NP

VOLUME 5

DEMAND-SIDE RESOURCE ANALYSIS

THE EMPIRE DISTRICT ELECTRIC COMPANY D/B/A LIBERTY ("LIBERTY-EMPIRE")

4 CSR 240-22.050

FILE NO. EO-2024-0280

April 1, 2025

20 CSR 4240-2.135(2)(A)5

****Denotes Confidential****

TABLE OF CONTENTS

TABLE OF TABLES

TABLE OF FIGURES

TABLE OF RULE REQUIREMENTS

4 CSR 240-22.050 DEMAND-SIDE RESOURCE ANALYSIS

DEMAND-SIDE RESOURCE ANALYSIS

4 CSR 240-22.050

PURPOSE: This rule specifies the principles by which potential demand-side resource options shall be developed and analyzed for cost effectiveness, with the goal of achieving all cost effective demand-side savings. It also requires the selection of demand-side candidate resource options that are passed on to integrated resource analysis in 4 CSR 240-22.060 and an assessment of their maximum achievable potentials, technical potentials, and realistic achievable potentials.

SECTION 1 POTENTIAL DEMAND-SIDE RESOURCES

(1) The utility shall identify a set of potential demand-side resources from which demand-side candidate resource options will be identified for the purposes of developing the alternative resource plans required by 4 CSR 240-22.060(3). A potential demand-side resource consists of a demand-side program designed to deliver one (1) or more energy efficiency and energy management measures or a demand-side rate. The utility shall select the set of potential demand-side resources and describe and document its selection—

1.1 Describe and Document Selections

(A) To provide broad coverage of–

1. Appropriate market segments within each major class;

Liberty-Empire engaged Applied Energy Group ("AEG") to conduct a Demand-Side Management ("DSM") Potential Study to assess the future potential for savings through its programs and to identify refinements that will enhance savings.

The first step in the analysis was to assess Liberty-Empire's service territory. The market assessment defined the market segments (building types, end uses, and other

dimensions) relevant to the Liberty-Empire service territory. The segmentation scheme for this project is described in the table below.

Table 5-1 – Overview of Liberty-Empire Analysis Segmentation Scheme

Dimension	Segmentation Variable	Description
1	Sector	Residential, Commercial, Industrial
2	Segment	***Residential:*** Single Family, Multifamily, Single Family Low Income, and Multifamily Low Income ***Commercial:*** Office, retail, college, school, grocery, hospital, other health, lodging, restaurant, warehouse, and miscellaneous ***Industrial:*** Key industrial segments and other/misc.
3	Vintage	Existing and new construction
4	End use	Cooling, Space Heating, Lighting, Water Heating, Motors, etc. (as appropriate by sector)
5	Appliances/end uses and technologies	Technologies such as lamp type, HVAC equipment, appliance type, etc.
6	Equipment efficiency levels for new purchases	Baseline and higher-efficiency options as appropriate for each technology

With the segmentation scheme defined, AEG then performed a high-level market characterization of electricity sales in the base period. AEG used detailed Liberty-Empire billing and customer data with minimal augmentation from secondary sources to allocate energy use and customers to the various sectors and segments such that the total customer count and energy consumption matched the statements of revenue provided by Liberty-Empire. In C&I, opt-out customers were included in the baseline forecast but excluded from the estimation of energy efficiency potential. This information provided control totals at a sector level for calibrating AEG's VisionLoadMAP model to known data for the base-year.

The total number of households and electricity sales for the service territory were obtained from Liberty-Empire's customer database; characterization of the residential electric market is shown in Figure 5-1 and Table 5-2.

Figure 5-1 – Residential Electricity Use by Segment (2023)

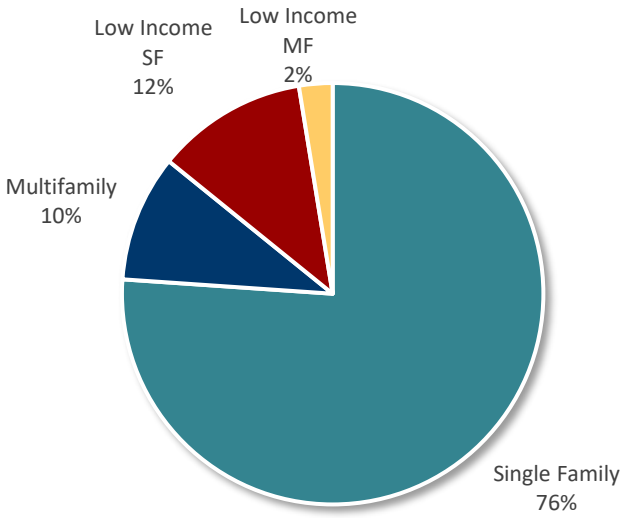


Table 5-2 – Residential Market Characterization (2023)

Segment	Households	Electric Use (GWh)	Annual Use/Customer (kWh/HH)
Single Family	105,299	1,309	12,433
Multi Family	21,571	168	7,768
Low Income Single Family	17,807	200	11,211
Low Income Multi Family	6,527	44	6,776
Total	**151,204**	**1,721**	**11,380**

AEG utilized commercial and industrial customer billing data and secondary sources to characterize the commercial sector, shown in Figure 5-2 and Table 5-3, and the industrial sector, shown in Figure 5-3 and Table 5-4. The base-year characterization includes commercial and industrial customers that opt-out of Liberty-Empire's DSM tariff. However, these opt-out customers are removed from the estimation of energy efficiency potential because they have elected not to participate in Liberty's programs. Specific municipalities projected to discontinue service with Liberty-Empire were removed from both the baseline and the potential.

Figure 5-2 – Commercial Electricity Use by Segment (2023)

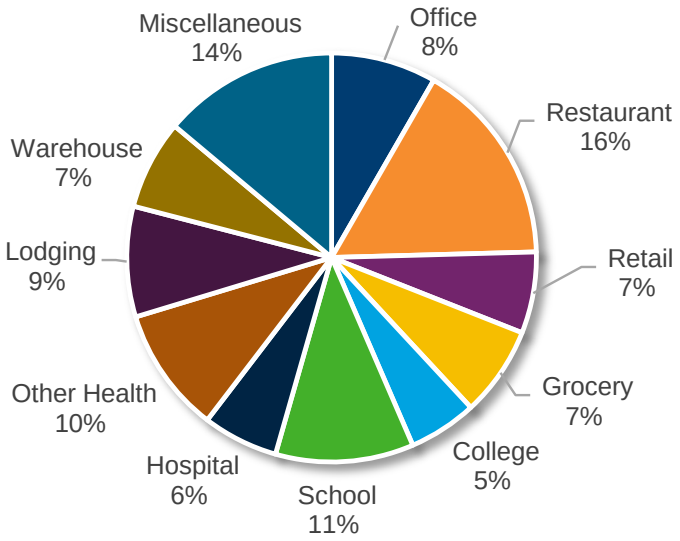


Table 5-3 – Commercial Market Characterization (2023)

Segment	Electricity Sales (GWh)	Intensity (Annual kWh/SqFt)	Floor Space (Million SqFt)
Office	117	12.68	9.2
Restaurant	228	21.13	10.8
Retail	90	46.50	1.9
Grocery	100	62.78	1.6
College	76	11.43	6.7
School	153	6.57	23.3
Hospital	84	31.65	2.6
Other Health	140	18.15	7.7
Lodging	123	17.15	7.2
Warehouse	99	5.57	17.9
Miscellaneous	195	8.43	23.1
Total	**1,406**	**12.55**	**112.0**

Figure 5-3 – Industrial Electricity Use by Segment (2023)

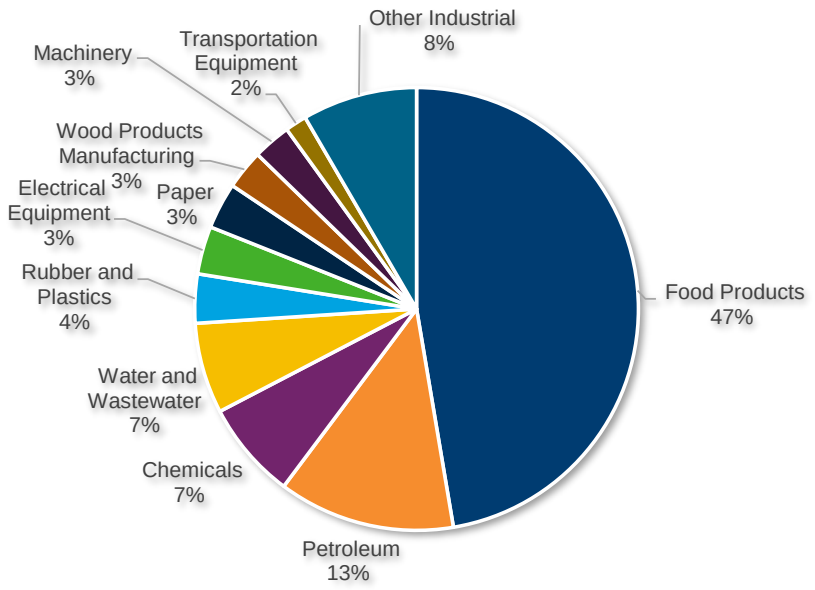


Table 5-4 – Industrial Market Characterization (2023)

Segment	Electricity Sales (GWh)	Intensity (Annual kWh/Employee)	Employees
Food Products	434	39,267	11,059
Petroleum	118	31,070	3,800
Chemicals	65	57,803	1,131
Water and Wastewater	61	19,703	3,081
Rubber and Plastics	33	98,264	334
Electrical Equipment	32	102,394	313
Paper	31	78,813	392
Wood Products Manufacturing	26	108,533	243
Machinery	25	32,548	780
Transportation Equipment	14	32,810	440
Other Industrial	77	28,941	2,655
Total	**917**	**37,858**	**24,228**

2. All significant decision makers – including those who choose building design features and thermal integrity levels, equipment and appliance efficiency levels, and utilization levels of the energy-using capital stock – and

Liberty-Empire's energy efficiency personnel regularly interface and communicate with a variety of trade allies, Community Action Program ("CAP") agencies, implementation contractors, consulting, evaluation, marketers, regulatory stakeholders, and customers

from all classes. Decision makers are involved in all matters related to Liberty-Empire's active portfolios of residential, commercial, and industrial energy efficiency programs in Arkansas and Missouri. The table below represents an exhaustive list of entities with which Liberty-Empire interacts regarding demand-side issues. Representatives from these entities are potential decision-makers as defined by the IRP Regulatory Stakeholder Group.

Table 5-5 – List of Primary Liberty-Empire Demand-Side Decision Makers

Category	Group
Customers	Current and Prospective Residential Electric Customers
	Current and Prospective Commercial Electric Customers
	Current and Prospective Industrial Electric Customers
	Current and Prospective Residential Gas Customers
	Current and Prospective Commercial Gas Customers
	Current and Prospective Industrial Gas Customers
	Current and Prospective Residential Solar Customers
	Current and Prospective Commercial Solar Customers
	Current and Prospective Industrial Solar Customers
	Current and Prospective Residential Landlords/Property Owners
	Current and Prospective Commercial Landlords/Property Owners
	Large Commercial and Industrial Customers Requesting "Opt-Out"
	Large Commercial and Industrial Customers with Curtailment Contracts
	Large Commercial and Industrial Customers For Voluntary Curtailments
Regulatory and/or Governmental Stakeholders	Missouri Public Service Commission Staff
	Missouri Office of the Public Counsel
	Missouri Department of Economic Development-Division of Energy
	Missouri-based Environmental Advocates
	Missouri-based Customer Advocates
	Arkansas Public Service Commission Staff
	The Arkansas Energy Office
	Arkansas Community Action Agency Association
	The office of the Arkansas Attorney General
	Arkansas-based Environmental Advocates
	Kansas Public Service Commission Staff
	Oklahoma Public Service Commission Staff
	Municipal Governments advocating for Liberty-Empire Retail Customers
	Municipal Governments advocating for Liberty-Empire Wholesale Customers
	Contracted Consultants of any of the above agencies
	Outside/Contracted Legal Counsel of any of the above agencies

Category	Group
	Peer Investor-Owned Electric and Gas Utilities
	Peer Rural Electric Cooperatives
	Peer Rural Electric Cooperative Associations
	Peer Municipal Utility Companies
Contractors	Implementation Contractors
	Evaluation, Measurement, & Verification Contractors
	Energy Efficiency Program Design Contractors
	Consulting Contractors for Energy Efficiency
	Marketing Contractors
	Product Vendors for DSM and Solar Programs
	Outside/Contracted Legal Counsel for Regulatory Support
Trade Allies	Residential and Commercial Building Contractors
	Residential and Commercial Energy Raters
	Residential and Commercial Energy Auditors
	Non-Profit/Public Commercial and Industrial Energy Auditors
	Residential and Commercial HVAC Contractors
	Residential and Commercial Plumbing Contractors (Gas)
	Commercial Lighting Vendors
	Residential and Commercial Solar Contractors
	Local/Regional Homeowner's Associations
	Local/Regional Real Estate Agents
Community Action Agencies	Economic Security Corporation (of SW Missouri)
	Ozarks Area Community Action Corporation
	West Central Community Action Agency
	Community Services, Inc. of Northwest Missouri
	Green Hills Community Action Agency
	Missouri Valley Community Action Agency
	The Office of Human Concern (of NW Arkansas)
	Central Arkansas Development Council
Other	Potential other stakeholder groups as appropriate

3. All major end uses, including at least the end uses which are to be considered in the utility's load analysis as listed in 4 CSR 240-22.030(4)(A)1.;

AEG analyzed potential demand-side resources for all major end uses, as identified by Liberty-Empire's 2021 Market Research and secondary sources. The major end uses considered include:

- Residential sector: cooling, space heating, water heating, interior lighting, exterior lighting, appliances, electronics, and miscellaneous.
- Non-Residential sector: space cooling, space heat, ventilation, water heating, refrigeration, interior and exterior lighting, office equipment, food preparation, motors, process, and miscellaneous.[1]

Using the market segmentation and sector-level control totals presented in Section 1.1(A).1, AEG developed base-year consumption estimates for each end use within each segment. AEG developed this end use characterization using results of Liberty-Empire's 2021 Market Research Study, data from Itron's load forecast, and secondary sources (e.g., the Energy Information Administration's stock assessments and Annual Energy Outlook), as detailed in Section 2. The base-year distribution of each sector's load by end use is below.

Residential Sector

Figure 5-4 and Figure 5-5 show the average distribution of annual electricity use and winter peak demand by end use for all residential customers.

[1] CHP is analyzed as a supply-side resource.

