479	509 501	497 489	534 525	519 511
6	19	452	449	456	452	463	455	477	464	499	485
7	20 21	445 427	442 428	449 431	445 436	456 438	448 454	469 450	457 473	492 472	477 497
12	21	392	393	396	401	438	434	430	473	472	497 459
15	23	354	355	357	362	363	379	374	396	391	417
18	24	320	320	323	323	328	328	337	337	354	354
Peak	Summer	202 Base Load	21 Load w/DR	202 Base Load	25 Load w/DR	203 Base Load	30 Load w/DR	20 Base Load	35 Load w/DR	20 Base Load	40 Load w/DR
Hours	07/10	(MW)	Curtailment								
18 20	1 2	350 327	350 327	353 330	353 330	359 336	359 336	369 345	369 345	387 362	387 362
22	2	315	315	317	317	323	323	332	332	348	348
24	4	308	308	311	311	316	316	325	325	341	341
23 21	5 6	312 323	312 323	315 326	315 326	320 332	320 332	329 341	329 341	345 357	345 357
19	7	342	342	345	345	351	351	361	361	378	378
17	8	376	376	379	379	385	385	396	396 437	415	415
15 13	9 10	414 456	414 456	418 460	418 460	425 467	425 467	437 481	437 481	458 504	458 504
12	11	494	494	499	499	507	507	522	522	546	546
9 7	12 13	536 567	536 567	540 572	540 572	549 581	549 581	565 598	565 598	592 626	592 626
3	13	594	590	599	592	609	590	626	601	656	628
1	15	617	613	622	615	632	613	651	625	682	653
2 4	16 17	608 584	605 580	614 589	606 581	624 599	605 579	642 616	616 590	673 645	644 617
5	18	577	573	582	574	591	572	608	583	637	609
6	19	567	564	573	565	582	563	598	573	627	599
8 10	20 21	543 527	544 528	548 532	553 537	557 540	573 557	573 556	595 579	600 583	625 608
	22	499	499	504	508	512	528	526	549	551	577
11											
11 14 16	23 24	446 396	446 396	450 400	450 400	457 406	457 406	470 418	470 418	492 438	493 438



Technical, Economic, and Achievable Demand

Combined

Combined					
Technical Potential (MWh)	2021	2025	2030	2035	2040
HVAC	3,533	3,813	4,152	4,475	4,820
Water Heating	508	624	765	901	1,048
Batteries	12,944	26,272	33,523	40,601	46,750
Industrial Processes	657	796	963	1,116	1,259
Lighting	2,291	2,828	3,463	4,040	4,571
Refrigeration	7	7	. 8	9	. 9
Voltage Reduction	424	427	434	447	468
Total Technical Potential (MWh)	20,363	34,767	43,308	51,588	58,925
Economic Potential (MWh)	2021	2025	2030	2035	2040
HVAC	3,533	3,813	4,152	4,475	4,820
Water Heating	508	624	765	901	1,048
Batteries	-	-	656	5,842	11,360
Industrial Processes	657	796	963	1,116	1,259
Lighting	-	-	-	-	-
Refrigeration	-	-	-	-	-
Voltage Reduction	424	427	434	447	468
Total Economic Potential (MWh)	5,121	5,660	6,970	12,781	18,954
Achievable Potential (MWh)	2021	2025	2030	2035	2040
HVAC	92	755	2,158	2,627	2,754
Water Heating	2	44	283	514	602
Batteries	-	-	206	1,100	3,995
Industrial Processes	2	57	356	653	769
Lighting	-	-	-	-	-
Refrigeration	-	-	-	-	-
Voltage Reduction	424 520	427 1.284	434 3.438	447 5.341	468
Total Achievable Potential (MWh)	520	1,204	3,430	5,341	8,589
Total Achievable Incremental	1				
Costs (\$000s)	2021	2025	2030	2035	2040
HVAC	\$1,235	\$2,892	\$4,347	\$3,397	\$4,590
Water Heating	\$1,235	\$2,092 \$133	\$4,347 \$404	\$3,397 \$389	\$4,590 \$525
Batteries	\$1Z	\$133	\$404 \$89	\$369 \$627	
Industrial Processes	\$8	- \$89			\$1,688 \$357
Lighting	φo	\$0 8	\$275	\$294	\$357
Refrigeration	-	-	-	-	-
	¢0.000	-	-	-	-
Voltage Reduction Total Incremental Costs (\$000s)	\$2,280 \$3,535	\$3,114	\$5,115	\$4,708	\$7,160
Total incremental costs (\$0003)	43,333	φ 3 ,11 4	ψ3,113	φ 4 ,700	ψ1,100
Multi-Year Cumulative Cost	I				
(\$000s)	2021-2025	2026-2030	2031-2035	2036-2040	
HVAC	\$10,149	\$20,227	\$18,396	\$21,417	
Water Heating	\$289	\$1,567	\$1,983	\$2,353	
Batteries	φ205 -	\$342	\$1,897	\$6,102	
Industrial Processes	\$194	\$1,056	\$1,417	\$1,705	
Lighting	ψ10 4	φ1,000	ψι,τι <i>ί</i>	ψ1,700 -	
Refrigeration		-	-	-	
Voltage Reduction	\$2,280	_	_	_	
Total 5-Year Costs (\$000s)	\$12,913	\$23,192	\$23,692	\$31,578	
Participant Cost	\$1,943	\$4,237	\$4,328	\$5,769	
	- 1,010	÷.,=01	÷.,020	,	

\$8,108

\$2,863

\$12,711

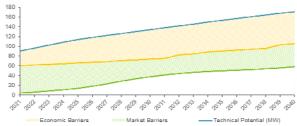
\$6,244

\$12,985 \$17,307

\$8,502

\$6,379

Technical, Economic, and Achievable Demand Response Potential (Deferred MW)



Economic Potential (MW) Achievable Potential (MW)

Combined					
Technical Potential (MW)	2021	2025	2030	2035	2040
HVAC	49.1	53.0	57.7	62.1	66.9
Water Heating	3.5	4.3	5.3	6.3	7.3
Batteries	14.3	28.6	37.3	45.7	53.2
Industrial Processes	4.6	5.5	6.7	7.8	8.7
Lighting	15.9	19.6	24.0	28.1	31.7
Refrigeration	0.0	0.1	0.1	0.1	0.1
Voltage Reduction	2.9	3.0	3.0	3.1	3.3
Total Technical Potential (MW)	90.4	114.1	134.1	153.1	171.2
Economic Potential (MW)	2021	2025	2030	2035	2040
HVAC	49.1	53.0	57.7	62.1	66.9
Water Heating	3.5	4.3	5.3	6.3	7.3
Batteries	-	-	0.9	10.8	19.1
Industrial Processes	4.6	5.5	6.7	7.8	8.7
Lighting	-	-	-	-	-
Refrigeration	-	-	-	-	-
Voltage Reduction	2.9	3.0	3.0	3.1	3.3
Total Economic Potential (MW)	60.1	65.8	73.6	90.1	105.4
Achievable Potential (MW)	2021	2025	2030	2035	2040
HVAC	1.3	10.5	30.0	36.5	38.3
Water Heating	0.01	0.3	2.0	3.6	4.2
Batteries	-	-	0.3	1.9	7.0
Industrial Processes	0.02	0.4	2.5	4.5	5.3
Lighting	-	-	-	-	-
Refrigeration	-				
Voltage Reduction	2.9	3.0	3.0	3.1	3.3
Total Achievable Potential (MW)	4.3	14.2	37.7	49.6	58.1
Incremental Achievable Potential	1				
(MW)	2021	2025	2030	2035	2040
HVAC	1.3	3.0	4.5	3.5	4.7
Water Heating	0.01	0.1	0.4	0.4	0.6
Batteries	-	-	0.1	0.5	1.5
Industrial Processes	0.02	0.2	0.5	0.5	0.7
Lighting	-	-	-	-	-
Refrigeration	-	-	-	-	-
Voltage Reduction	2.9	0.0	0.0	0.0	0.0
Total Achievable Potential (MW)	4.3	3.3	5.5	5.0	7.5
Incremental Cost per Unit Capacity	\$831.52	\$940.86	\$927.56	\$938.94	\$950.17