Figure 5-4 – Residential Electricity Use by End Use (2023)

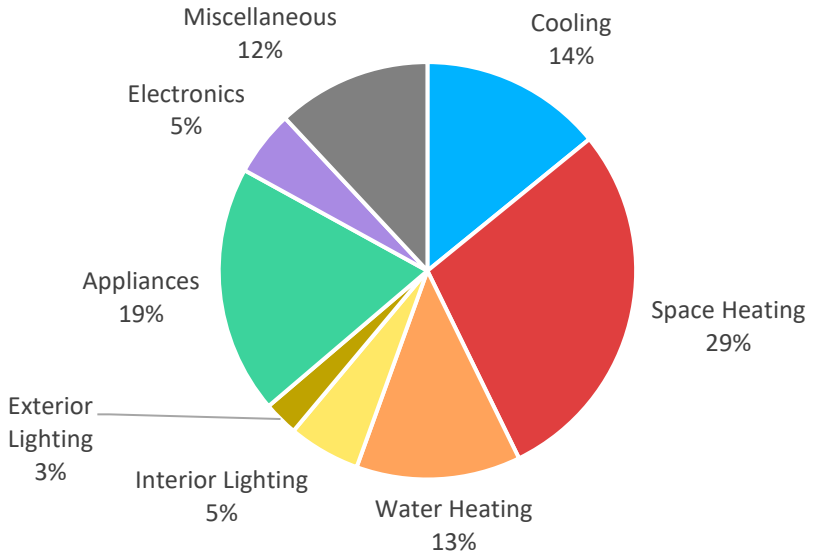


Figure 5-5 – Residential Electricity Winter Peak Demand by End Use (2023)

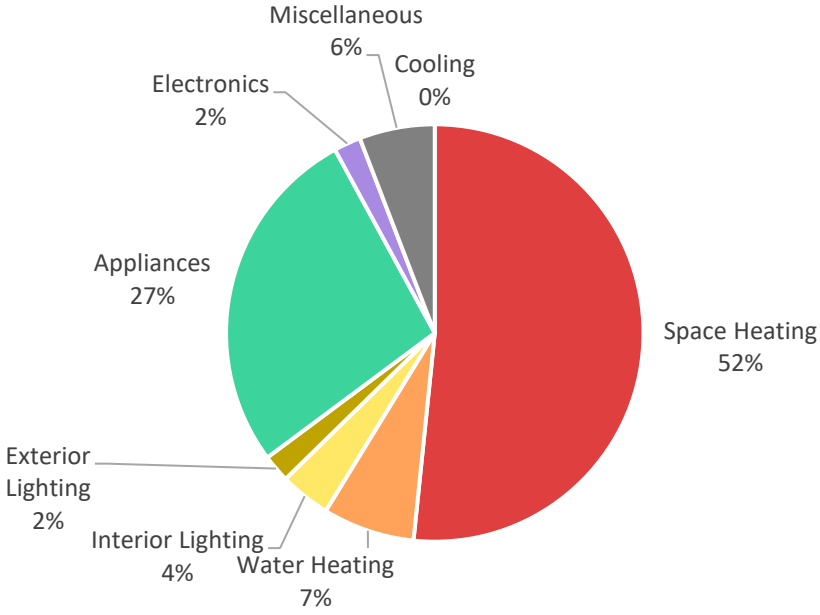
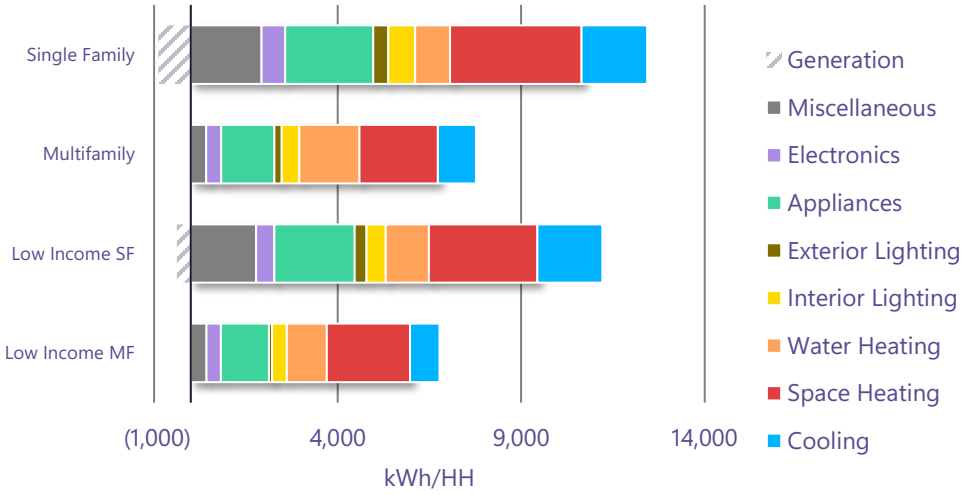


Figure 5-6 presents the electricity intensities (kWh per household) by end use, housing type, and income level.

Figure 5-6 – Residential Intensity by End Use and Segment (2023) (Annual kWh/HH)



Commercial Sector

Figure 5-7 presents the distribution of annual electricity consumption by end use, and Figure 5-8 shows peak winter demand by end use for the commercial sector.

Figure 5-7 – Commercial Sector Electricity Consumption by End Use (2023)

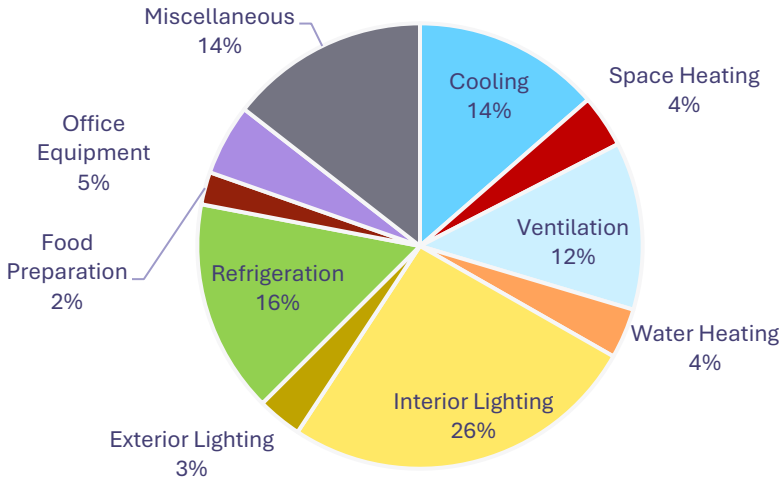
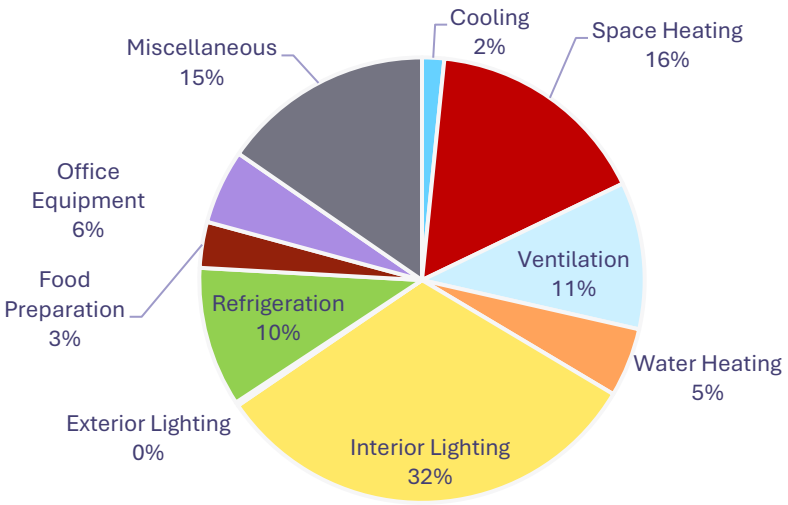


Figure 5-8 – Commercial Sector Electricity Peak Winter Demand by End Use (2023)



Industrial Sector

Figure 5-9 presents the distribution of annual electricity consumption by end use, and Figure 5-10 shows peak winter demand by end use for the industrial sector.

Figure 5-9 – Industrial Sector Electricity Consumption by End Use (2023)

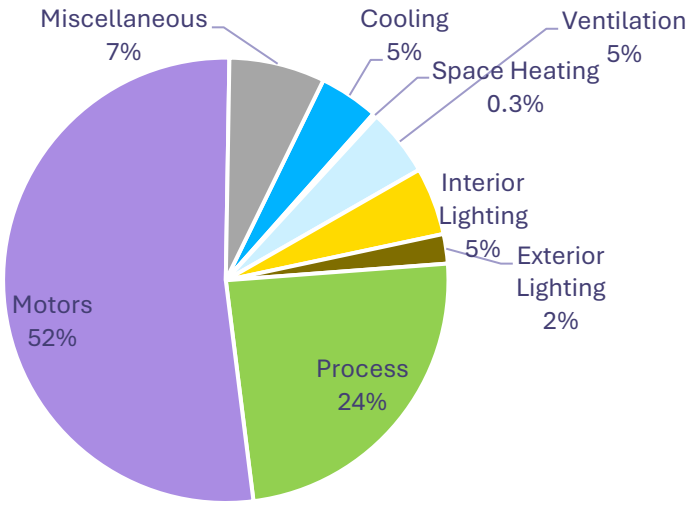
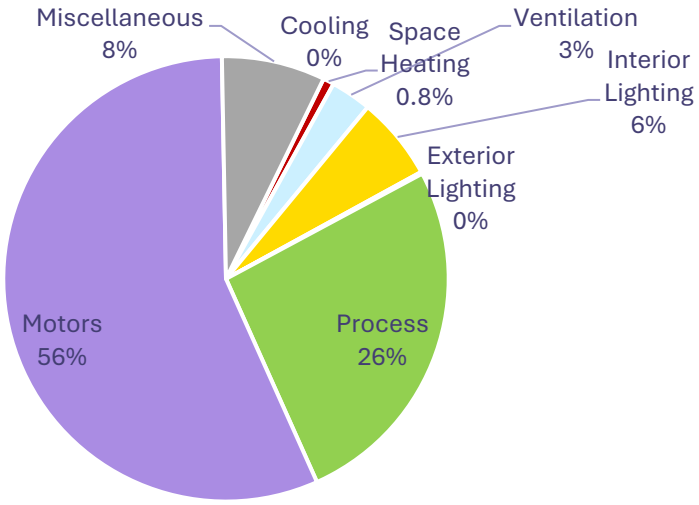


Figure 5-10 – Industrial Sector Electricity Peak Winter Demand by End Use (2023)



1.2 Designing Effective Potential Demand-Side Programs

(B) To fulfill the goal of achieving all cost effective demand-side savings, the utility shall design highly effective potential demand-side programs consistent with subsection (1)(A) that broadly cover the full spectrum of cost effective end-use measures for all customer market segments;

AEG developed IRP bundles using a bottom-up approach incorporating measure and participation data from the DSM Potential Study. Cost-effective measures in the DSM Potential Study were included in the economic and achievable potential. The DSM Potential Study measure-level maximum achievable potential ("MAP") and realistic achievable potential ("RAP") results were vetted for inclusion in a DSM bundle and added to bundles as they became cost-effective throughout the timeframe.

General considerations when translating the measure-level potential to bundle design included:

- May include multiple efficiency levels for a specific technology throughout the projection.
- May exclude measures that have minimal potential or have implementation challenges.

- Addition of administrative, marketing, and evaluation costs may render certain measures or bundles not cost-effective.
- Net to gross rates impact savings.

Measures were bundled based on the end-use, sector, and implementation strategy. Incentive and non-incentive costs were assigned to bundles, and bundles were rescreened for cost-effectiveness. The proposed bundles for the 20-year time period, from 2027 to 2047, are described in Table 5-6.

The proposed bundle design delivers an effective and balanced portfolio of energy and peak demand savings opportunities. Each bundle was designed to leverage the mix of best-practice measures and technologies, delivery strategies, and target markets in order to most effectively deliver bundles and measures to Liberty-Empire customers.

Liberty-Empire's bundle portfolio uses a combination of education and customer incentives to advance energy efficiency in Missouri. Customer incentives are the primary mechanism for bundle delivery. Customers receive rebates to purchase energy efficient equipment and services through existing market actors, including equipment dealers and retailers.

Table 5-6 – Proposed DSM Bundle Descriptions

Bundle	Description
Energy Efficiency	
Residential Prescriptive	Rebates to purchase and install qualifying ductless mini-split heat pumps, appliances, and connected thermostats. Enhanced incentives will be available for income-eligible customers.
Income Eligible Lighting	Qualifying general lighting will be offered to income-eligible customers.
Commercial Prescriptive	Rebates to commercial customers for the purchase and installation of qualifying prescriptive energy efficient equipment.
Commercial Custom	Rebates to commercial customers for the purchase and installation of energy efficient equipment that doesn't qualify for a prescriptive rebate and has a TRC benefit-cost ratio of at least 1.0.
Small Business Direct Install	Small commercial customers receive an energy evaluation identifying potential energy savings. Customers are then eligible to receive an incentive, direct installation of measures, and a customized recommendation of efficiency upgrades.
Demand Response	

Battery Storage Direct Load Control (DLC)	Peak shifting of loads using stored electrochemical energy for qualifying residential and commercial customers.
Smart Thermostats DLC – Heating	Internet-enabled control of thermostat set points for qualifying residential and commercial customers.
Grid-Interactive Water Heater	Internet-enabled control of water heater equipment for qualifying residential and commercial customers.
Smart Appliances DLC	DLC switch installed on customer's equipment for qualifying residential customers.
Curtailment – Firm	Commercial customers enact their customized, mandatory curtailment plan. Penalties apply for non-performance.
Curtailment - Non-Firm	Commercial customers enact their customized, mandatory curtailment plan. No penalties apply for non-performance.
Demand-Side Rates	
Critical Peak Pricing	Residential and commercial customers pay higher peak period prices during a critical peak event day and pay a discounted off-peak price for the remainder of the year.
Time-of-Use Opt-Out	Residential and commercial customers pay a higher price during the designated peak period and lower prices during off-peak periods.

AEG developed two DSM scenarios for consideration during the integration phase of Liberty-Empire's IRP process to determine which DSM portfolio was the optimal decision based on Liberty-Empire's supply options.

- RAP Scenario – DSM Potential Study RAP participation. Incentives vary from 50% to 100% of incremental costs, depending on the bundle and customer segment.
- MAP Scenario – DSM Potential Study MAP participation. As with the RAP Scenario, incentives vary from 50% to 100% of incremental costs, depending on the bundle and customer segment.

The final step was to develop inputs that would represent the demand side resources available to Liberty-Empire in the 2025 IRP filing. Programs were assigned to $/kWh bundles based on the averages of the program's $/kWh saved for 2027 - 2031.

- Low $/kWh ($0.20 < $0.40/kWh): Commercial Prescriptive and Commercial Custom
- Mid $/kWh ($0.40 < $0.55/kWh): Residential Prescriptive
- High $/kWh ([3]$0.55/kWh): Income Eligible Lighting and Small Business Direct Install
- Demand Side Rates / Demand Response

1.3 Demand-Side Rates

(C) To include demand-side rates for all customer market segments;

AEG assessed the three most common demand side rate options for the Liberty-Empire service territory across different customer segments.

- **Time-of-Use**. Customers pay a higher price during the designated peak period and lower prices during off-peak periods. The designated peak and off-peak periods are typically defined by the season, day, and time of day. Requires an interval meter.
- **Critical Peak Price**. Customers pay higher peak period prices during a critical peak event day and pay a discounted off-peak price for the remainder of the year. A critical peak event day occurs multiple times a year and is typically called a day in advance when wholesale prices are forecasted to be highest. Requires an interval meter.
- **Real Time Pricing**. Customers pay for energy at a rate that is linked to the hourly market price for electricity. Depending on their size, participants are typically made aware of the hourly prices on either a day-ahead or hour-ahead basis. Typically, only the largest customers — above one megawatt of load — face hour-ahead prices. Requires an interval meter.