Utility Incentives

Utility Administrative Costs

DR.High: Demand Response High Avoided Cost Scenario Results

Residential Technical Potential (MWh)	2019	2025	2030	2035	2040
HVAC	3,267	3,522	3,831	4,126	4,445
Water Heating	508	624	765	901	1,048
Batteries	11,608	23,803	29,732	35,619	40,687
Industrial Processes	n/a	n/a	n/a	n/a	n/a
Lighting	n/a	n/a	n/a	n/a	n/a
Refrigeration	n/a	n/a	n/a	n/a	n/a
Voltage Reduction	n/a	n/a	n/a	n/a	n/a
Total Technical Potential (MWh)	15,383	27,949	34,328	40,646	46,180
Economic Potential (MWh)	2021	2025	2030	2035	2040
HVAC	3,267	3,522	3,831	4,126	4,445
Water Heating	508	624	765	901	1,048
Batteries	-	-	656	860	5,297
Industrial Processes	n/a	n/a	n/a	n/a	n/a
Lighting	n/a	n/a	n/a	n/a	n/a
Refrigeration	n/a	n/a	n/a	n/a	n/a
Voltage Reduction	n/a	n/a	n/a	n/a	n/a
Total Economic Potential (MWh)	3,775	4,146	5,252	5,887	10,790
Achievable Potential (MWh)	2021	2025	2030	2035	2040
HVAC	91	735	2,039	2,418	2,524
Water Heating	2	44	2,039	2,410	2,524
Batteries	-	-	206	449	1,258
Industrial Processes	n/a	n/a	200 n/a	n/a	n/a
Lighting	n/a	n/a	n/a	n/a	n/a
Refrigeration	n/a	n/a	n/a	n/a	n/a
Voltage Reduction	n/a	n/a	n/a	n/a	n/a
Total Achievable Potential (MWh)	93	779	2,528	3,381	4,384
Total Achievable Internet					
Total Achievable Incremental Costs (\$000s)	2021	2025	2030	2035	2040
HVAC	\$1,220	\$2,744	\$3,963	\$3,191	\$4,373
Water Heating	\$1,220	\$133	\$3,903 \$404	\$389	\$525
Batteries	ψ12	φ100 -	\$89	\$64	\$647
Industrial Processes	n/a	n/a	n/a	n/a	n/a
Voltage Reduction	424	427	434	447	468
Total Technical Potential (MWh)	20,363	34,767	43,308	51,588	58,925
Economic Potential (MWh)	2021	2025	2030	2035	2040
HVAC	3,533	3,813	4,152	4,475	4,820
Water Heating Batteries	508	624	765 656	901 5,842	1,048 11,360
Industrial Processes	657	796	963	5,642 1,116	1,259
Lighting		130	- 305	1,110	1,200
Refrigeration	-	-		-	-
Voltage Reduction	424	427	434	447	468
Total Economic Potential (MWh)	5,121	5,660	6,970	12,781	18,954
Achievable Potential (MWh)	2021	2025	2030	2035	2040
HVAC	92	755	2,158	2,627	2,754
Water Heating	2	44	283	514	602
Batteries	-	-	206	1,100	3,995
Industrial Processes	2	57	356	653	769
Lighting Retrigeration	-	-	-	-	-
Voltage Reduction	424	427	434	447	
Total Achievable Potential (MWh)					468
rotal Achievable Potential (www.)	520	1 284			
	520	1,284	3,438	5,341	468 8,589
Total Achievable Incremental	520	1,284			
	520 2021	1,284 2025			8,589
Costs (\$000s)	2021	2025	3,438 2030	5,341 2035	8,589 2040
Costs (\$000s) HVAC	2021 \$1,235	2025 \$2,892	3,438	5,341	8,589 2040 \$4,590
Costs (\$000s) HVAC Water Heating	2021	2025	3,438 2030 \$4,347	5,341 2035 \$3,397	8,589 2040 \$4,590 \$525
Costs (\$000s) HVAC Water Heating Batteries	2021 \$1,235	2025 \$2,892 \$133	3,438 2030 \$4,347 \$404	5,341 2035 \$3,397 \$389	8,589 2040 \$4,590 \$525
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting	2021 \$1,235 \$12	2025 \$2,892 \$133	3,438 2030 \$4,347 \$404 \$89	5,341 2035 \$3,397 \$389 \$627	8,589 2040 \$4,590 \$525 \$1,688
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration	2021 \$1,235 \$12 - \$8 -	2025 \$2,892 \$133	3,438 2030 \$4,347 \$404 \$89	5,341 2035 \$3,397 \$389 \$627	8,589 2040 \$4,590 \$525 \$1,688
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction	2021 \$1,235 \$12 \$8 \$2,280	2025 \$2,892 \$133 - \$89	3,438 2030 \$4,347 \$404 \$89 \$275	5,341 2035 \$3,397 \$389 \$627 \$294 - -	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction	2021 \$1,235 \$12 - \$8 -	2025 \$2,892 \$133	3,438 2030 \$4,347 \$404 \$89	5,341 2035 \$3,397 \$389 \$627	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s)	2021 \$1,235 \$12 \$8 \$2,280	2025 \$2,892 \$133 - \$89	3,438 2030 \$4,347 \$404 \$89 \$275	5,341 2035 \$3,397 \$389 \$627 \$294 - -	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s) Multi-Year Cumulative Cost	2021 \$1,235 \$12 \$8 \$2,280	2025 \$2,892 \$133 \$89 \$89 \$3,114	3,438 2030 \$4,347 \$404 \$89 \$275 - - - \$5,115	5,341 2035 \$3,397 \$3,397 \$627 \$294 - - \$4,708	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s) Multi-Year Cumulative Cost (\$000s)	2021 \$1,235 \$12 \$88 \$2,280 \$3,535	2025 \$2,892 \$133 \$89 \$89 \$3,114	3,438 2030 \$4,347 \$404 \$89 \$275 - - - \$5,115	5,341 2035 \$3,397 \$3,397 \$627 \$294 - - \$4,708	2040 \$4,590 \$525 \$1,688
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s) Multi-Year Cumulative Cost (\$000s) HVAC	2021 \$1,235 \$12 \$8 \$2,280 \$3,535 2021-2025	2025 \$2,892 \$133 \$89 - - \$3,114 2026-2030 2	3,438 2030 \$4,347 \$404 \$89 \$275 - - \$5,115 2031-2035	5,341 2035 \$3,397 \$389 \$627 \$294 - - \$4,708 2036-2040	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s) Multi-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries	2021 \$1,235 \$12 \$8 \$2,280 \$3,535 2021-2025 2 \$10,149 \$289	2025 \$2,892 \$133 \$899 \$3,114 2026-2030 \$1,567 \$342	3,438 2030 \$4,347 \$404 \$89 \$275 - - \$5,115 \$18,396 \$1,983 \$1,897	5,341 2035 \$3,397 \$627 \$294 - \$4,708 2036-2040 \$21,417 \$2,353 \$6,102	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s) Multi-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Industrial Processes	2021 \$1,235 \$12 \$8 \$2,280 \$3,535 2021-2025 2 \$10,149	2025 \$2,892 \$133 \$89 \$3,114 2026-2030 2 \$20,227 \$1,567	3,438 2030 \$4,347 \$404 \$89 \$275 \$5,115 2031-2035 \$18,396 \$1,983	5,341 2035 \$3,397 \$389 \$627 \$294 - - - \$4,708 \$2036-2040 \$21,417 \$2,353	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s) Multi-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting	2021 \$1,235 \$12 \$8 \$2,280 \$3,535 2021-2025 2 \$10,149 \$289	2025 \$2,892 \$133 \$899 \$3,114 2026-2030 \$1,567 \$342	3,438 2030 \$4,347 \$404 \$89 \$275 - - - \$5,115 2031-2035 \$1,983 \$1,983 \$1,897 \$1,417	5,341 2035 \$3,397 \$627 \$294 - \$4,708 2036-2040 \$21,417 \$2,353 \$6,102	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s) Multi-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration	2021 \$1,235 \$12 \$8 \$2,280 \$3,535 2021-2025; \$10,149 \$289 \$194 -	2025 \$2,892 \$133 \$899 \$3,114 2026-2030 \$1,567 \$342	3,438 2030 \$4,347 \$404 \$89 \$275 - - \$5,115 \$18,396 \$1,983 \$1,897	5,341 2035 \$3,397 \$627 \$294 - \$4,708 2036-2040 \$21,417 \$2,353 \$6,102	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s) Multi-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction	2021 \$1,235 \$12 \$88 \$2,280 \$3,535 2021-20252 \$10,149 \$289 \$194 \$194 \$2,280	2025 \$2,892 \$133 \$89 \$3,114 2026-2030 2 \$20,227 \$1,567 \$342 \$1,056 -	3,438 2030 \$4,347 \$404 \$89 \$275 5,115 2031-2035 \$18,396 \$1,897 \$1,417 - -	5,341 2035 \$389 \$627 \$294 - - - \$4,708 2036-2040 \$21,417 \$2,353 \$6,102 \$1,705	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s) Multi-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total 5-Year Costs (\$000s)	2021 \$1,235 \$12 \$8 \$2,280 \$3,535 2021-2025; \$10,149 \$289 - \$194 - \$194 \$289 - \$194 \$1,215 \$2,280 \$1,215 \$1,215 \$2,280 \$1,215 \$2,280 \$3,535 \$2,280 \$1,215 \$2,280 \$3,535 \$2,280 \$3,535 \$2,280 \$3,535 \$2,280 \$3,535 \$2,280 \$3,535 \$2,280 \$3,535 \$2,280 \$3,535 \$2,280 \$2,280 \$3,535 \$2,280 \$2,280 \$3,535 \$2,280 \$2,280 \$3,535 \$2,280 \$2,280 \$3,535 \$2,280 \$2,280 \$2,280 \$3,535 \$2,280 \$2,280 \$2,280 \$2,280 \$2,280 \$2,280 \$2,280 \$2,280 \$2,280 \$2,280 \$2,280 \$3,535 \$2,280 \$2,290 \$2,	2025 \$2,892 \$133 \$89 \$3,114 2026-2030 \$20,227 \$1,567 \$342 \$1,056 \$20,227 \$3,105	3,438 2030 \$4,347 \$404 \$89 \$275 \$5,115 2031-2035 \$1,983 \$1,8396 \$1,983 \$1,897 \$1,417 \$1,417 \$2,3,692	5,341 2035 \$3,397 \$389 \$627 - - \$4,708 2036-2040 \$2,353 \$6,102 \$1,705 - - \$3,397 - - - - - - - - - - - - -	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s) Multi-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total 5-Year Costs (\$000s) Participant Cost	2021 \$1,235 \$12 \$8 \$2,280 \$3,535 \$021-2025; \$10,149 \$289 \$194 \$2,280 \$194 \$2,280 \$1,943 \$1,943	2025 \$2,892 \$133 \$89 \$3,114 2026-2030 2 \$20,227 \$1,567 \$342 \$1,056 \$24,227 \$342 \$1,056 \$342 \$4,237	3,438 2030 \$4,347 \$404 \$89 \$275 - \$5,115 2031-2035: \$18,396 \$1,983 \$1,983 \$1,983 \$1,417 - \$4,147 \$4,447 \$4,984 \$1,983 \$4,147 \$1,983 \$1,985 \$1,98	5,341 2035 \$3,397 \$389 \$627 \$294 - \$4,708 2036-2040 \$21,417 \$2,353 \$6,102 \$1,705 - - \$3,37 \$2,353 \$6,102 \$1,705 - \$3,37 \$2,353 \$6,102 \$1,705 - - - - - - - - - - - - -	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s) Multi-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total 5-Year Costs (\$000s) Participant Cost Utility Incentives	2021 \$1,235 \$12 \$8 \$2,280 \$3,535 2021-20252 \$10,149 \$289 \$10,149 \$289 \$194 \$2,280 \$1,913 \$1,943 \$8,108	2025 \$2,892 \$133 \$89 \$3,114 2026-2030 2 \$20,227 \$1,567 \$342 \$1,056 \$20,227 \$1,567 \$342 \$1,056 \$20,227 \$1,567 \$3,114	3,438 2030 \$4,347 \$404 \$89 \$275 \$5,115 2031-2035 \$18,396 \$1,897 \$1,417 \$1,417 \$23,692 \$4,328 \$12,985	5,341 2035 \$3,397 \$389 \$627 \$294 - \$4,708 2036-2040 \$21,417 \$2,353 \$6,102 \$1,705 - \$31,578 \$5,769 \$17,307	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s) Multi-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total 5-Year Costs (\$000s) Participant Cost	2021 \$1,235 \$12 \$8 \$2,280 \$3,535 \$021-2025; \$10,149 \$289 \$194 \$2,280 \$194 \$2,280 \$1,943 \$1,943	2025 \$2,892 \$133 \$89 \$3,114 2026-2030 2 \$20,227 \$1,567 \$342 \$1,056 \$24,227 \$342 \$1,056 \$342 \$4,237	3,438 2030 \$4,347 \$404 \$89 \$275 - \$5,115 2031-2035: \$18,396 \$1,983 \$1,983 \$1,983 \$1,417 - \$4,147 \$4,447 \$4,984 \$1,983 \$4,147 \$1,983 \$1,985 \$1,98	5,341 2035 \$3,397 \$389 \$627 \$294 - \$4,708 2036-2040 \$21,417 \$2,353 \$6,102 \$1,705 - - \$3,37 \$2,353 \$6,102 \$1,705 - \$3,37 \$2,353 \$6,102 \$1,705 - - - - - - - - - - - - -	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s) Multi-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total 5-Year Costs (\$000s) Participant Cost Utility Incentives Utility Administrative Costs	2021 \$1,235 \$12 \$8 \$2,280 \$3,535 2021-20252 \$10,149 \$289 \$10,149 \$289 \$194 \$2,280 \$1,913 \$1,943 \$8,108	2025 \$2,892 \$133 \$89 \$3,114 2026-2030 2 \$20,227 \$1,567 \$342 \$1,056 \$20,227 \$1,567 \$342 \$1,056 \$20,227 \$1,567 \$3,114	3,438 2030 \$4,347 \$404 \$89 \$275 \$5,115 2031-2035 \$18,396 \$1,897 \$1,417 \$1,417 \$23,692 \$4,328 \$12,985	5,341 2035 \$3,397 \$389 \$627 \$294 - \$4,708 2036-2040 \$21,417 \$2,353 \$6,102 \$1,705 - \$31,578 \$5,769 \$17,307	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Utility Incentives Utility Administrative Costs Residential	2021 \$1,235 \$12 \$8 \$2,280 \$3,535 2021-20252 \$10,149 \$289 \$10,149 \$289 \$194 \$2,280 \$1,913 \$1,943 \$8,108	2025 \$2,892 \$133 \$89 \$3,114 2026-2030 2 \$20,227 \$1,567 \$342 \$1,056 \$20,227 \$1,567 \$342 \$1,056 \$20,227 \$1,567 \$3,114	3,438 2030 \$4,347 \$404 \$89 \$275 \$5,115 2031-2035 \$18,396 \$1,897 \$1,417 \$1,417 \$23,692 \$4,328 \$12,985	5,341 2035 \$3,397 \$389 \$627 \$294 - \$4,708 2036-2040 \$21,417 \$2,353 \$6,102 \$1,705 - \$31,578 \$5,769 \$17,307	8,589 2040 \$4,590 \$525 \$1,688 \$357 - -
Costs (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total Incremental Costs (\$000s) Multi-Year Cumulative Cost (\$000s) HVAC Water Heating Batteries Industrial Processes Lighting Refrigeration Voltage Reduction Total 5-Year Costs (\$000s) Participant Cost Utility Incentives Utility Incentives	2021 \$1,235 \$12 \$8 \$2,280 \$3,535 2021-20252 \$10,149 \$289 \$10,149 \$289 \$10,149 \$2,80 \$1,943 \$1,943 \$1,943 \$1,943 \$1,943 \$1,943 \$1,944 \$2,863	2025 \$2,892 \$133 \$89 \$3,114 2026-2030 2 \$20,227 \$1,567 \$342 \$1,056 \$20,227 \$1,567 \$342 \$1,056 \$20,227 \$1,567 \$3,114 \$20,227 \$1,567 \$3,114 \$20,227 \$1,567 \$3,114 \$20,227 \$1,567 \$3,114 \$20,227 \$1,567 \$3,114 \$20,227 \$1,567 \$3,20 \$1,056 \$2,892 \$1,056 \$2,892 \$1,056 \$1,056 \$2,892 \$1,0566 \$1,0566 \$1,0566 \$1	3,438 2030 \$4,347 \$404 \$89 \$275 \$5,115 2031-2035 \$18,396 \$1,897 \$1,417 \$1,417 \$23,692 \$4,328 \$12,985 \$6,379	5,341 2035 \$3,397 \$389 \$627 \$294 - \$4,708 2036-2040 \$21,417 \$2,353 \$6,102 \$1,705 \$1,705 \$5,769 \$17,307 \$8,502	8,589 2040 \$4,590 \$525 \$1,688 \$357 - - - \$7,160