The table below presents the eligible customer classes for the demand-side rates analyzed, briefly indicates the load control mechanism, and lists the associated reliability. Liberty-Empire introduced a TOU rate option called Time Choice Plus to Residential and C&I customers in 2022, though the other program options are not currently offered by Liberty-Empire.[2]

[2] Liberty-Empire rolled out a Time Choice Rate Program as an opt-out rate in 2022. This program offers a "Plus" option to a limited number of customers (500 residential and 200 general service customers). The Time Choice Plus program resembles a typical TOU program which AEG used as a starting point for the TOU opt-in program potential.

Table 5-7 – Demand Side Rate Options

Program Option	Eligibility	Mechanism	Reliability[3]
Time of use (TOU) Rates	All segments	Higher rate for the peak block of hours that occurs every day. Requires either on/off peak meters or AMI technology.	Non-firm
Critical Peak Pricing (CPP)	All segments	Much higher rate for the peak block of hours that occurs only on critical event days. Requires AMI technology.	Non-firm
Real-time Pricing (RTP)	Commercial, Industrial	Dynamic rate that fluctuates throughout the day based on hourly energy market prices. Requires AMI technology.	Non-firm

1.4 Multiple Designs

(D) To consider and assess multiple designs for demand-side programs and demand-side rates, selecting the optimal designs for implementation, and modifying them as necessary to enhance their performance; and

AEG considered multiple scenarios to investigate potential designs for demand-side programs and demand-side rates. See Section 1.2 above for information on the scenarios modeled.

1.5 Effects of Improved Technologies

(E) To include the effects of improved technologies expected over the planning horizon to—

Reduce or manage energy use; or improve the delivery of demand-side programs or demand-side rates.

AEG's analysis included "improved" or "emerging" technologies that are either available in the market but restricted by current market barriers (e.g., due to high cost or low supply) or that are not currently available but projected to come on the market during the planning period. The intent for including these technologies was to capture the effects of advancements in technology and potential reduction in technology costs. The assumptions for these technologies were based on currently available secondary

[3] Reliability refers to the customer's commitment to the specific program, it is not related to the technology that calls the events.

research. Table 5-8 below contains the measures that AEG classified as emerging technology options.

Table 5-8– Improved or Emerging Technologies

Sector	End Use	Technology	Measure Label
Residential	Cooling	Central AC	SEER 24.0 VRF | SEER2 22.8
Residential	Cooling	Room AC	CEER 16.0
Residential	Cooling	Room AC	CEER 22.0
Residential	Cooling	Portable AC	CEER 10.7
Residential	Cooling / Space Heating	Air-Source Heat Pump	SEER 24.0 / HSPF 13 | SEER2 22.8 / HSPF2 11.1
Residential	Cooling / Space Heating	Ductless Mini Split Heat Pump	SEER 30.0 / HSPF 14.0 | SEER2 30 / HSPF2 12.6
Residential	Water Heating	Water Heater (<= 55 Gal)	Heat Pump (UEF 3.75)
Residential	Water Heating	Water Heater (> 55 Gal)	Heat Pump (UEF 3.90)
Residential	Interior Lighting	General Service Lighting	LED 2035 (147 lm/W)
Residential	Interior Lighting	Linear Lighting	LED 2035 (152 lm/W system)
Residential	Interior Lighting	Exempted Lighting	LED 2035 (137 lm/W)
Residential	Exterior Lighting	General Service Lighting	LED 2035 (167 lm/W)
Residential	Appliances	Clothes Dryer	CEF(D2) 7.4 - Heat Pump
Residential	Appliances	Air Purifier	Highest-Efficiency Air Purifier (12.8 CADR/W)
Residential	Miscellaneous	Pool Heater	High-Efficiency Heat Pump
Residential	HVAC	Central System	Ducting - Repair and Sealing - Aerosol
Residential	HVAC	All	Building Shell - Whole-Home Aerosol Sealing
Residential	HVAC	All	Building Shell - Liquid-Applied Weather-Resistive Barrier
Residential	HVAC	All	Building Shell - High Reflectivity Roof
Residential	HVAC	All	Windows - High Efficiency (Triple Pane)
Residential	HVAC	Central System	Combination Heat Pump Water Heater/Space Heating
Residential	HVAC	All	HVAC - Energy Recovery Ventilator
Residential	All	All	Home Energy Management System (HEMS)
Residential	Appliances	Clothes Dryer	Laundry - Smart Dryer Sensor
Residential	All	All	Advanced New Construction Designs
Commercial	Cooling	Air-Cooled Chiller	COP 7.2 (0.49 kW/ton)
Commercial	Cooling	Air-Cooled Chiller	COP 7.8 (0.45 kW/ton)
Commercial	Cooling	Water-Cooled Chiller	COP 13.03 (0.27 kW/ton)
Commercial	Cooling	Water-Cooled Chiller	COP 14.07 (0.25 kW/ton)
Commercial	Cooling	RTU	IEER 23.3 - EIA High Efficiency
Commercial	Cooling / Space Heating	Air-Source Heat Pump	IEER 20.3 / COP 3.7 - EIA High Efficiency

Sector	End Use	Technology	Measure Label
Commercial	Cooling / Space Heating	Geothermal Heat Pump	EER 25 / COP 4.5 EIA High Efficiency
Commercial	Water Heating	Water Heater	UEF 3.9 - Heat Pump
Commercial	Interior Lighting	General Service Lighting	LED 2035 (147 lm/W)
Commercial	Interior Lighting	Exempted Lighting	LED 2035 (137 lm/W)
Commercial	Interior Lighting	Linear Lighting	LED 2035 (152 lm/W system)
Commercial	Interior Lighting	Linear Lighting	LED 2035 (152 lm/W system) w/ Controls
Commercial	Interior Lighting	High-Bay Lighting	LED 2035 (181 lm/W)
Commercial	Interior Lighting	High-Bay Lighting	LED 2035 (181 lm/W) w/ Controls
Commercial	Exterior Lighting	General Service Lighting	LED 2035 (167 lm/W)
Commercial	Exterior Lighting	Linear Lighting	LED 2035 (152 lm/W system)
Commercial	Exterior Lighting	Linear Lighting	LED 2035 (152 lm/W system) w/Controls
Commercial	Exterior Lighting	Area Lighting	LED 2035 (165 lm/W)
Commercial	Exterior Lighting	Area Lighting	LED 2035 (165 lm/W) w/ Controls
Commercial	Miscellaneous	Pool Heater	High-Efficiency Heat Pump
Commercial	Miscellaneous	Clothes Dryer	CEF 5.1 - Hybrid Heat Pump
Commercial	Miscellaneous	Clothes Dryer	CEF 8.0 - Heat Pump
Commercial	HVAC	All	HVAC - Energy Recovery Ventilator
Commercial	Cooling / Space Heating	Zonal	Ductless Mini Split Heat Pump
Commercial	Water Heating	Water Heater	Commercial Laundry - Ozone Treatment
Commercial	Water Heating	Water Heater	Commercial Laundry - Alternative Dry-Cleaning Methods
Commercial	Interior Lighting	All	Interior Lighting - Retrofit - Networked Lighting Controls
Commercial	Space Heating	All	Refrigeration - Heat Recovery
Commercial	Office Equipment	Server	Data Center - Upgrade and Optimization
Commercial	All	All	Advanced New Construction Designs
Industrial	Cooling	Air-Cooled Chiller	COP 7.2 (0.49 kW/ton)
Industrial	Cooling	Air-Cooled Chiller	COP 7.8 (0.45 kW/ton)
Industrial	Cooling	Water-Cooled Chiller	COP 13.03 (0.27 kW/ton)
Industrial	Cooling	Water-Cooled Chiller	COP 14.07 (0.25 kW/ton)
Industrial	Cooling	RTU	IEER 23.3 - EIA High Efficiency
Industrial	Cooling / Space Heating	Air-Source Heat Pump	IEER 20.3 / COP 3.7 - EIA High Efficiency
Industrial	Cooling / Space Heating	Geothermal Heat Pump	EER 25 / COP 4.5 EIA High Efficiency
Industrial	Interior Lighting	General Service Lighting	LED 2035 (147 lm/W)
Industrial	Interior Lighting	Linear Lighting	LED 2035 (152 lm/W system)
Industrial	Interior Lighting	Linear Lighting	LED 2035 (152 lm/W system) w/ Controls
Industrial	Interior Lighting	High-Bay Lighting	LED 2035 (181 lm/W)

Sector	End Use	Technology	Measure Label
Industrial	Interior Lighting	High-Bay Lighting	LED 2035 (181 lm/W) w/ Controls
Industrial	Exterior Lighting	General Service Lighting	LED 2035 (167 lm/W)
Industrial	Exterior Lighting	Linear Lighting	LED 2035 (152 lm/W system)
Industrial	Exterior Lighting	Linear Lighting	LED 2035 (152 lm/W system) w/Controls
Industrial	Exterior Lighting	Area Lighting	LED 2035 (165 lm/W)
Industrial	Exterior Lighting	Area Lighting	LED 2035 (165 lm/W) w/ Controls
Industrial	Interior Lighting	All	Interior Lighting - Retrofit - Networked Lighting Controls
Industrial	Motors	All	Advanced Industrial Motors
Industrial	Process	Process Other	Municipal Water Treatment - UV-C LED Disinfection
Industrial	Process	Process Heating	Dairy - Heat Recovery from Refrigeration

SECTION 2 DEMAND-SIDE RESEARCH

(2) The utility shall conduct, describe, and document market research studies, customer surveys, pilot demand-side programs, pilot demand-side rates, test marketing programs, and other activities as necessary to estimate the maximum achievable potential, technical potential, and realistic achievable potential of potential demand-side resource options for the utility and to develop the information necessary to design and implement cost-effective demand-side programs and demand-side rates. These research activities shall be designed to provide a solid foundation of information applicable to the utility about how and by whom energy-related decisions are made and about the most appropriate and cost-effective methods of influencing these decisions in favor of greater long-run energy efficiency and energy management impacts. The utility may compile existing data or adopt data developed by other entities, including government agencies and other utilities, as long as the utility verifies the applicability of the adopted data to its service territory. The utility shall provide copies of completed market research studies, pilot programs, pilot rates, test marketing programs, and other studies as required by this rule and descriptions of those studies that are planned or in progress and the scheduled completion dates.

Consistent with the variance granted to Liberty-Empire for the 2022 IRP, Liberty-Empire engaged AEG to conduct new primary market research to inform the 2025 DSM process. AEG performed this market research in 2021 and published a final report summarizing methods and findings on January 26, 2022. The market research effort included completed surveys of 300 residential and 300 non-residential customers. Findings from these surveys were used directly within the DSM potential analysis where possible, and supplemented with secondary regional or national data sources, where necessary.

Data Specific to Liberty-Empire Service Territory

Wherever possible, AEG used data specific to Liberty-Empire and its customers, including:

- Liberty-Empire 2023 customer billing data
- Load forecasts: most recent load and peak forecasts, economic growth forecast by sector, and retail electricity price history and forecasts.
- Economic information: avoided cost forecasts, discount rate, and line loss factor.
- 2021 market research on residential and non-residential customers, performed by AEG
- Liberty-Empire current and historical DSM program data

AEG Data

AEG maintains several databases and modeling tools used for forecasting and potential studies. Relevant data from these tools has been incorporated into the analysis and deliverables for this study.

- **AEG Energy Market Profiles**. For more than 10 years, AEG has maintained profiles of end-use consumption for the residential, commercial, and industrial sectors. These profiles include market size, fuel shares, unit consumption estimates, annual energy use by fuel (electricity and natural gas), customer segment, and end use for 10 regions in the U.S. The Energy Information Administration surveys (RECS, CBECS, and MECS), state-level statistics, and local customer research provide the foundation for these regional profiles.
- **Building Energy Simulation Tool (BEST)**. AEG's BEST is a derivative of the DOE 2.2 building simulation model, used to estimate base-year UECs and EUIs, as well as measure savings for the HVAC-related measures.
- **Recent studies**. AEG has conducted numerous studies of energy efficiency potential in the last five years. We checked our input assumptions and analysis results against the results from these other studies, as well as the results from the prior Liberty-Empire potential study completed in 2022.

Other Secondary Data and Reports

Finally, a variety of secondary data sources and reports were used for this study. The main sources are identified below.

- **Annual Energy Outlook.** The Annual Energy Outlook (AEO), conducted each year by the U.S. Energy Information Administration (EIA), presents yearly projections and analysis of energy topics.
- **American Community Survey.** The US Census American Community Survey is an ongoing survey that provides data every year on household characteristics. Data for Liberty-Empire were available for this study at http://www.census.gov/acs/www/
- **EIA Stock Assessments:** The Residential Energy Consumption Survey (RECS), Commercial Building Energy Consumption Survey (CBECS), and Manufacturing Energy Consumption Survey (MECS) provide sector-specific information on equipment saturations and energy consumption. For this analysis, AEG relied on the most current and granular versions of these data: state-specific from the 2020 RECS and Census Division-specific from the 2018 CBECS and 2019 MECS.
- **Local Weather Data.** Weather from NOAA's National Climatic Data Center for Springfield, Missouri was used where applicable.
- **EPRI End-Use Models (REEPS and COMMEND).** These models provide the energy-use elasticities we apply to electricity prices, household income, home size, and heating and cooling.
- **U.S. Department of Energy** (DOE) Energy Efficiency Standards and Technical Support Documents (TSD). The U.S. DOE provides supporting documentation for appliance and equipment standards and develops TSDs with recent engineering and market research. This documentation was used to identify equipment efficiency options and develop key parameters as part of the measure characterization effort.
- **California Electronic Technical Reference Manual (CA eTRM).** Managed by the California Technical Forum (Cal TF) and cooperatively owned and funded by major California utilities, the eTRM is designed to provide well-documented estimates of energy and peak demand savings values, measure costs, and effective useful life for the State of California and to replace the Database for Energy Efficient Resources.

- **Other relevant resources:** Includes reports and specifications from the Consortium for Energy Efficiency, the US Environmental Protection Agency (particularly through ENERGY STAR), and the American Council for an Energy-Efficient Economy.

Table 5-9 through Table 5-11 below note how the data sources above were applied to develop the market profiles, measure characteristics, baseline projections, and potential estimates.