ndustrial Processes ighting Voltage Reduction Fotal Achievable Potential (MW) ncremental Achievable Potential MW) 4VAC Vater Heating 3atteries ndustrial Processes ughting Refrigeration fotal Achievable Potential (MW) ncremental Cost per Unit Capacity \$	1.3 0.01 - 0.02 2.9 4.3 - - 2.9 4.3 - - 2.9 4.3 - - 2.9 4.3 - - 2.9 4.3 - - - - - - - - - - - - - - - - - - -	10.5 0.3 0.4 - - - - - - - - - - - - - - - - - - -	2030 30.0 2.0 3.0 3.0 3.0 3.0 3.7.7 2030 4.5 0.4 0.1 0.5 \$927.56	2035 36.5 3.6 1.9 4.5 3.1 49.6 2035 3.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0	204 38 4 7 5 3 3 58 204 4 0 0 1 1 0 0 7 7 5 \$950.1
ighting Collage Reduction fotal Achievable Potential (MW) ncremental Achievable Potential MW) tVAC Vater Heating Jatteries ndustrial Processes ighting Sefrigeration /oltage Reduction fotal Achievable Potential (MW)	1.3 0.01 - 2.9 4.3 2021 1.3 0.01 - 0.02 - 2.9 4.3	10.5 0.3 	30.0 2.0 3.0 3.0 3.0 3.0 3.7.7 2030 4.5 0.4 0.1 0.5 5 .5	36.5 3.6 1.9 4.5 3.1 49.6 2035 3.5 0.4 0.5 0.5 0.5 0.5 0.5 0.5	38 4 7 5 5 3 3 58 204 4 0 1 1 0 0 7 7
ighting Collage Reduction fotal Achievable Potential (MW) ncremental Achievable Potential MW) tVAC Vater Heating Jatteries ndustrial Processes ighting Sefrigeration /oltage Reduction fotal Achievable Potential (MW)	1.3 0.01 - 2.9 4.3 2021 1.3 0.01 - 0.02 - 2.9 4.3	10.5 0.3 	30.0 2.0 3.0 3.0 3.0 3.0 3.7.7 2030 4.5 0.4 0.1 0.5 5 .5	36.5 3.6 1.9 4.5 3.1 49.6 2035 3.5 0.4 0.5 0.5 0.5 0.5 0.5 0.5	38 4 7 5 5 3 3 58 204 4 0 1 1 0 0 7 7
ighting Collage Reduction fotal Achievable Potential (MW) ncremental Achievable Potential MW) tVAC Vater Heating Jatteries ndustrial Processes ighting Sefrigeration /oltage Reduction fotal Achievable Potential (MW)	1.3 0.01 - 2.9 4.3 2021 1.3 0.01 - 0.02 - 2.9 4.3	10.5 0.3 	30.0 2.0 3.0 3.0 3.0 3.0 3.7.7 2030 4.5 0.4 0.1 0.5 5 .5	36.5 3.6 1.9 4.5 3.1 49.6 2035 3.5 0.4 0.5 0.5 0.5 0.5 0.5 0.5	38 4 7 5 5 3 3 58 204 4 0 1 1 0 0 7 7
ighting Lighting Lighting Leidenta Collage Reduction Collage Reduction Collage Reduction Collage Reduction Collage Reduction Collage Reducting Leidenta Collage Reduction Coll	1.3 0.01 	10.5 0.3 0.4 - - - - - - - - - - - - - - - - - - -	30.0 2.0 3.0 3.0 3.0 37.7 2030 4.5 0.4 0.4 0.4 0.5 0.0	36.5 3.6 1.9 4.5 3.1 49.6 2035 3.5 0.4 0.5 0.5	38 4 7 5 5 3 3 58 204 4 0 0 1 1 0 0
ighting terrigeration /oltage Reduction Fotal Achievable Potential (MW) ncremental Achievable Potential MW) HVAC Vater Heating Satteries ndustrial Processes Jighting terrigeration	1.3 0.01 - - 2.9 4.3 2021 1.3 0.01 - 0.02	10.5 0.3 - - - - - - - - - - - - - - - - - - -	30.0 2.0 2.5 2.5 3.0 37.7 2030 4.5 0.4 0.1 0.5	36.5 3.6 1.9 4.5 - 3.1 49.6 2035 3.5 3.5 0.4 0.5 0.5	38 4 7 5 3 3 58 204 4 0 1 1 0
ighting defrigeration fotal Achievable Potential (MW) ncremental Achievable Potential MW) tVAC Vater Heating atteries ndustrial Processes	1.3 0.01 - 0.02 - 2.9 4.3 2021 1.3 0.01	10.5 0.3 0.4 - 3.0 14.2 2025 3.0 0.1	30.0 2.0 0.3 2.5 - 3.0 37.7 2030 4.5 0.4 0.1	36.5 3.6 1.9 4.5 - 3.1 49.6 2035 3.5 0.4 0.5	38 4 7 5 5 3 58 204 4 0 1
ighting terrigeration /oltage Reduction fotal Achievable Potential (MW) ncremental Achievable Potential MW) tVAC Vater Heating Satteries	1.3 0.01 - 0.02 - 2.9 4.3 2021 1.3 0.01	10.5 0.3 0.4 - 3.0 14.2 2025 3.0 0.1	30.0 2.0 0.3 2.5 - 3.0 37.7 2030 4.5 0.4 0.1	36.5 3.6 1.9 4.5 - 3.1 49.6 2035 3.5 0.4 0.5	38 4 7 5 5 3 58 204 4 0 1
ighting terrigeration fotal Achievable Potential (MW) ncremental Achievable Potential MW) tVAC VAC Vater Heating	1.3 0.01 - 0.02 - 2.9 4.3 2021 1.3	10.5 0.3 0.4 - 3.0 14.2 2025 3.0	30.0 2.0 0.3 2.5 - 3.0 37.7 2030 4.5 0.4	36.5 3.6 1.9 4.5 - 3.1 49.6 2035 3.5 0.4	38 4 7 5 3 3 58 204 4 0
ighting Veringeration /oltage Reduction Fotal Achievable Potential (MW) ncremental Achievable Potential MW)	1.3 0.01 - - 2.9 4.3 2021	10.5 0.3 - 0.4 - 3.0 14.2 2025	30.0 2.0 0.3 2.5 - 3.0 37.7 2030	36.5 3.6 1.9 4.5 - 3.1 49.6 2035	38 4 7 5 3 3 58 204
ighting Vetrigeration /oltage Reduction /otal Achievable Potential (MW) ncremental Achievable Potential	1.3 0.01 - 0.02 - 2.9 4.3	10.5 0.3 - 0.4 - 3.0 14.2	30.0 2.0 0.3 2.5 - 3.0 37.7	36.5 3.6 1.9 4.5 - 3.1 49.6	38 4 7 5 3 58
ighting Refrigeration /oltage Reduction	1.3 0.01 - 0.02 - 2.9	10.5 0.3 - 0.4 - 3.0	30.0 2.0 0.3 2.5 - 3.0	36.5 3.6 1.9 4.5 - 3.1	38 4 7 5 3
ighting Refrigeration /oltage Reduction	1.3 0.01 - 0.02 - 2.9	10.5 0.3 - 0.4 - 3.0	30.0 2.0 0.3 2.5 - 3.0	36.5 3.6 1.9 4.5 - 3.1	38 4 7 5 3
ighting Refrigeration	1.3 0.01 - 0.02 -	10.5 0.3 - 0.4 -	30.0 2.0 0.3 2.5 -	36.5 3.6 1.9 4.5 -	38 4 7 5
ighting	1.3 0.01 -	10.5 0.3	30.0 2.0 0.3 2.5	36.5 3.6 1.9 4.5	38 4 7
	1.3 0.01 -	10.5 0.3	30.0 2.0 0.3	36.5 3.6 1.9	38 4 7
Batteries	1.3	10.5	30.0 2.0	36.5 3.6	38 4
Vater Heating					
Achievable Potential (MW) HVAC	2021	2025			
Achievable Detential (MIM)	2024	2025			
Total Economic Potential (MW)	60.1	65.8	73.6	90.1	105
Retrigeration /oltage Reduction	- 2.9	3.0	3.0	- 3.1	3
lighting	-	-	-	-	
ndustrial Processes	4.6	5.5	6.7	7.8	8
Vater Heating Batteries	3.5	4.3	5.3 0.9	6.3 10.8	7
IVAC	49.1	53.0	57.7	62.1	66
Economic Potential (MW)	2021	2025	2030	2035	204
Total Technical Potential (MW)	90.4	114.1	134.1	153.1	171
/oltage Reduction	2.9	3.0	3.0	3.1	3
Batteries ndustrial Processes	- n/a	\$342 n/a	\$360 n/a	\$1,635 n/a	
Vater Heating	\$289	\$1,567	\$1,983	\$2,353	
IVAC	\$9,817	\$18,647	\$16,935	\$20,538	
Aulti-Year Cumulative Cost \$000s) 202	21-2025	2026-20302	2031-2035	2036-2040	2041-20
Total Achievable Potential (MW)	1.3	10.5	30.6	37.8	41
Refrigeration /oltage Reduction	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n
ighting	n/a	n/a	n/a	n/a	n
Batteries ndustrial Processes	- n/a	- n/a	0.3 n/a	0.6 n/a	n n
Vater Heating	0.0	0.3	2.0	3.6	4
IVAC	1.3	10.2	2030	33.6	35
Achievable Potential (MW)	2021	2025	2030	2035	204
Total Economic Potential (MW)	48.9	53.3	59.5	64.8	76
Refrigeration /oltage Reduction	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n n
ighting	n/a	n/a	n/a	n/a	n
Batteries ndustrial Processes	- n/a	- n/a	0.9 n/a	1.2 n/a	7 n
Vater Heating	3.5	4.3	5.3	6.3	7
IVAC	45.4	48.9	53.2	57.3	61
Economic Potential (MW)	2021	2025	2030	2035	204
otal Technical Potential (MW)	60.7	77.1	88.6	99.7	110
/oltage Reduction	n/a n/a	n/a	n/a n/a	n/a n/a	n
ighting Refrigeration	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n n
ndustrial Processes	n/a	n/a	n/a	n/a	n
Vater Heating Batteries	3.5 11.8	4.3 23.9	5.3 30.0	6.3 36.2	7 41
IVAC	45.4	48.9	53.2	57.3	61

DR.Hourly.High: Demand Response High Avoided Cost Scenario Results

	Winter	202	21	20	25	20	30	20	35	20	040
	12/19		Total Deferral Available	Base Load (MW)	Total Deferral Available	Base Load (MW)	Total Deferral Available	Base Load (MW)	Total Deferral Available	Base Load (MW)	Total Deferral Available
8449	1	326.9	-0.7	329.9	-6.6	335.2	-22.1	344.8	-30.3	361.3	
8450	2	318.4	0.0	321.3	0.0	326.5	-0.3	335.8	-0.6	351.9	
8451	3	315.3	0.0	318.2	0.0	323.3	0.0	332.6	0.0	348.4	
8452 8453	4 5	316.6 326.0	0.0 0.0	319.4 329.0	0.0 0.0	324.6 334.3	0.0 0.0	333.9 343.9	0.0 0.0	349.9 360.3	
8453	6	348.9	0.0	352.1	0.0	357.8	0.0	368.0	0.0	385.6	
8455	7	386.2	0.0	389.7	0.0	396.1	0.0	407.4	0.0	426.8	
8456	8	405.2	0.0	408.9	0.0	415.5	0.0	427.4	0.0	447.8	
8457	9	406.7	0.0	410.4	0.0	417.1	0.0	429.0	0.0	449.5	
8458 8459	10 11	401.9 397.7	0.0 0.0	405.5 401.3	0.0 0.0	412.1 407.8	0.0 0.0	423.9 419.5	0.0 0.0	444.2 439.5	
8460	12	393.9	0.0	397.5	0.0	403.9	0.0	415.5	0.0	435.3	
8461	13	389.5	0.0	393.0	0.0	399.4	0.0	410.8	0.0	430.4	
8462	14	386.5	0.0	390.0	0.0	396.3	0.0	407.7	0.0	427.1	
8463	15 16	382.2	0.0	385.7	0.0 0.0	391.9	0.0 0.0	403.2	0.0	422.4	
8464 8465	10	384.2 408.1	0.0 3.0	387.8 411.8	4.7	394.0 418.5	0.0	405.3 430.5	0.0 18.5	424.7 451.1	
8466	18	447.0	3.0	451.1	4.7	458.4	11.6	471.5	18.5	494.1	
8467	19	448.1	3.0	452.2	4.7	459.5	11.6	472.7	18.5	495.2	25.5
8468	20	441.3	3.0	445.4	4.7	452.6	11.6	465.5	18.5	487.8	
8469	21	430.8	3.0	434.7	4.7	441.7	11.6	454.4	18.5	476.1	
8470 8471	22 23	408.1 374.6	3.0 -0.7	411.8 378.0	4.7 -6.6	418.5 384.2	11.6 -22.1	430.4 395.2	18.5 -31.6	451.0 414.0	
8472	24	344.7	-0.7	347.8	-6.6	353.5	-22.1	363.6	-31.6	381.0	
		448.1 MW	3.0 MW	452.2 MW	4.7 MW	459.5 MW	11.6 MW	472.7 MW	18.5 MW	495.2 MW	25.5 MW
s	Spring/Fall	202	21	20	25	20	30	20	35	20	040
	09/15	Base Load (MW)	Total Deferral Available	Base Load (MW)	Total Deferral Available	Base Load (MW)	Total Deferral Available	Base Load (MW)	Total Deferral Available	Base Load (MW)	Total Deferral Available
6169	1	313.1	0.0	315.9	0.0	321.0	0.0	330.2		346.0	0.0
6170	2	298.0	0.0	300.8	0.0	305.6	0.0	314.4	0.0	329.4	
6171 6172	3 4	289.5 284.7	0.0 0.0	292.1 287.3	0.0 0.0	296.9 291.9	0.0 0.0	305.4 300.3	0.0 0.0	320.0 314.6	
6172	4 5	286.6	0.0	289.2	0.0	291.9	0.0	302.3	0.0	314.0	
6174	6	302.0	0.0	304.8	0.0	309.7	0.0	318.6	0.0	333.8	
6175	7	331.5	0.0	334.5	0.0	340.0	0.0	349.7	0.0	366.4	
6176	8	349.7	0.0	352.9	0.0	358.7	0.0	368.9	0.0	386.5	
6177	9 10	370.4	0.0 0.0	373.8	0.0 0.0	379.8	0.0 0.0	390.7	0.0	409.4	
6178 6179	10	391.3 410.7	0.0	394.9 414.4	0.0	401.3 421.2	0.0	412.8 433.2	0.0 0.0	432.5 453.9	
6180	12	426.4	0.0	430.3	0.0	437.2	0.0	449.8	0.0	471.2	
6181	13	441.4	0.0	445.5	0.0	452.7	0.0	465.6	0.0	487.9	0.0
6182	14	457.2	0.0	461.4	0.0	468.8	0.0	482.2	0.0	505.3	
6183 6184	15 16	471.3 479.5	3.0 3.0	475.6 483.9	4.7 4.7	483.3 491.8	11.6 11.6	497.2 505.8	18.5 18.5	520.9 530.0	
6185	10	482.9	3.0	487.4	4.7	491.0	11.6	509.4	18.5	533.8	
6186	18	475.4	3.0	479.7	4.7	487.5	11.6	501.4	18.5	525.4	
6187	19	451.8	3.0	455.9	4.7	463.3	11.6	476.5	18.5	499.3	
6188	20	444.8	3.0	448.9	4.7	456.2	11.6	469.2	18.5	491.6	
6189	21 22	427.0	-0.7	430.9	-6.6 -6.6	437.9	-22.1 -22.1	450.4 414.0	-31.6	471.9	
6190 6191	22	392.5 354.1	-0.7 -0.7	396.1 357.3	-0.0 -6.6	402.5 363.1	-22.1	414.0 373.5	-31.6 -30.3	433.8 391.4	