Table 5-9 – Data Applied for the Market Profiles

Model Inputs	Description	Key Sources
Market size	Base-year residential dwellings and nonresidential floor space	Liberty-Empire billing data Liberty-Empire 2021 Market Research US Census ACS data
Annual intensity	Residential: Annual use per household Commercial: Annual use per square foot Industrial: Annual use per employee	Liberty-Empire billing data Liberty-Empire 2021 Market Research AEG's Energy Market Profiles AEO Recent AEG Studies
Appliance/equipment saturations	Fraction of dwellings with an appliance/technology Percentage of commercial floor space with equipment/technology	Liberty-Empire 2021 Market Research AEG's Energy Market Profiles Other recent potential studies
UEC/EUI for each end-use technology	UEC: Annual electricity use in homes and buildings that have the technology EUI: Annual electricity use per square foot for a technology in floor space that has the technology	Recent Midwest studies HVAC uses: BEST simulations using prototypes developed for Missouri Engineering analysis
Appliance/equipment age distribution	Age distribution for each technology	Liberty-Empire 2021 Market Research EIA Data (CBECs, RECs) Recent AEG studies
Efficiency options for each technology	List of available efficiency options and annual energy use for each technology	DOE TSDs AEO Illinois TRM Recent AEG Studies and Research
Peak factors	Share of technology energy use that occurs during the peak hour	Liberty-Empire system peak data EnergyShape database

Table 5-10 – Data Needs for the Baseline Projection and Potentials Estimation in VisionLoadMAP

Model Inputs	Description	Key Sources
Customer growth forecasts	Forecasts of new construction in residential and nonresidential sectors	Itron's Liberty-Empire Forecast Drivers
Equipment purchase shares for baseline projection	For each equipment/technology, purchase shares for each efficiency level; specified separately for existing equipment replacement and new construction	Shipments data from AEO and ENERGY STAR AEO regional forecast assumptions Appliance/efficiency standards analysis
Electricity prices	Forecast of average energy and capacity avoided costs and retail prices	Itron's Liberty-Empire Forecast Drivers

Table 5-11 – Data Needs for the Measure Characteristics in VisionLoadMAP

Model Inputs	Description	Key Sources
Energy Impacts	Annual reduction in consumption attributable to a specific measure. Savings were developed as a percentage of the energy end use that the measure affects.	TRMs: Illinois, Missouri, Arkansas DOE TSDs AEG BEST (HVAC only) AEO Other Secondary Sources AEG Measure Research
Peak Demand Impacts	Savings during the peak demand periods are specified for each electric measure. These impacts relate to the energy savings and depend on the extent to which each measure is coincident with the system peak.	AEG BEST (HVAC only) NREL End Use Loadshapes Liberty-Empire System Shape
Costs	Equipment Measures: the full cost of purchasing and installing the equipment on a per-household or per-square-foot basis for the residential and nonresidential sectors, respectively. Non-equipment measures: 1. Existing buildings – full installed cost. 2. New Construction – either the full installed cost or, as appropriate, the incremental cost of upgrading from a standard level to a higher efficiency level.	DOE TSDs AEO 2023 Illinois TRM AEG Measure Cost Research Other Secondary Sources
Measure Lifetimes	Estimates derived from the technical data and secondary data sources that support the measure demand and energy savings analysis.	TRMs: Missouri, Illinois DOE TSDs AEO 2023 Other Secondary Sources
Applicability	Estimate the percentage of dwellings in the residential sector or square feet in the nonresidential sector where the measure is applicable and technically feasible to implement.	AEG Measure Research Other Secondary Sources
On Market and Off Market Availability	Expressed as years for equipment measures to reflect when the equipment technology is available or no longer available in the market.	AEG appliance standards and building codes analysis

SECTION 3 DEVELOPMENT OF POTENTIAL DEMAND-SIDE PROGRAMS

(3) The utility shall develop potential demand-side programs that are designed to deliver an appropriate selection of end-use measures to each market segment. The utility shall describe and document its potential demand-side program planning and design process which shall include at least the following activities and elements:

3.1 Previously Implemented Demand-Side Programs from Other Utilities

(A) Review demand-side programs that have been implemented by other utilities with similar characteristics and identify programs that would be applicable for the utility;

To inform the development of DSM programs for Liberty-Empire, AEG analyzed the demand-side portfolios of Evergy and Ameren Missouri.[4] These utilities were chosen due to their proximity to Liberty-Empire's service territory, although Liberty-Empire is smaller and more rural than other IOUs in Missouri.

In previous filings, Liberty-Empire analyzed the energy efficiency portfolios of comparably-sized utilities in other states or regions. However, this did not prove to be a useful exercise. The rule cited above specifies that the purpose of the exercise is to "identify programs that would be applicable for the utility." Comparably-sized investor-owned utilities in different states and regions encounter many differences in relevant, but difficult-to-analyze variables. These variables — which could include rate structures, energy efficiency rules, recovery mechanisms, regulatory environments, customer ideologies, and utility practices — would inevitably vary significantly from state to state or region to region. Liberty-Empire has based its analysis of other Missouri investor-owned utilities on the assertion that, regardless of size, the only utility that could possess enough

[4] The Evergy and Ameren Missouri portfolios analyzed are the most recent versions in their Missouri Energy Efficiency Investment Act ("MEEIA") filings anticipated to start January 1, 2025. These portfolios are not finalized but represent future program offerings.

"similar characteristics" to serve as a useful reference point would have to be a Missouri investor-owned utility.

AEG designed the bundles based on the potential study results and considered potential program designs in future Missouri Energy Efficiency Investment Act ("MEEIA") filings. The bundles are designed to enhance Liberty-Empire's current DSM portfolio and to expand the available offerings to allow customers greater access to energy efficiency rebates and information while considering Liberty-Empire's historical program performance and the demographics of Liberty-Empire's customers.

While many commonalities exist between Liberty-Empire's proposed programs and Evergy or Ameren Missouri's programs, there are some programs that were deemed not cost-effective or beneficial to Liberty-Empire's service territory.

Table 5-12 – Demand-Side Program Review

Program	Evergy[5]	Ameren MO[6]	Liberty-Empire IRP
Residential			
Efficient Products	n/a	– Online Marketplace – Instant Discounts	Included with Residential Programs
HVAC	Fast Track Rebates	Included	Included with Residential Programs
Whole House	Moderate Income PAYS	PAYS	Included with Residential Programs
Multifamily	n/a	- DI for dwelling units - Incentives for whole-building and common areas	Served through all Residential Programs
Income Qualified	IE MF: in-unit DI and rebates, common area prescriptive and custom rebates	- ***SF*** (whole home, grants, kits, discounts) - ***MF*** (rebates, financing, tech. support) - ***Business Social Services*** (DI for facilities that serve IE customers)	Served through all Residential Programs
New Construction	n/a	Energy Star and/or DOE's ZERH certifications	n/a

[5] Docket EO-2023-0369. 9/27/2024. https://efis.psc.mo.gov/Case/FilingDisplay/601894
[6] Docket EO-2023-0136. 1/25/2024. https://efis.psc.mo.gov/Case/FilingDisplay/582149

Program	Evergy[5]	Ameren MO[6]	Liberty-Empire IRP
Kits	n/a	- Education Kits - Community Events - SF customers with electric DHW	n/a
Non-Residential Programs			
Business Prescriptive	Included	Included	Included
Business Custom	Included	Included	Included
Business Midstream	n/a	Space conditioning technologies, targeting small and midsize customers	n/a
Small Business Direct Install	n/a	Included	Included
RCx	n/a	- RCx study - Incentives for upgrades	n/a
New Construction	Included in Custom Program	Included in Prescriptive Program	n/a
Demand Response			
Business Demand Response	Incentives for load curtailment using curtailment agreements, smart tstats, advanced DR	Capacity payments for performance during events/dispatches	Included
Residential Demand Response	DLC on CAC or Heat Pump Incentives for qualified DLC device – smart tstat, advanced water heater controllers, etc.	Approved devices – smart tstats or switches – to control devices. Incentives for enrollment and events.	Included

3.2 Market Segment Identification

(B) Identify, describe, and document market segments that are numerous and diverse enough to provide relatively complete coverage of the major classes and decision-makers identified in subsection (1)(A) and that are specifically defined to reflect the primary market imperfections that are common to the members of the market segment;

As part of the DSM Potential Study, AEG thoroughly characterized customers and energy consumption within each key market segment within the residential, commercial, and industrial sector within Liberty-Empire's service territory. The results of this market characterization are provided in Section 1.1.

3.3 Development of End Use Measures

(C) Identify a comprehensive list of end-use measures and demand-side programs considered by the utility and develop menus of end-use measures for each demand-side program. The demand-side programs shall be appropriate to the shared characteristics of each market segment. The end-use measures shall reflect technological changes in end-uses that may be reasonably anticipated to occur during the planning horizon;

AEG compiled a comprehensive list of energy efficiency and demand response measures for each customer sector, drawing upon Liberty-Empire's current programs, AEG's measure database, and measure lists developed from previous studies. The list of energy efficiency measures covers all major types of end-use equipment and actions to reduce energy consumption. Potential measures include the replacement of a unit that has failed or is at the end of its useful life with an efficient unit, retrofit or early replacement of equipment, improvements to the building envelope, the application of controls to optimize energy use, and other actions resulting in improved energy efficiency. The list of measures includes technologies that are widely commercially available today and those that are expected to become available during the study period (i.e., emerging technologies). Emerging technologies assessed are provided in Table 5-8.

After the universe of measures was finalized, AEG characterized the associated energy and demand savings, incremental cost, service life, and other performance factors specific to each market segment. Energy and demand impacts were calculated using regional Technical Reference Manuals (TRMs) and generally accepted engineering algorithms based on reasonable assumptions.

Table 5-13 – Residential Equipment Measures

End Use	Technology	Measure Definition
HVAC	Central AC	SEER 15.0 | SEER2 14.3
HVAC	Central AC	SEER 16.0 | SEER2 15.2 (ENERGY STAR 6.1)
HVAC	Central AC	SEER 18.0 | SEER2 17.2
HVAC	Central AC	SEER 21.0 | SEER2 20.0
HVAC	Central AC	SEER 24.0 VRF | SEER2 22.8
HVAC	Room AC	CEER 12.0 (ENERGY STAR 4.2)

End Use	Technology	Measure Definition
HVAC	Room AC	CEER 14.7 (ENERGY STAR 5.0)
HVAC	Room AC	CEER 16.0
HVAC	Room AC	CEER 22.0
HVAC	Portable AC	CEER 8.5
HVAC	Portable AC	CEER 10.7
HVAC	Air-Source Heat Pump	SEER 16.0 / HSPF 9.2 | SEER2 15.2 / HSPF2 7.8 (ENERGY STAR 6.1)
HVAC	Air-Source Heat Pump	SEER 18.0 / HSPF 10 | SEER2 17.2 / HSPF2 8.5
HVAC	Air-Source Heat Pump	SEER 20.0 / HSPF 12 | SEER2 19.0 / HSPF2 10.2
HVAC	Air-Source Heat Pump	SEER 24.0 / HSPF 13 | SEER2 22.8 / HSPF2 11.1
HVAC	Geothermal Heat Pump	EER 17.1 / COP 3.6 (ENERGY STAR 3.2)
HVAC	Geothermal Heat Pump	EER 22.4 / COP 4.5
HVAC	Geothermal Heat Pump	EER 28 / COP 5.4
HVAC	Ductless Mini Split Heat Pump	SEER 15.2 / HSPF 9.4 | SEER2 15.2 / HSPF2 8.5 (ENERGY STAR 6.1)
HVAC	Ductless Mini Split Heat Pump	SEER 18 / HSPF 10.5 | SEER2 18 / HSPF2 9.5
HVAC	Ductless Mini Split Heat Pump	SEER 20.0 / HSPF 12.0 | SEER2 20 / HSPF2 10.8
HVAC	Ductless Mini Split Heat Pump	SEER 30.0 / HSPF 14.0 | SEER2 30 / HSPF2 12.6
Water Heating	Water Heater (<= 55 Gal)	Heat Pump (UEF 2.3) - 2029 Standard
Water Heating	Water Heater (<= 55 Gal)	Heat Pump (UEF 3.3) - ENERGY STAR 5.0
Water Heating	Water Heater (<= 55 Gal)	Heat Pump (UEF 3.75)
Water Heating	Water Heater (> 55 Gal)	Heat Pump (UEF 2.50) - 2029 Standard
Water Heating	Water Heater (> 55 Gal)	Heat Pump (UEF 3.30) - ENERGY STAR 5.0
Water Heating	Water Heater (> 55 Gal)	Heat Pump (UEF 3.90)
Interior Lighting	General Service Lighting	LED 2025 (122 lm/W)
Interior Lighting	General Service Lighting	LED 2030 (136 lm/W)
Interior Lighting	General Service Lighting	LED 2035 (147 lm/W)
Interior Lighting	Linear Lighting	LED 2025 (126 lm/W system)
Interior Lighting	Linear Lighting	LED 2030 (140 lm/W system)
Interior Lighting	Linear Lighting	LED 2035 (152 lm/W system)
Interior Lighting	Exempted Lighting	LED 2025 (112 lm/W)
Interior Lighting	Exempted Lighting	LED 2030 (125 lm/W)
Interior Lighting	Exempted Lighting	LED 2035 (137 lm/W)
Exterior Lighting	General Service Lighting	LED 2025 (132 lm/W)
Exterior Lighting	General Service Lighting	LED 2030 (150 lm/W)
Exterior Lighting	General Service Lighting	LED 2035 (167 lm/W)
Appliances	Refrigerator	ENERGY STAR (5.1)
Appliances	Refrigerator	Standard 2029
Appliances	Refrigerator	High Efficiency
Appliances	Second Refrigerator	ENERGY STAR (5.1)
Appliances	Second Refrigerator	Standard 2029

End Use	Technology	Measure Definition
Appliances	Second Refrigerator	High Efficiency
Appliances	Freezer	ENERGY STAR (5.1)
Appliances	Freezer	Standard 2029
Appliances	Freezer	High Efficiency
Appliances	Clothes Dryer	CEF(D2) 3.93 - ENERGY STAR 1.1/2028 Standard
Appliances	Clothes Dryer	CEF(D2) 5.2 - Hybrid Heat Pump
Appliances	Clothes Dryer	CEF(D2) 7.4 - Heat Pump
Appliances	Stove/Oven	Standard 2028
Appliances	Stove/Oven	ENERGY STAR (1.0)
Appliances	Stove/Oven	Induction
Appliances	Microwave	2026 Standard
Appliances	Microwave	2026 Efficient (Level 4)
Appliances	Dehumidifier	ENERGY STAR (6.0) (2.0 L/kWh)
Appliances	Air Purifier	ENERGY STAR (2.0) (2.4 CADR/W)
Appliances	Air Purifier	High-Efficiency Air Purifier (5.4 CADR/W)
Appliances	Air Purifier	Highest-Efficiency Air Purifier (12.8 CADR/W)
Electronics	Personal Computers	ENERGY STAR (8.0)
Electronics	Monitor	ENERGY STAR (8.0)
Electronics	Laptops	ENERGY STAR (8.0)
Electronics	Imaging Equipment	ENERGY STAR (3.2)
Electronics	TVs	ENERGY STAR (9.1)
Miscellaneous	EV Supply Equipment	Level 2
Miscellaneous	EV Supply Equipment	Level 2 - ENERGY STAR (1.2)
Miscellaneous	Pool Heater	Heat Pump (2028 Standard)
Miscellaneous	Pool Heater	High-Efficiency Heat Pump
Miscellaneous	Pool Pump	Variable Speed ENERGY STAR (3.1)
Miscellaneous	Hot Tub/Spa	Improved Controls and Pumps
Miscellaneous	Bathroom Exhaust Fan	ENERGY STAR - 5.3 CFM/W
Miscellaneous	Bathroom Exhaust Fan	ENERGY STAR Most Efficient - 12.9 CFM/W
Miscellaneous	Well Pump	High Efficiency (70% EF)

Table 5-14 – Residential Non-Equipment Measures

End Use	Measure
HVAC	Insulation - Ceiling Installation
HVAC	Insulation - Ceiling Upgrade
HVAC	Insulation - Radiant Barrier
HVAC	Insulation - Wall Cavity Installation
HVAC	Insulation - Wall Cavity Upgrade
HVAC	Insulation - Wall Sheathing
HVAC	Insulation - Floor Installation
HVAC	Insulation - Floor Upgrade

End Use	Measure
HVAC	Insulation - Rim/Band Joist
HVAC	Insulation - Basement Sidewall
HVAC	Insulation - Foundation
HVAC	Insulation - Ducting
HVAC	Ducting - Repair and Sealing
HVAC	Ducting - Repair and Sealing - Aerosol
HVAC	Building Shell - Air Sealing (Infiltration Control)
HVAC	Building Shell - Whole-Home Aerosol Sealing
HVAC	Building Shell - Liquid-Applied Weather-Resistive Barrier
HVAC	Building Shell - High Reflectivity Roof
HVAC	Windows - High Efficiency (ENERGY STAR 7.0)
HVAC	Windows - High Efficiency (Triple Pane)
HVAC	Windows - Low-e Storm Addition
HVAC	Windows - Install Reflective Film
HVAC	Windows - Manual Shading
HVAC	Doors - Storm and Thermal - ENERGY STAR (6.0)
HVAC	Ductless Mini Split Heat Pump (Zonal)
HVAC	Supplement Central System with Ductless Mini Split Heat Pump
HVAC	Conversion to Ductless Mini Split Heat Pump
HVAC	HVAC - Conversion to Ground-Source Heat Pump
HVAC	Furnace - Conversion to Air-Source Heat Pump
HVAC	HVAC - Efficient Blower Motor
HVAC	Combination Heat Pump Water Heater/Space Heating
HVAC	HVAC - Maintenance and Tune-Up
HVAC	HVAC - Energy Recovery Ventilator
HVAC	Whole-House Fan - Installation
HVAC	Room AC - Recycling
HVAC	Thermostat - Programmable
HVAC	Connected Thermostat - ENERGY STAR (1.0)
HVAC	Connected Thermostat - Line-Voltage
All	Home Energy Management System (HEMS)
Water Heating	Water Heater - Drainwater Heat Recovery
Water Heating	Water Heater - Faucet Aerators
Water Heating	Water Heater - Low-Flow Showerheads
Water Heating	Water Heater - Pipe Insulation
Water Heating	Water Heater - Desuperheater
Water Heating	Water Heater - Thermostatic Shower Restriction Valve
Water Heating	Water Heater - Solar System
Water Heating	Circulation Pump - High Efficiency Motor
Water Heating	Circulation Pump - Controls
Interior Lighting	Interior Lighting - Occupancy Sensors

End Use	Measure
Interior Lighting	Interior Lighting - ENERGY STAR Skylights
Exterior Lighting	Exterior Lighting - Photosensor Control
Exterior Lighting	Exterior Lighting - Photovoltaic Installation
Appliances	Refrigerator - Decommissioning and Recycling
Appliances	Freezer - Decommissioning and Recycling
Water Heating	Clothes Washer - CEE Tier 2
Appliances	Clothes Dryer - 2028 Washer Code Savings Adder
Water Heating	Dishwasher - ENERGY STAR (7.0)
Appliances	Laundry - Smart Dryer Sensor
Appliances	Dehumidifier Recycling
Electronics	ENERGY STAR (3.0) Home Audio
Miscellaneous	Water Cooler - ENERGY STAR (3.0)
Electronics	Advanced Power Strips - Tier 1
Electronics	Advanced Power Strips - Tier 2
Miscellaneous	Pool Heater - Solar System
Miscellaneous	Pool Covers
Miscellaneous	Pool Cleaner - Robotic
Miscellaneous	LED Holiday String Lighting
Miscellaneous	Ceiling Fan - ENERGY STAR (4.1)
All	ENERGY STAR Home Design
All	Advanced New Construction Designs
All	Home Energy Reports

Table 5-15 – Commercial Equipment Measures

End Use	Technology	Measure Definition
Cooling	Air-Cooled Chiller	COP 4.5 (0.79 kW/ton)
Cooling	Air-Cooled Chiller	COP 4.9 (0.72 kW/ton)
Cooling	Air-Cooled Chiller	COP 5.2 (0.68 kW/ton)
Cooling	Air-Cooled Chiller	COP 6.4 (0.55 kW/ton)
Cooling	Air-Cooled Chiller	COP 7.2 (0.49 kW/ton)
Cooling	Air-Cooled Chiller	COP 7.8 (0.45 kW/ton)
Cooling	Water-Cooled Chiller	COP 9.77 (0.36 kW/ton)
Cooling	Water-Cooled Chiller	COP 11.72 (0.30 kW/ton)
Cooling	Water-Cooled Chiller	COP 12.13 (0.29 kW/ton)
Cooling	Water-Cooled Chiller	COP 13.03 (0.27 kW/ton)
Cooling	Water-Cooled Chiller	COP 14.07 (0.25 kW/ton)
Cooling	RTU	IEER 15.4
Cooling	RTU	IEER 18.0 ENERGY STAR / IVEC 14.3 Federal Standard 2029
Cooling	RTU	IEER 23.3 - EIA High Efficiency
Cooling	Packaged Terminal AC	EER 11.7
Cooling	Packaged Terminal AC	EER 13

End Use	Technology	Measure Definition
Space Heating	Packaged Terminal HP	EER 11.7 / COP 3.4
Space Heating	Packaged Terminal HP	EER 13 / COP 3.6
Space Heating	Air-Source Heat Pump	IEER 15.3 / COP 3.5 - ENERGY STAR (4.0)
Space Heating	Air-Source Heat Pump	IEER 17.3 / COP 3.4 | IVEC 13.4 / IVHE 6.2 - 2029 Standard
Space Heating	Air-Source Heat Pump	IEER 18.9 / COP 3.5
Space Heating	Air-Source Heat Pump	IEER 20.3 / COP 3.7 - EIA High Efficiency
Space Heating	Geothermal Heat Pump	EER 17.1 / COP 3.6 - ENERGY STAR (3.1)
Space Heating	Geothermal Heat Pump	EER 22.4 / COP 4.5
Space Heating	Geothermal Heat Pump	EER 25 / COP 4.5 EIA High Efficiency
Ventilation	Ventilation	Variable Air Volume
Water Heating	Water Heater	UEF 3.0 - Heat Pump (ENERGY STAR 2.0)
Water Heating	Water Heater	UEF 3.3 - Heat Pump
Water Heating	Water Heater	UEF 3.9 - Heat Pump
Interior Lighting	General Service Lighting	LED 2025 (122 lm/W)
Interior Lighting	General Service Lighting	LED 2030 (136 lm/W)
Interior Lighting	General Service Lighting	LED 2035 (147 lm/W)
Interior Lighting	Exempted Lighting	LED 2020 (95 lm/W)
Interior Lighting	Exempted Lighting	LED 2025 (112 lm/W)
Interior Lighting	Exempted Lighting	LED 2030 (125 lm/W)
Interior Lighting	Exempted Lighting	LED 2035 (137 lm/W)
Interior Lighting	Linear Lighting	LED 2020 (109 lm/W system) w/ Controls
Interior Lighting	Linear Lighting	LED 2025 (126 lm/W system)
Interior Lighting	Linear Lighting	LED 2025 (126 lm/W system) w/ Controls
Interior Lighting	Linear Lighting	LED 2030 (140 lm/W system)
Interior Lighting	Linear Lighting	LED 2030 (140 lm/W system) w/ Controls
Interior Lighting	Linear Lighting	LED 2035 (152 lm/W system)
Interior Lighting	Linear Lighting	LED 2035 (152 lm/W system) w/ Controls
Interior Lighting	High-Bay Lighting	LED 2025 (152 lm/W)
Interior Lighting	High-Bay Lighting	LED 2025 (152 lm/W) w/ Controls
Interior Lighting	High-Bay Lighting	LED 2030 (167 lm/W)
Interior Lighting	High-Bay Lighting	LED 2030 (167 lm/W) w/ Controls
Interior Lighting	High-Bay Lighting	LED 2035 (181 lm/W)
Interior Lighting	High-Bay Lighting	LED 2035 (181 lm/W) w/ Controls
Exterior Lighting	General Service Lighting	LED 2025 (132 lm/W)
Exterior Lighting	General Service Lighting	LED 2030 (150 lm/W)
Exterior Lighting	General Service Lighting	LED 2035 (167 lm/W)
Exterior Lighting	Linear Lighting	LED 2025 (126 lm/W system)
Exterior Lighting	Linear Lighting	LED 2025 (126 lm/W system) w/ Controls
Exterior Lighting	Linear Lighting	LED 2030 (140 lm/W system)
Exterior Lighting	Linear Lighting	LED 2030 (140 lm/W system) w/ Controls
Exterior Lighting	Linear Lighting	LED 2035 (152 lm/W system)

End Use	Technology	Measure Definition
Exterior Lighting	Linear Lighting	LED 2035 (152 lm/W system) w/Controls
Exterior Lighting	Area Lighting	LED 2025 (138 lm/W)
Exterior Lighting	Area Lighting	LED 2025 (138 lm/W) w/ Controls
Exterior Lighting	Area Lighting	LED 2030 (152 lm/W)
Exterior Lighting	Area Lighting	LED 2030 (152 lm/W) w/ Controls
Exterior Lighting	Area Lighting	LED 2035 (165 lm/W)
Exterior Lighting	Area Lighting	LED 2035 (165 lm/W) w/ Controls
Refrigeration	Walk-in Refrigerator/Freezer	High Efficiency
Refrigeration	Reach-in Refrigerator/Freezer	ENERGY STAR (5.0)
Refrigeration	Icemaker	ENERGY STAR (3.0)
Refrigeration	Vending Machine	ENERGY STAR (4.0)
Food Preparation	Oven	ENERGY STAR (3.0)
Food Preparation	Fryer	ENERGY STAR (3.0)
Food Preparation	Hot Food Container	ENERGY STAR (2.0)
Food Preparation	Steamer	ENERGY STAR (1.2)
Food Preparation	Griddle	ENERGY STAR (1.2)
Food Preparation	Griddle	High Efficiency
Office Equipment	Desktop Computer	ENERGY STAR (8.0)
Office Equipment	Laptop	ENERGY STAR (8.0)
Office Equipment	Monitor	ENERGY STAR (8.0)
Office Equipment	Server	ENERGY STAR (4.0)
Office Equipment	Imaging Equipment	ENERGY STAR (3.2)
Office Equipment	POS Terminal	ENERGY STAR (8.0)
Miscellaneous	Pool Pump	Variable Speed ENERGY STAR (3.1)
Miscellaneous	Pool Heater	Heat Pump (2028 Standard)
Miscellaneous	Pool Heater	High-Efficiency Heat Pump
Miscellaneous	EV Supply Equipment	Level 2
Miscellaneous	EV Supply Equipment	Level 2 - ENERGY STAR (1.2)
Miscellaneous	Clothes Dryer	ENERGY STAR (1.1)
Miscellaneous	Clothes Dryer	CEF 5.1 - Hybrid Heat Pump
Miscellaneous	Clothes Dryer	CEF 8.0 - Heat Pump

Table 5-16 – Commercial Non-Equipment Measures

End Use	Measure
HVAC	Insulation - Ceiling
HVAC	Insulation - Wall Cavity
HVAC	Insulation - Ducting
HVAC	Building Shell - High Reflectivity Roof
HVAC	Ducting - Repair and Sealing
HVAC	Windows - High Efficiency Glazing
HVAC	Chiller - Chilled Water Reset

End Use	Measure
HVAC	Chiller - Variable Flow Chilled Water Pump
HVAC	Water-Cooled Chiller - Variable Flow Condenser Water Pump
HVAC	Water-Cooled Chiller - Condenser Water Temperature Reset
HVAC	Chiller - Variable Speed Fans
HVAC	Chiller - Plant Optimization
HVAC	HVAC - Energy Recovery Ventilator
HVAC	Building Shell - Air Sealing (Infiltration Control)
HVAC	Industrial Air Curtains
HVAC	Infiltration Control - Loading Dock Sealing
HVAC	Overhead Doors - Automatic High Speed Doors
HVAC	Ventilation - High Efficiency Motors
HVAC	Ventilation - Fan Drive Improvements
HVAC	Ventilation - Variable Speed Control
HVAC	Ventilation - Demand Controlled
HVAC	Ventilation - Parking Garages, Demand Controlled
HVAC	HVAC - Dedicated Outdoor Air System (DOAS)
HVAC	Destratification Fans (HVLS)
HVAC	HVAC - Economizer Addition
HVAC	HVAC - Economizer Controls
HVAC	RTU - Advanced Controls
HVAC	HVAC - Maintenance
HVAC	Ductless Mini Split Heat Pump
HVAC	Connected Thermostat - ENERGY STAR (1.0)
HVAC	Lodging - Guest Room Controls
HVAC	High Efficiency Computer Room AC
Space Heating	Refrigeration - Heat Recovery
Space Heating	Kitchen Ventilation - Advanced Controls
Cooling	Server Room Temperature Setback
Water Heating	Water Heater - Thermostatic Shower Restriction Valve
Water Heating	Water Heater - Pre-Rinse Spray Valve
Water Heating	Water Heater - Faucet Aerators/Low Flow Nozzles
Water Heating	Water Heater - Low-Flow Showerheads
Water Heating	Water Heater - Drainwater Heat Recovery
Water Heating	Water Heater - Pipe Insulation
Water Heating	Water Heater - Solar System
Water Heating	Commercial Laundry - Ozone Treatment
Water Heating	Commercial Laundry - ENERGY STAR Washer (8.0)
Water Heating	Commercial Laundry - Alternative Dry-Cleaning Methods
Water Heating	Water Heater - ENERGY STAR Dishwasher (3.0)
Interior Lighting	Interior Lighting - Retrofit - Networked Lighting Controls
Interior Lighting	Interior Lighting - LED/LEC Exit Lighting