6192	20	319.9	0.0	322.8	0.0	328.1	-0.3	337.5	-0.6	353.6	i -1.8
	ļ	482.9 MW	3.0 MW	487.4 MW	4.7 MW	495.2 MW	11.6 MW	509.4 MW	18.5 MW	533.8 MW	25.5 MW
_	Summer	202 Base Load		20	25 Total Deferral		30 Total Deferral	20 Base Load	35 Total Deferral		040 Total Deferral
	07/10	(MW)	Total Deferral Available	Base Load (MW)	Available	Base Load (MW)	Available	(MW)	Available	Base Load (MW)	Available
4561	1	350.3	0.0	353.5	0.0	359.2	0.0	369.5		387.1	
4562 4563	2 3	327.3 314.6	0.0 0.0	330.3 317.5	0.0 0.0	335.6 322.6	0.0 0.0	345.2 331.9	0.0 0.0	361.7 347.7	
4564	4	308.1	0.0	310.9	0.0	316.0	0.0	325.0	0.0	340.5	
4565	5	312.0	0.0	314.8	0.0	319.9	0.0	329.1	0.0	344.8	0.0
4566	6	323.5	0.0	326.4	0.0	331.7	0.0	341.2	0.0	357.5	0.0
4567	7	342.0	0.0	345.1	0.0	350.7	0.0	360.8		378.0	
4568	8	375.8	0.0	379.2	0.0	385.3	0.0	396.4	0.0	415.3	
4569 4570	9 10	414.2 455.7	0.0 0.0	418.0 459.8	0.0 0.0	424.7 467.3	0.0 0.0	436.9 480.6	0.0 0.0	457.7 503.6	
4570	10	494.4	0.0	498.9	0.0	507.0	0.0	521.5	0.0	546.4	
	12	535.6	0.0	540.5	0.0	549.2	0.0	564.9	0.0	591.9	0.0
4572	10	566.6	0.0	571.7	0.0	581.0	0.0	597.6	0.0	626.2	
4572 4573	13		3.6	599.3	9.5	609.0	25.0	626.4	34.5	656.4	42.2
4572 4573 4574	14	593.9				632.4	25.0	650.5	34.5	681.6	42.2
4572 4573 4574 4575	14 15	616.7	3.6	622.3 614.0	9.5 9.5		25.0	644.0	94 F	670 5	
4572 4573 4574 4575 4576	14 15 16	616.7 608.5	3.6 3.6	614.0	9.5	624.0	25.0 25.0	641.9 615.7	34.5 34.5	672.5 645.1	
4572 4573 4574 4575	14 15	616.7	3.6				25.0 25.0 25.0	641.9 615.7 608.2	34.5	672.5 645.1 637.3	42.2 42.2
4572 4573 4574 4575 4576 4577 4578 4579	14 15 16 17 18 19	616.7 608.5 583.7 576.6 567.3	3.6 3.6 3.6 3.6 3.6 3.6	614.0 589.0 581.8 572.5	9.5 9.5 9.5 9.5	624.0 598.5 591.3 581.8	25.0 25.0 25.0	615.7 608.2 598.4	34.5 34.5 34.5	645.1 637.3 627.0	42.2 42.2 42.2
4572 4573 4574 4575 4576 4577 4578 4579 4580	14 15 16 17 18 19 20	616.7 608.5 583.7 576.6 567.3 543.1	3.6 3.6 3.6 3.6 3.6 -0.7	614.0 589.0 581.8 572.5 548.0	9.5 9.5 9.5 9.5 -6.6	624.0 598.5 591.3 581.8 556.9	25.0 25.0 25.0 -22.1	615.7 608.2 598.4 572.8	34.5 34.5 34.5 -31.6	645.1 637.3 627.0 600.2	42.2 42.2 42.2 42.2 -39.3
4572 4573 4574 4575 4576 4577 4578 4579 4580 4580	14 15 16 17 18 19 20 21	616.7 608.5 583.7 576.6 567.3 543.1 527.1	3.6 3.6 3.6 3.6 3.6 -0.7 -0.7	614.0 589.0 581.8 572.5 548.0 531.9	9.5 9.5 9.5 9.5 -6.6 -6.6	624.0 598.5 591.3 581.8 556.9 540.5	25.0 25.0 25.0 -22.1 -22.1	615.7 608.2 598.4 572.8 556.0	34.5 34.5 34.5 -31.6 -31.6	645.1 637.3 627.0 600.2 582.5	42.2 42.2 42.2 -39.3 -39.3
4572 4573 4574 4575 4576 4577 4578 4579 4580 4580 4581 4582	14 15 16 17 18 19 20 21 22	616.7 608.5 583.7 576.6 567.3 543.1 527.1 499.0	3.6 3.6 3.6 3.6 -0.7 -0.7 -0.7	614.0 589.0 581.8 572.5 548.0 531.9 503.5	9.5 9.5 9.5 -6.6 -6.6 -6.6	624.0 598.5 591.3 581.8 556.9 540.5 511.7	25.0 25.0 -22.1 -22.1 -22.1	615.7 608.2 598.4 572.8 556.0 526.3	34.5 34.5 34.5 -31.6 -31.6 -30.3	645.1 637.3 627.0 600.2 582.5 551.5	42.2 42.2 42.2 42.2 -39.3 -39.3 -39.3 -34.0
4572 4573 4574 4575 4576 4577 4578 4579 4580 4580	14 15 16 17 18 19 20 21	616.7 608.5 583.7 576.6 567.3 543.1 527.1	3.6 3.6 3.6 3.6 3.6 -0.7 -0.7	614.0 589.0 581.8 572.5 548.0 531.9	9.5 9.5 9.5 9.5 -6.6 -6.6	624.0 598.5 591.3 581.8 556.9 540.5	25.0 25.0 25.0 -22.1 -22.1	615.7 608.2 598.4 572.8 556.0	34.5 34.5 34.5 -31.6 -31.6	645.1 637.3 627.0 600.2 582.5	42.2 42.2 42.2 -39.3 -39.3 -39.3 -34.0 -1.8