End Use	Measure
Interior Lighting	Interior Lighting - Skylights
Exterior Lighting	Exterior Lighting - Photovoltaic Installation
Refrigeration	Refrigeration - Door Gasket Replacement
Refrigeration	Refrigeration - High Efficiency Compressor
Refrigeration	Refrigeration - Defrost Controls
Refrigeration	Refrigeration - Automatic High Speed Doors
Refrigeration	Refrigeration - High Efficiency Condenser Coil
Refrigeration	Refrigeration - Liquid-Suction Heat Exchange
Refrigeration	Refrigeration - High Efficiency Evaporator Fan Motors
Refrigeration	Refrigeration - Evaporator Fan Controls
Refrigeration	Refrigeration - Economizer Addition
Refrigeration	Refrigeration - Efficient Compressor Head Fan Motor
Refrigeration	Refrigeration - Suction Line Insulation
Refrigeration	Refrigeration - Floating Head Pressure
Refrigeration	Refrigeration - Floating Suction Pressure
Refrigeration	Refrigeration - Strip Curtain
Refrigeration	Refrigeration - Air Curtain
Refrigeration	Grocery - Display Case - Anti-Sweat Heater Controls
Refrigeration	Grocery - Display Case - Low-Heat/No-Heat Doors
Refrigeration	Grocery - Display Case - Door Retrofit
Refrigeration	Grocery - Display Case - Closed Case Replacement
Refrigeration	Grocery - Display Case - LED Lighting
Refrigeration	Grocery - Display Case - Motion Sensors
Refrigeration	Grocery - Open Display Case - Night Covers
Refrigeration	Ultra-Low Temperature Freezer - ENERGY STAR (1.1)
Refrigeration	Vending Machine - Occupancy Sensor
Office Equipment	Office Equipment - Advanced Power Strips
Office Equipment	Data Center - Upgrade and Optimization
Ventilation	Optimized Lab Hood Design
Miscellaneous	Circulation Pump - Controls
Miscellaneous	Circulation Pump - High Efficiency Motor
Miscellaneous	Grocery - On-Demand Overwrappers
Miscellaneous	Pool Heater - Night Covers
Miscellaneous	Water Cooler - ENERGY STAR (3.0)
Miscellaneous	Water Cooler - Timer
Miscellaneous	Efficient Hand Dryers
Miscellaneous	Engine Block Heater Controls
Miscellaneous	Circulating Engine Block Heater
Miscellaneous	Improved Vertical Lift Technology
Miscellaneous	High Frequency Battery Chargers
All	Advanced New Construction Designs

End Use	Measure
All	Strategic Energy Management
All	Commissioning
All	Retrocommissioning

Table 5-17 – Industrial Equipment Measures

End Use	Technology	Measure Definition
Cooling	Air-Cooled Chiller	COP 4.5 (0.79 kW/ton)
Cooling	Air-Cooled Chiller	COP 4.9 (0.72 kW/ton)
Cooling	Air-Cooled Chiller	COP 5.2 (0.68 kW/ton)
Cooling	Air-Cooled Chiller	COP 6.4 (0.55 kW/ton)
Cooling	Air-Cooled Chiller	COP 7.2 (0.49 kW/ton)
Cooling	Air-Cooled Chiller	COP 7.8 (0.45 kW/ton)
Cooling	Water-Cooled Chiller	COP 9.77 (0.36 kW/ton)
Cooling	Water-Cooled Chiller	COP 11.72 (0.30 kW/ton)
Cooling	Water-Cooled Chiller	COP 12.13 (0.29 kW/ton)
Cooling	Water-Cooled Chiller	COP 13.03 (0.27 kW/ton)
Cooling	Water-Cooled Chiller	COP 14.07 (0.25 kW/ton)
Cooling	RTU	IEER 15.4
Cooling	RTU	IEER 18.0 ENERGY STAR / IVEC 14.3 Federal Standard 2029
Cooling	RTU	IEER 23.3 - EIA High Efficiency
Space Heating	Air-Source Heat Pump	IEER 15.3 / COP 3.5 - ENERGY STAR (4.0)
Space Heating	Air-Source Heat Pump	IEER 17.3 / COP 3.4 | IVEC 13.4 / IVHE 6.2 - 2029 Standard
Space Heating	Air-Source Heat Pump	IEER 18.9 / COP 3.5
Space Heating	Air-Source Heat Pump	IEER 20.3 / COP 3.7 - EIA High Efficiency
Space Heating	Geothermal Heat Pump	EER 17.1 / COP 3.6 - ENERGY STAR (3.1)
Space Heating	Geothermal Heat Pump	EER 22.4 / COP 4.5
Space Heating	Geothermal Heat Pump	EER 25 / COP 4.5 EIA High Efficiency
Ventilation	Ventilation	Variable Air Volume
Interior Lighting	General Service Lighting	LED 2025 (122 lm/W)
Interior Lighting	General Service Lighting	LED 2030 (136 lm/W)
Interior Lighting	General Service Lighting	LED 2035 (147 lm/W)
Interior Lighting	Linear Lighting	LED 2025 (126 lm/W system)
Interior Lighting	Linear Lighting	LED 2025 (126 lm/W system) w/ Controls
Interior Lighting	Linear Lighting	LED 2030 (140 lm/W system)
Interior Lighting	Linear Lighting	LED 2030 (140 lm/W system) w/ Controls
Interior Lighting	Linear Lighting	LED 2035 (152 lm/W system)
Interior Lighting	Linear Lighting	LED 2035 (152 lm/W system) w/ Controls
Interior Lighting	High-Bay Lighting	LED 2025 (152 lm/W)
Interior Lighting	High-Bay Lighting	LED 2025 (152 lm/W) w/ Controls
Interior Lighting	High-Bay Lighting	LED 2030 (167 lm/W)
Interior Lighting	High-Bay Lighting	LED 2030 (167 lm/W) w/ Controls

End Use	Technology	Measure Definition
Interior Lighting	High-Bay Lighting	LED 2035 (181 lm/W)
Interior Lighting	High-Bay Lighting	LED 2035 (181 lm/W) w/ Controls
Exterior Lighting	General Service Lighting	LED 2025 (132 lm/W)
Exterior Lighting	General Service Lighting	LED 2030 (150 lm/W)
Exterior Lighting	General Service Lighting	LED 2035 (167 lm/W)
Exterior Lighting	Linear Lighting	LED 2025 (126 lm/W system)
Exterior Lighting	Linear Lighting	LED 2025 (126 lm/W system) w/ Controls
Exterior Lighting	Linear Lighting	LED 2030 (140 lm/W system)
Exterior Lighting	Linear Lighting	LED 2030 (140 lm/W system) w/ Controls
Exterior Lighting	Linear Lighting	LED 2035 (152 lm/W system)
Exterior Lighting	Linear Lighting	LED 2035 (152 lm/W system) w/Controls
Exterior Lighting	Area Lighting	LED 2025 (138 lm/W)
Exterior Lighting	Area Lighting	LED 2025 (138 lm/W) w/ Controls
Exterior Lighting	Area Lighting	LED 2030 (152 lm/W)
Exterior Lighting	Area Lighting	LED 2030 (152 lm/W) w/ Controls
Exterior Lighting	Area Lighting	LED 2035 (165 lm/W)
Exterior Lighting	Area Lighting	LED 2035 (165 lm/W) w/ Controls

Table 5-18 – Industrial Non-Equipment Measures

End Use	Measure
HVAC	Insulation - Ceiling
HVAC	Insulation - Wall Cavity
HVAC	Insulation - Ducting
HVAC	Ducting - Repair and Sealing
HVAC	Building Shell - Air Sealing (Infiltration Control)
HVAC	Chiller - Chilled Water Reset
HVAC	Chiller - Variable Flow Chilled Water Pump
HVAC	Chiller - Variable Speed Fans
HVAC	Water-Cooled Chiller - Variable Flow Condenser Water Pump
HVAC	Water-Cooled Chiller - Condenser Water Temperature Reset
HVAC	HVAC - Economizer Addition
HVAC	HVAC - Economizer Controls
HVAC	Ventilation - Demand Controlled
HVAC	Destratification Fans (HVLS)
HVAC	RTU - Advanced Controls
HVAC	Industrial Air Curtains
HVAC	Infiltration Control - Loading Dock Sealing
HVAC	Overhead Doors - Automatic High Speed Doors
HVAC	HVAC - Maintenance
HVAC	HVAC - Energy Recovery Ventilator
HVAC	Connected Thermostat - ENERGY STAR (1.0)

End Use	Measure
Interior Lighting	Interior Lighting - Retrofit - Networked Lighting Controls
Interior Lighting	Interior Lighting - LED/LEC Exit Lighting
Interior Lighting	Interior Lighting - Skylights
Exterior Lighting	Exterior Lighting - Photovoltaic Installation
Process	Indoor Agriculture - LED Lighting
Miscellaneous	High Frequency Battery Chargers
Process	Refrigeration - System Optimization
Process	Refrigeration - System Upgrade
Process	Refrigeration - System Maintenance
Motors	Pumping System - Controls
Motors	Pumping System - Equipment Upgrade
Motors	Pumping System - System Optimization
Motors	Fan System - Controls
Motors	Fan System - Equipment Upgrade
Motors	Fan System - Flow Optimization
Motors	Compressed Air - Equipment Upgrade
Motors	Compressed Air - End Use Optimization
Motors	Compressed Air - System Controls
Motors	Compressed Air - Variable Speed Drive
Motors	Compressed Air - Dryer Optimization and Replacement
Motors	Compressed Air - Low Pressure-Drop Filters
Motors	Compressed Air - Zero-Loss Condensate Drain
Motors	Advanced Industrial Motors
Miscellaneous	Engine Block Heater Controls
Miscellaneous	Circulating Engine Block Heater
Motors	Material Handling - Upgrade and Optimization
Process	Pulp and Paper - Process Efficiency
Process	Metal - New Arc Furnace
Process	Process - High Efficiency Welder
Process	Process Cooling - Upgrade and Optimization
Process	Electrochemical Processes - Upgrade and Optimization
Process	Injection Molding - Process Improvements
Process	Municipal Water Treatment - UV-C LED Disinfection
Motors	Municipal Sewage Treatment - Optimization
Motors	Municipal Water Supply Treatment - Optimization
Process	Dairy - Milk Pre-Cooler
Process	Dairy - Heat Recovery from Refrigeration
Motors	Dairy - Variable Speed Milk Vacuum Pump
Motors	Dairy - Variable Speed Milk Transfer Pump
Process	Dairy - Compressor Upgrade
Miscellaneous	Agriculture - Efficient Stock Watering Tanks

End Use	Measure
Miscellaneous	Agriculture - Stock Tank De-Icer
Miscellaneous	Agriculture - Thermostatically Controlled Outlets
Ventilation	Agriculture - Efficient Circulation Fan
Process	Agriculture - Swine Heat Pads
Process	Agriculture - High Efficiency Grain Dryer
Process	Agriculture - Grain Dryer Maintenance
Motors	Irrigation - Sprinkler Maintenance
Motors	Irrigation - Low Pressure Sprinkler Nozzles
Motors	Irrigation - Drip System Conversion
Motors	Irrigation - Pipe Maintenance
Motors	Irrigation - Leveler Maintenance
Motors	Irrigation - New Sprinkler Package
Motors	Irrigation - Variable Speed Pumps
All	Strategic Energy Management
All	Commissioning
All	Retrocommissioning

3.4 Advanced, Metering, and Distribution Assessment

(D) Assess how advancements in metering and distribution technologies that may be reasonably anticipated to occur during the planning horizon affect the ability to implement or deliver potential demand-side programs;

Advancements in metering and distribution technologies, such as two-way communicating meters and programmable thermostats, allow utilities to communicate in real-time with the customer and provide customers with a better understanding of their energy consumption. These technologies may improve demand-side programs, particularly customer behavior programs. The demand response programs were modeled to take advantage of advanced metering technology (such as AMI or smart meters) that Liberty-Empire has recently deployed.

3.5 End-Use Measures Marketing Plan

(E) Design a marketing plan and delivery process to present the menu of end-use measures to the members of each market segment and to persuade decision-makers to implement

as many of these measures as may be appropriate to their situation. When appropriate, consider multiple approaches such as rebates, financing, and direct installations for the same menu of end-use measures;

The marketing plan and delivery process will be designed to inform each market segment of the DSM programs. The plan will include a combination of strategies and approaches to reach all market segments and decision-makers.

Preliminary program-specific marketing tactics included in the proposed DSM bundles will be discussed and finalized during implementation. The marketing plan will include, but not be limited to:

- Direct customer outreach (via Liberty-Empire and/or an implementation contractor)
- Bill inserts, on-bill messaging, and email blasts
- Newspaper, radio, and billboard advertisements
- Community newsletters and events
- Trade publication advertisements
- Partnerships with local businesses/contractors developed through education and training seminars, presentations/presence at Chamber of Commerce meetings, trade association events, and business organization events.

3.6 State-Wide Marketing and Outreach Program Evaluation

(F) Evaluate, describe, and document the feasibility, cost-reduction potential and potential benefits of statewide marketing and outreach programs, joint programs with natural gas utilities, upstream market transformation programs, and other activities. In the event that statewide marketing and outreach programs are preferred, the utilities shall develop joint programs in consultation with the stakeholder group;

Liberty-Empire will cooperatively market options jointly run with outside organizations, such as non-profit organizations and other Missouri electric and natural gas utilities.

Liberty-Empire is currently cooperatively marketing the Low-Income Weatherization, Low-Income New Homes, Building Operating Certificate, and whole-home programs with partnering organizations. Liberty-Empire will assess the benefits and economies from cooperating with neighboring municipalities, rural electric cooperatives and investor-owned utilities.

3.7 Cost-Effectiveness

(G) Estimate the characteristics needed for the twenty (20)-year planning horizon to assess the cost effectiveness of each potential demand-side program, including:

1. An assessment of the demand and energy reduction impacts of each stand-alone end-use measure contained in each potential demand-side program;

Measures that were found to be cost-effective at some point during the 20-year period analyzed for the DSM Potential Study were vetted for inclusion in the DSM IRP Bundles. The average measure data for the first program year (2027) is shown in the table below.