DR.Hourly.High: Demand Response High Avoided Cost Scenario Results

	Winter	202	21	202	25	203	30	203	35	20	40
Peak Hours	12/19	Base Load (MW)	Load w/DR Curtailment	Base Load (MW)	Load w/DR Curtailment	Base Load (MW)	Load w/DR Curtailment	Base Load (MW)	Load w/DR Curtailment	Base Load (MW)	Load w/DR Curtailment
20	1	327	S28	330	S36	335	S57	345	375	361	Surtaiment 395
22	2	318	318	321	321	326	327	336	336	352	354
24 23	3	315 317	315 317	318 319	318 319	323 325	323 325	333 334	333 334	348 350	348 350
21	5	326	326	329	329	334	334	344	344	360	360
18	6	349	349	352	352	358	358	368	368	386	386
14	7	386 405	386 405	390 409	390 409	396 416	396 416	407 427	407 427	427 448	427 448
7	9	407	407	410	410	417	417	429	429	450	450
9	10	402	402	406	406	412	412	424	424	444	444
10 11	11 12	398 394	398 394	401 397	401 397	408 404	408 404	419 415	419 415	439 435	439 435
12	13	389	389	393	393	399	399	411	411	430	430
13 16	14 15	386 382	386 382	390 386	390 386	396 392	396 392	408 403	408 403	427 422	427 422
15	16	384	384	388	388	394	394	405	400	425	425
5	17	408	405	412	407	419	407	430	412	451	426
2	18 19	447 448	444 445	451 452	446 447	458 460	447 448	472 473	453 454	494 495	469 470
3	20	441	438	445	441	453	441	466	447	488	462
4	21	431	428	435	430	442	430	454	436	476	451
6 17	22 23	408 375	405 375	412 378	407 385	418 384	407 406	430 395	412 427	451 414	425 453
19	24	345	345	348	354	353	376	364	395	381	420
s	Spring/Fall	202	21	202	25	203	30	203	35	20	40
Peak Hours	09/15	Base Load	Load w/DR	Base Load	Load w/DR	Base Load	Load w/DR	Base Load	Load w/DR	Base Load	Load w/DR Curtailment
19	1	(MW) 313	Curtailment 313	(MW) 316	Curtailment 316	(MW) 321	Curtailment 321	(MW) 330	Curtailment 330	(MW) 346	346
21	2	298	298	301	301	306	306	314	314	329	329
22 24	3 4	290 285	290 285	292 287	292 287	297 292	297 292	305 300	305 300	320 315	320 315
23	5	287	287	289	289	294	294	302	302	317	317
20	6 7	302	302	305	305	310	310	319	319	334	334
17	8	332 350	332 350	335 353	335 353	340 359	340 359	350 369	350 369	366 387	366 387
14	9	370	370	374	374	380	380	391	391	409	409
13	10 11	391 411	391 411	395 414	395 414	401 421	401 421	413 433	413 433	433 454	433 454
10	12	411	411	414	414	421	437	450	433	434 471	404
8	13	441	441	445	445	453	453	466	466	488	488
5	14 15	457 471	457 468	461 476	461 471	469 483	469 472	482 497	482 479	505 521	505 495
2	16	480	476	484	479	492	480	506	487	530	504
1	17	483	480	487	483	495	484	509	491	534	508
3	18 19	475 452	472 449	480 456	475 451	487 463	476 452	501 477	483 458	525 499	500 474
7	20	445	442	449	444	456	445	469	451	492	466
9	21	427	428	431	438	438	460	450	482	472	511
12 15	22 23	392 354	393 355	396 357	403 364	402 363	425 385	414 374	446 404	434 391	473 425
18	24	320	320	323	323	328	328	337	338	354	355
	Summer	202	21	202	25	203	30	203	35	20	40
Peak Hours	07/10	Base Load (MW)	Load w/DR Curtailment	Base Load (MW)	Load w/DR Curtailment	Base Load (MW)	Load w/DR Curtailment	Base Load (MW)	Load w/DR Curtailment	Base Load (MW)	Load w/DR Curtailment
18	1	350	350	353	353	359	359	369	369	387	387
20 22	2 3	327 315	327 315	330 317	330 317	336 323	336 323	345 332	345 332	362 348	362 348
24	4	308	308	311	311	316	316	325	325	341	341
23	5	312	312	315	315	320 332	320 332	329	329	345	345 357
21 19	6 7	323 342	323 342	326 345	326 345	332 351	332 351	341 361	341 361	357 378	357 378
17	8	376	376	379	379	385	385	396	396	415	415
15	9 10	414	414	418	418	425	425	437	437	458	458
13 12	10 11	456 494	456 494	460 499	460 499	467 507	467 507	481 522	481 522	504 546	504 546
9	12	536	536	540	540	549	549	565	565	592	592
7	13 14	567 594	567 590	572 599	572 590	581 609	581 584	598 626	598 592	626 656	626 614
1	14	594 617	590 613	599 622	590 613	609 632	584 607	626	592 616	656 682	614
2	16	608	605	614	605	624	599	642	607	673	630
4	17	584 577	580 573	589 582	579 572	599 591	574 566	616 608	581 574	645 637	603 595
5	18	577 567	573 564	582 573	572	591	566	608 598	574 564	637 627	595
5	19			÷. •							
5 6 8	20	543	544	548	555	557	579	573	604	600	639
5 6 8 10	20 21	543 527	528	532	538	540	563	556	588	583	622
5 6 8	20	543				557 540 512 457					639 622 585 494 438