Table 5-19 – Measure Details for DSM IRP Bundles

Sector	Measure	Measure Life (Years)	Gross kWh Savings @ Meter	Gross kW Savings @ Meter	Per Unit Incremental Measure Cost ($)
Residential	Advanced Power Strips - Tier 1	7	156	0.02	$19.23
Residential	Air Purifier	11	-	0.06	$11.00
Residential	Connected Thermostat - ENERGY STAR (1.0)	11	156	0.07	$144.20
Residential	Pool Pump	9	10	0.01	$1.14
Residential	Thermostat - Programmable	16	89	0.04	$28.84
Residential	Water Heater - Pipe Insulation	12	101	0.03	$14.42
Residential	General Service Lighting	4	0	0.10	$4.98
Commercial	Commercial Laundry - ENERGY STAR Washer (8.0)	9	539	0.13	$581.27
Commercial	Grocery - Display Case - Door Retrofit	15	2	0.00	$0.89
Commercial	Grocery - Display Case - LED Lighting	7	8,658	0.96	$1,836.85
Commercial	Grocery - Display Case - Low-Heat/No-Heat Doors	11	-	-	$0.00
Commercial	Grocery - Open Display Case - Night Covers	5	-	-	$0.00
Commercial	Water Heater - Faucet Aerators/Low Flow Nozzles	10	1,155	0.27	$41.14
Commercial	Water Heater - Low-Flow Showerheads	10	1,139	0.31	$88.76
Commercial	Water Heater - Pipe Insulation	15	5,418	1.41	$691.57
Commercial	Water Heater - Pre-Rinse Spray Valve	5	239	0.06	$50.60
Commercial	Water Heater - Thermostatic Shower Restriction Valve	6	-	-	$0.00
Commercial	Kitchen Ventilation - Advanced Controls	20	1,312	0.20	$491.67
Commercial	Water Heater - ENERGY STAR Dishwasher (3.0)	15	0	0.00	$0.42
Commercial	Lodging - Guest Room Controls	15	7,719	0.37	$66.26
Commercial	Refrigeration - Heat Recovery	15	10	0.01	$1.60
Commercial	Refrigeration - High Efficiency Compressor	15	1	0.00	$0.21
Commercial	Refrigeration - High Efficiency Evaporator Fan Motors	15	2,131	0.24	$548.48
Commercial	Refrigeration - Strip Curtain	4	16,394	1.81	$982.91
Commercial	Ventilation - Demand Controlled	10	2,267	0.64	$981.26
Commercial	Ventilation - Fan Drive Improvements	15	1,399	0.29	$467.55
Commercial	Ventilation - High Efficiency Motors	15	3,179	0.61	$964.52
Commercial	Ventilation - Variable Speed Control	15	6,468	1.08	$1,212.69
Commercial	Chiller - Plant Optimization	15	260	0.01	$123.97
Commercial	Chiller - Variable Flow Chilled Water Pump	15	817	0.00	$198.83
Commercial	Chiller - Variable Speed Fans	15	2,743	0.08	$837.42
Commercial	Infiltration Control - Loading Dock Sealing	15	9,557	5.41	$4,990.49
Residential	Battery Storage DLC	1	120	8.00	$0.00
Residential	CPP	1	13	0.64	$0.00
Residential	Grid-Interactive WH	1	60	2.14	$0.00
Residential	Smart Appliances DLC	1	379	0.56	$0.00
Residential	Smart Thermostats DLC - Heating	1	237	5.92	$0.00
Residential	TOU Opt-Out	1	110	0.21	$0.00
Commercial	Battery Storage DLC	1	330	22.00	$0.00
Commercial	CPP	1	196	9.78	$0.00
Commercial	Curtailment - Firm	1	1,516	31.58	$0.00
Commercial	Curtailment - Non-Firm	1	1,516	31.58	$0.00
Commercial	Grid-Interactive WH	1	165	5.90	$0.00
Commercial	Smart Thermostats DLC - Heating	1	268	6.69	$0.00
Commercial	TOU Opt-Out	1	1,398	2.65	$0.00

2. An assessment of how the interactions between end-use measures, when bundled with other end-use measures in the potential demand-side program, would affect the stand-alone end-use measure impact estimates;

Cost-effective measures within Vision LoadMAP were included in the economic and achievable potential study. The DSM Potential Study measure-level MAP and RAP

results were vetted for inclusion in a DSM program. Measures were bundled into programs, incentive and program costs were assigned, and programs were re-screened for cost-effectiveness. Measures were added to bundles as they became cost-effective throughout the timeframe.

All bundles were designed to be cost-effective. Measures were bundled into programs based on the end-use, sector, and implementation strategy. The programs were bundled into three resource bundles of $/kWh (low, medium, and high).

3. An estimate of the incremental and cumulative number of program participants and end-use measure installations due to the potential demand-side program;

An estimate of the RAP Portfolio incremental and cumulative end-use measure installations and participants is shown in the tables below.

Table 5-20 – Incremental End-Use Measure Installations

Bundle	Measure	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential Prescriptive	Advanced Power Strips - Tier 1	1,763	1,803	1,844	1,884	1,924	1,960	1,999	1,932	1,949	1,970	1,990	2,009	2,027	2,048	2,070	2,091	2,112	2,134	2,156	2,178	2,223
Residential Prescriptive	Air Purifier	1,876	2,004	2,105	2,180	2,241	2,180	2,107	2,091	2,116	280	633	470	451	408	462	525	530	498	517	70	72
Residential Prescriptive	Connected Thermostat - ENERGY STAR (1.0)	2,660	2,701	2,744	2,786	2,829	2,871	2,914	2,956	2,998	3,040	3,083	3,126	3,170	3,212	3,256	3,299	3,344	3,387	3,430	3,475	3,546
Residential Prescriptive	Pool Pump	3,553	3,817	4,019	3,818	3,629	3,568	3,587	150	674	322	521	660	662	599	510	-	164	139	136	284	290
Residential Prescriptive	Thermostat - Programmable	1,115	1,128	1,142	1,157	1,170	1,184	1,199	1,214	1,228	1,242	1,256	1,272	1,285	1,300	1,315	1,329	1,344	1,357	1,373	1,387	1,414
Residential Prescriptive	Water Heater - Pipe Insulation	848	864	877	891	904	917	932	944	958	972	985	999	1,011	1,026	1,039	1,052	1,066	1,079	1,093	1,106	1,129
Income Eligible Lighting	General Service Lighting	4,080	4,333	4,570	4,218	3,927	3,388	3,311	3,228	1,680	1,688	1,713	134	77	89	98	583	209	351	511	782	797
SBDI	Commercial Laundry - ENERGY STAR Washer (8.0)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
SBDI	Grocery - Display Case - Door Retrofit	41,093	41,023	40,945	40,855	40,757	40,650	40,534	40,413	40,283	40,145	39,999	39,848	39,690	39,527	39,354	39,179	38,998	38,810	38,619	38,421	39,194
SBDI	Grocery - Display Case - LED Lighting	5	5	5	5	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4
SBDI	Grocery - Display Case - Low-Heat/No-Heat Doors	-	-	16	16	16	16	16	16	16	16	16	16	16	16	16	15	15	15	15	15	16
SBDI	Grocery - Open Display Case - Night Covers	-	-	-	-	-	-	8,237	8,215	8,190	8,164	8,136	8,106	8,075	8,042	8,008	7,972	7,935	7,897	7,857	7,817	7,973
SBDI	Water Heater - Faucet Aerators/Low Flow Nozzles	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
SBDI	Water Heater - Low-Flow Showerheads	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
SBDI	Water Heater - Pipe Insulation	37	37	37	37	37	37	37	36	36	36	36	36	36	36	36	35	35	35	35	35	36
SBDI	Water Heater - Pre-Rinse Spray Valve	25	25	25	25	25	25	25	25	25	25	24	24	23	23	23	23	23	23	23	23	23
SBDI	Water Heater - Thermostatic Shower Restriction Valve	-	-	-	-	64	64	64	64	63	61	61	61	61	61	61	60	60	60	59	59	60
Commercial Prescriptive	Kitchen Ventilation - Advanced Controls	35	34	34	34	49	49	49	48	48	47	47	47	46	46	46	46	45	45	45	45	45
Commercial Prescriptive	Water Heater - ENERGY STAR Dishwasher (3.0)	585,363	635,461	674,786	705,465	729,212	747,384	661,755	612,920	589,300	582,481	586,417	681,643	703,505	719,955	732,074	721,723	701,251	678,117	656,514	638,526	651,297
Commercial Prescriptive	Commercial Laundry - ENERGY STAR Washer (8.0)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
Commercial Prescriptive	Grocery - Display Case - Door Retrofit	41,093	41,023	40,945	40,855	40,757	40,650	40,534	40,413	40,283	40,145	39,999	39,848	39,690	39,527	39,354	39,179	38,998	38,810	38,619	38,421	39,194
Commercial Prescriptive	Grocery - Display Case - LED Lighting	5	5	5	5	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4
Commercial Prescriptive	Lodging - Guest Room Controls	16	16	16	16	16	16	16	15	15	15	15	15	15	15	15	15	15	15	14	14	15
Commercial Prescriptive	Refrigeration - Heat Recovery	143,539	143,302	143,031	142,727	142,392	142,028	141,634	141,213	140,763	140,290	139,791	139,268	138,723	138,157	137,567	136,960	136,331	135,686	135,023	134,343	137,031
Commercial Prescriptive	Refrigeration - High Efficiency Compressor	36,583	36,495	36,398	36,293	36,180	36,060	35,932	35,797	35,656	35,509	35,355	35,196	35,031	34,860	34,685	34,504	34,320	34,131	33,937	33,740	34,414
Commercial Prescriptive	Refrigeration - High Efficiency Evaporator Fan Motors	57	57	57	57	57	57	57	57	56	56	56	56	56	56	56	55	55	54	54	54	55
Commercial Prescriptive	Refrigeration - Strip Curtain	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Commercial Prescriptive	Ventilation - Demand Controlled	51	51	51	51	51	51	51	50	50	50	50	50	50	50	49	49	49	49	49	49	49
Commercial Prescriptive	Ventilation - Fan Drive Improvements	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Commercial Prescriptive	Ventilation - High Efficiency Motors	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Commercial Prescriptive	Ventilation - Variable Speed Control	41	41	41	40	40	40	40	40	40	40	40	39	39	39	39	39	38	36	36	36	38
Commercial Custom	Kitchen Ventilation - Advanced Controls	10	14	19	20	25	27	30	33	35	40	44	47	51	55	58	60	64	69	73	76	77
Commercial Custom	Water Heater - ENERGY STAR Dishwasher (3.0)	193,313	192,269	191,957	192,253	192,169	192,127	238,540	271,042	300,049	323,444	341,848	422,799	413,171	417,597	416,671	232,461	248,615	267,363	286,813	307,262	313,408
Commercial Custom	Chiller - Plant Optimization	33	33	33	33	33	33	33	33	33	33	32	32	32	32	32	31	31	31	31	30	31
Commercial Custom	Chiller - Variable Flow Chilled Water Pump	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	12	12	12	12	12	12
Commercial Custom	Chiller - Variable Speed Fans	16	16	16	17	18	19	22	22	24	24	24	24	26	26	26	25	26	26	25	25	26
Commercial Custom	Commercial Laundry - ENERGY STAR Washer (8.0)	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-
Commercial Custom	Grocery - Display Case - LED Lighting	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Commercial Custom	Infiltration Control - Loading Dock Sealing	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3
Commercial Custom	Lodging - Guest Room Controls	2	2	2	3	3	4	4	4	5	5	6	6	7	7	8	6	7	7	7	7	7
Commercial Custom	Refrigeration - Heat Recovery	10,646	15,166	18,338	21,563	24,834	28,153	31,505	34,907	38,353	41,839	45,362	48,925	52,528	56,170	59,849	52,915	52,148	52,760	53,350	53,933	55,011
Commercial Custom	Refrigeration - High Efficiency Compressor	2,988	3,764	4,549	5,347	6,156	6,976	7,804	8,644	9,494	10,353	11,221	12,098	12,984	13,880	14,785	12,708	12,854	12,997	13,134	13,269	13,535
Commercial Custom	Refrigeration - High Efficiency Evaporator Fan Motors	5	6	7	9	10	11	12	14	16	16	17	18	21	22	25	21	21	21	21	22	22
Commercial Custom	Ventilation - Demand Controlled	5	6	7	9	10	11	11	14	17	18	13	14	14	14	14	14	15	15	17	17	17
Commercial Custom	Ventilation - Fan Drive Improvements	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Commercial Custom	Ventilation - Variable Speed Control	3	3	5	6	7	7	8	8	9	10	10	10	12	14	15	12	12	12	12	13	13
Commercial Custom	Water Heater - Pipe Insulation	2	2	3	3	5	7	7	7	8	8	8	9	11	11	11	10	10	10	11	11	11
Commercial Custom	Water Heater - Pre-Rinse Spray Valve	2	2	3	3	4	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
Battery Storage DLC	Battery Storage DLC	17	43	79	117	165	216	283	352	420	501	509	516	523	529	534	540	547	556	566	577	577
CPP	CPP	2,327	6,972	16,209	20,676	22,766	22,498	22,171	22,229	22,281	22,322	22,366	22,404	22,436	22,446	22,451	22,467	22,482	22,489	22,490	22,480	22,480
Grid-Interactive WH	Grid-Interactive WH	21	76	206	298	363	390	415	438	458	420	383	349	318	289	263	241	222	201	184	169	169
Smart Appliances DLC	Smart Appliances DLC	776	2,277	5,067	6,313	6,864	6,776	6,670	6,694	6,717	6,738	6,756	6,773	6,789	6,805	6,819	6,839	6,859	6,877	6,897	6,915	6,915
Smart Thermostats DLC	Smart Thermostats DLC	574	1,303	2,191	3,387	4,600	5,979	7,525	7,576	7,621	7,666	7,710	7,755	7,800	7,845	7,891	7,883	7,887	7,892	7,906	7,929	7,929
TOU Opt-Out	TOU Opt-Out	11,116	32,294	70,300	86,462	93,265	91,883	90,218	90,429	90,609	90,745	90,900	91,027	91,131	91,129	91,104	91,133	91,153	91,136	91,091	90,994	90,994
Battery Storage DLC	Battery Storage DLC	-	1	2	2	4	5	7	8	10	13	13	14	14	15	15	15	16	17	17	18	18
CPP	CPP	398	1,206	2,839	3,679	4,118	4,145	4,170	4,203	4,235	4,265	4,294	4,322	4,348	4,362	4,375	4,385	4,392	4,398	4,402	4,400	4,400
Curtailment - Firm	Curtailment - Firm	20	33	41	42	42	43	43	44	44	45	45	45	46	46	47	47	48	48	49	49	49
Curtailment - Non-Firm	Curtailment - Non-Firm	30	48	61	62	62	63	64	64	65	66	66	67	67	68	69	69	70	71	71	72	72
Grid-Interactive WH	Grid-Interactive WH	3	10	28	40	47	50	52	54	55	50	45	41	37	33	30	27	25	22	20	18	18
Smart Thermostats DLC	Smart Thermostats DLC	12	28	47	73	99	129	163	164	166	167	169	170	171	173	174	175	176	177	178	180	180
TOU Opt-Out	TOU Opt-Out	2,270	6,667	14,724	18,449	20,286	20,407	20,512	20,668	20,816	20,952	21,083	21,206	21,320	21,368	21,401	21,422	21,429	21,425	21,412	21,364	21,364

Table 5-21 – Cumulative End-Use Measure Installations

Bundle	Measure	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential Prescriptive	Advanced Power Strips - Tier 1	1,763	3,566	5,410	7,294	9,218	11,178	13,177	15,109	17,058	19,028	21,018	23,027	25,054	27,102	29,172	31,263	33,375	35,509	37,665	39,843	42,066
Residential Prescriptive	Air Purifier	1,876	3,880	5,985	8,165	10,406	12,586	14,693	16,784	18,900	19,180	19,813	20,283	20,734	21,142	21,604	22,129	22,659	23,157	23,674	23,744	23,816
Residential Prescriptive	Connected Thermostat - ENERGY STAR (1.0)	2,660	5,361	8,105	10,891	13,720	16,591	19,505	22,461	25,459	28,499	31,582	34,708	37,878	41,090	44,346	47,645	50,989	54,376	57,806	61,281	64,827
Residential Prescriptive	Pool Pump	3,553	7,370	11,389	15,207	18,836	22,404	25,991	26,141	26,815	27,137	27,658	28,318	28,980	29,579	30,089	30,089	30,253	30,392	30,528	30,812	31,102
Residential Prescriptive	Thermostat - Programmable	1,115	2,243	3,385	4,542	5,712	6,896	8,095	9,309	10,537	11,779	13,035	14,307	15,592	16,892	18,207	19,536	20,880	22,237	23,610	24,997	26,411
Residential Prescriptive	Water Heater - Pipe Insulation	848	1,712	2,589	3,480	4,384	5,301	6,233	7,177	8,135	9,107	10,092	11,091	12,102	13,128	14,167	15,219	16,285	17,364	18,457	19,563	20,692
Income Eligible Lighting	General Service Lighting	4,080	8,413	12,983	17,201	21,128	24,516	27,827	31,055	32,735	34,423	36,136	36,270	36,347	36,436	36,534	37,117	37,326	37,677	38,188	38,970	39,767
SBDI	Commercial Laundry - ENERGY STAR Washer (8.0)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	23
SBDI	Grocery - Display Case - Door Retrofit	41,093	82,116	123,061	163,916	204,673	245,323	285,857	326,270	366,553	406,698	446,697	486,545	526,235	565,762	605,116	644,295	683,293	722,103	760,722	799,143	838,337
SBDI	Grocery - Display Case - LED Lighting	5	10	15	20	25	30	35	40	44	48	52	56	60	64	68	72	76	80	84	88	92
SBDI	Grocery - Display Case - Low-Heat/No-Heat Doors	-	-	16	32	48	64	80	96	112	128	144	160	176	192	208	223	238	253	268	283	299
SBDI	Grocery - Open Display Case - Night Covers	-	-	-	-	-	-	8,237	16,452	24,642	32,806	40,942	49,048	57,123	65,165	73,173	81,145	89,080	96,977	104,834	112,651	120,624
SBDI	Water Heater - Faucet Aerators/Low Flow Nozzles	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
SBDI	Water Heater - Low-Flow Showerheads	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
SBDI	Water Heater - Pipe Insulation	37	74	111	148	185	222	259	295	331	367	403	439	475	511	547	582	617	652	687	722	758
SBDI	Water Heater - Pre-Rinse Spray Valve	25	50	75	100	125	150	175	200	225	250	274	298	321	344	367	390	413	436	459	482	505
SBDI	Water Heater - Thermostatic Shower Restriction Valve	-	-	-	-	64	128	192	256	319	380	441	502	563	624	685	745	805	865	924	983	1,043
Commercial Prescriptive	Kitchen Ventilation - Advanced Controls	35	69	103	137	186	235	284	332	380	427	474	521	567	613	659	705	750	795	840	885	930
Commercial Prescriptive	Water Heater - ENERGY STAR Dishwasher (3.0)	585,363	1,220,824	1,895,610	2,601,075	3,330,287	4,077,671	4,739,426	5,352,346	5,941,646	6,524,127	7,110,544	7,792,187	8,495,692	9,215,647	9,947,721	10,669,444	11,370,695	12,048,812	12,705,326	13,343,852	13,995,149
Commercial Prescriptive	Commercial Laundry - ENERGY STAR Washer (8.0)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	23
Commercial Prescriptive	Grocery - Display Case - Door Retrofit	41,093	82,116	123,061	163,916	204,673	245,323	285,857	326,270	366,553	406,698	446,697	486,545	526,235	565,762	605,116	644,295	683,293	722,103	760,722	799,143	838,337
Commercial Prescriptive	Grocery - Display Case - LED Lighting	5	10	15	20	25	30	35	40	44	48	52	56	60	64	68	72	76	80	84	88	92
Commercial Prescriptive	Lodging - Guest Room Controls	16	32	48	64	80	96	112	127	142	157	172	187	202	217	232	247	262	277	291	305	320
Commercial Prescriptive	Refrigeration - Heat Recovery	143,539	286,841	429,872	572,599	714,991	857,019	998,653	1,139,866	1,280,629	1,420,919	1,560,710	1,699,978	1,838,701	1,976,858	2,114,425	2,251,385	2,387,716	2,523,402	2,658,425	2,792,768	2,929,799
Commercial Prescriptive	Refrigeration - High Efficiency Compressor	36,583	73,078	109,476	145,769	181,949	218,009	253,941	289,738	325,394	360,903	396,258	431,454	466,485	501,345	536,030	570,534	604,854	638,985	672,922	706,662	741,076
Commercial Prescriptive	Refrigeration - High Efficiency Evaporator Fan Motors	57	114	171	228	285	342	399	456	512	568	624	680	736	792	848	903	958	1,012	1,066	1,120	1,175
Commercial Prescriptive	Refrigeration - Strip Curtain	3	6	9	12	15	18	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49
Commercial Prescriptive	Ventilation - Demand Controlled	51	102	153	204	255	306	357	407	457	507	557	607	657	707	756	805	854	903	952	1,001	1,050
Commercial Prescriptive	Ventilation - Fan Drive Improvements	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
Commercial Prescriptive	Ventilation - High Efficiency Motors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Commercial Prescriptive	Ventilation - Variable Speed Control	41	82	123	163	203	243	283	323	363	403	443	482	521	560	599	638	676	712	748	784	822
Commercial Custom	Kitchen Ventilation - Advanced Controls	10	24	43	63	88	115	145	178	213	253	297	344	395	450	508	568	632	701	774	850	927
Commercial Custom	Water Heater - ENERGY STAR Dishwasher (3.0)	193,313	385,582	577,539	769,792	961,961	1,154,088	1,392,628	1,663,670	1,963,719	2,287,163	2,629,011	3,051,810	3,464,981	3,882,578	4,299,249	4,531,710	4,780,325	5,047,688	5,334,501	5,641,763	5,955,171
Commercial Custom	Chiller - Plant Optimization	33	66	99	132	165	198	231	264	297	330	362	394	426	458	490	521	552	583	614	644	675
Commercial Custom	Chiller - Variable Flow Chilled Water Pump	13	26	39	52	65	78	91	104	117	130	143	156	169	182	195	207	219	231	243	255	267
Commercial Custom	Chiller - Variable Speed Fans	16	32	48	65	83	102	124	146	170	194	218	242	268	294	320	345	371	397	422	447	473
Commercial Custom	Commercial Laundry - ENERGY STAR Washer (8.0)	-	-	-	-	-	-	-	1	2	3	3	3	3	3	3	3	3	3	3	3	3
Commercial Custom	Grocery - Display Case - LED Lighting	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Commercial Custom	Infiltration Control - Loading Dock Sealing	2	4	6	8	10	12	14	16	19	22	25	28	31	34	37	40	43	46	49	52	55
Commercial Custom	Lodging - Guest Room Controls	2	4	6	9	12	16	20	24	29	34	40	46	53	60	68	74	81	88	95	102	109
Commercial Custom	Refrigeration - Heat Recovery	10,646	25,812	44,150	65,713	90,547	118,700	150,205	185,112	223,465	265,304	310,666	359,591	412,119	468,289	528,138	581,053	633,201	685,961	739,311	793,244	848,255
Commercial Custom	Refrigeration - High Efficiency Compressor	2,988	6,752	11,301	16,648	22,804	29,780	37,584	46,228	55,722	66,075	77,296	89,394	102,378	116,258	131,043	143,751	156,605	169,602	182,736	196,005	209,540
Commercial Custom	Refrigeration - High Efficiency Evaporator Fan Motors	5	11	18	27	37	48	60	74	90	106	123	141	162	184	209	230	251	272	293	315	337
Commercial Custom	Ventilation - Demand Controlled	5	11	18	27	37	48	59	73	90	108	121	135	149	163	177	191	206	221	238	255	272
Commercial Custom	Ventilation - Fan Drive Improvements	-	-	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Commercial Custom	Ventilation - Variable Speed Control	3	6	11	17	24	31	39	47	56	66	76	86	98	112	127	139	151	163	175	188	201
Commercial Custom	Water Heater - Pipe Insulation	2	4	7	10	15	22	29	36	44	52	60	69	80	91	102	112	122	132	143	154	165
Commercial Custom	Water Heater - Pre-Rinse Spray Valve	2	4	7	10	14	16	18	20	22	24	26	28	31	34	37	40	43	46	49	52	55
Battery Storage DLC	Battery Storage DLC	17	43	79	117	165	216	283	352	420	501	509	516	523	529	534	540	547	556	566	577	577
CPP	CPP	2,327	6,972	16,209	20,676	22,766	22,498	22,171	22,229	22,281	22,322	22,366	22,404	22,436	22,446	22,451	22,467	22,482	22,489	22,490	22,480	22,480
Grid-Interactive WH	Grid-Interactive WH	21	76	206	298	363	390	415	438	458	420	383	349	318	289	263	241	222	201	184	169	169
Smart Appliances DLC	Smart Appliances DLC	776	2,277	5,067	6,313	6,864	6,776	6,670	6,694	6,717	6,738	6,756	6,773	6,789	6,805	6,819	6,839	6,859	6,877	6,897	6,915	6,915
Smart Thermostats DLC	Smart Thermostats DLC	574	1,303	2,191	3,387	4,600	5,979	7,525	7,576	7,621	7,666	7,710	7,755	7,800	7,845	7,891	7,883	7,887	7,892	7,906	7,929	7,929
TOU Opt-Out	TOU Opt-Out	11,116	32,294	70,300	86,462	93,265	91,883	90,218	90,429	90,609	90,745	90,900	91,027	91,131	91,129	91,104	91,133	91,153	91,136	91,091	90,994	90,994
Battery Storage DLC	Battery Storage DLC	-	1	2	2	4	5	7	8	10	13	13	14	14	15	15	15	16	17	17	18	18
CPP	CPP	398	1,206	2,839	3,679	4,118	4,145	4,170	4,203	4,235	4,265	4,294	4,322	4,348	4,362	4,375	4,385	4,392	4,398	4,402	4,400	4,400
Curtailment - Firm	Curtailment - Firm	20	33	41	42	42	43	43	44	44	45	45	45	46	46	47	47	48	48	49	49	49
Curtailment - Non-Firm	Curtailment - Non-Firm	30	48	61	62	62	63	64	64	65	66	66	67	67	68	69	69	70	71	71	72	72
Grid-Interactive WH	Grid-Interactive WH	3	10	28	40	47	50	52	54	55	50	45	41	37	33	30	27	25	22	20	18	18
Smart Thermostats DLC	Smart Thermostats DLC	12	28	47	73	99	129	163	164	166	167	169	170	171	173	174	175	176	177	178	180	180
TOU Opt-Out	TOU Opt-Out	2,270	6,667	14,724	18,449	20,286	20,407	20,512	20,668	20,816	20,952	21,083	21,206	21,320	21,368	21,401	21,422	21,429	21,425	21,412	21,364	21,364

Table 5-22 – Incremental Participation by Program

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	11,815	12,317	12,731	12,716	12,697	12,680	12,738	9,287	9,923	7,826	8,468	8,536	8,606	8,593	8,652	8,296	8,560	8,594	8,705	8,500	8,674
Residential	Income Eligible Lighting	4,080	4,333	4,570	4,218	3,927	3,388	3,311	3,228	1,680	1,688	1,713	134	77	89	98	583	209	351	511	782	797
Total Residential	**Total Residential**	**15,895**	**16,650**	**17,301**	**16,934**	**16,624**	**16,068**	**16,049**	**12,515**	**11,603**	**9,514**	**10,181**	**8,670**	**8,683**	**8,682**	**8,750**	**8,879**	**8,769**	**8,945**	**9,216**	**9,282**	**9,471**
Commercial	Commercial Prescriptive	806,791	856,493	895,372	925,551	948,767	966,348	880,081	830,565	806,222	798,644	801,781	896,173	917,166	932,716	943,896	932,581	911,113	886,954	864,302	845,239	862,151
Commercial	Commercial Custom	207,040	211,299	214,955	219,283	223,291	227,394	277,995	314,748	348,064	375,811	398,605	484,002	478,878	487,849	491,515	298,283	313,823	333,331	353,514	374,685	382,178
Commercial	SBDI	41,419	41,349	41,287	41,047	41,013	40,906	49,027	48,883	48,726	48,560	48,385	48,204	48,014	47,818	47,611	47,397	47,179	46,953	46,721	46,483	47,417
Total Commercial	**Total Commercial**	**1,055,250**	**1,109,141**	**1,151,614**	**1,185,881**	**1,213,071**	**1,234,648**	**1,207,103**	**1,194,196**	**1,203,012**	**1,223,015**	**1,248,771**	**1,428,379**	**1,444,058**	**1,468,383**	**1,483,022**	**1,278,261**	**1,272,115**	**1,267,238**	**1,264,537**	**1,266,407**	**1,291,746**
Portfolio	**EE Programs**	**1,071,145**	**1,125,791**	**1,168,915**	**1,202,815**	**1,229,695**	**1,250,716**	**1,223,152**	**1,206,711**	**1,214,615**	**1,232,529**	**1,258,952**	**1,437,049**	**1,452,741**	**1,477,065**	**1,491,772**	**1,287,140**	**1,280,884**	**1,276,183**	**1,273,753**	**1,275,689**	**1,301,217**
Residential	Battery Storage DLC	17	43	79	117	165	216	283	352	420	501	509	516	523	529	534	540	547	556	566	577	577
Residential	CPP	2,327	6,972	16,209	20,676	22,766	22,498	22,171	22,229	22,281	22,322	22,366	22,404	22,436	22,446	22,451	22,467	22,482	22,489	22,490	22,480	22,480
Residential	Grid-Interactive WH	21	76	206	298	363	390	415	438	458	420	383	349	318	289	263	241	222	201	184	169	169
Residential	Smart Appliances DLC	776	2,277	5,067	6,313	6,864	6,776	6,670	6,694	6,717	6,738	6,756	6,773	6,789	6,805	6,819	6,839	6,859	6,877	6,897	6,915	6,915
Residential	Smart Thermostats DLC	574	1,303	2,191	3,387	4,600	5,979	7,525	7,576	7,621	7,666	7,710	7,755	7,800	7,845	7,891	7,883	7,887	7,892	7,906	7,929	7,929
Residential	TOU Opt-Out	11,116	32,294	70,300	86,462	93,265	91,883	90,218	90,429	90,609	90,745	90,900	91,027	91,131	91,129	91,104	91,133	91,153	91,136	91,091	90,994	90,994
Commercial	Battery Storage DLC	0	1	2	2	4	5	7	8	10	13	13	14	14	15	15	15	16	17	17	18	18
Commercial	CPP	398	1,206	2,839	3,679	4,118	4,145	4,170	4,203	4,235	4,265	4,294	4,322	4,348	4,362	4,375	4,385	4,392	4,398	4,402	4,400	4,400
Commercial	Curtailment - Firm	20	33	41	42	42	43	43	44	44	45	45	45	46	46	47	47	48	48	49	49	49
Commercial	Curtailment - Non-Firm	30	48	61	62	62	63	64	64	65	66	66	67	67	68	69	69	70	71	71	72	72
Commercial	Grid-Interactive WH	3	10	28	40	47	50	52	54	55	50	45	41	37	33	30	27	25	22	20	18	18
Commercial	Smart Thermostats DLC	12	28	47	73	99	129	163	164	166	167	169	170	171	173	174	175	176	177	178	180	180
Commercial	TOU Opt-Out	2,270	6,667	14,724	18,449	20,286	20,407	20,512	20,668	20,816	20,952	21,083	21,206	21,320	21,368	21,401	21,422	21,429	21,425	21,412	21,364	21,364
Total Demand Respo	**Total Demand Response**	**17,564**	**50,958**	**111,794**	**139,600**	**152,681**	**152,584**	**152,293**	**152,923**	**153,497**	**153,950**	**154,339**	**154,689**	**155,000**	**155,108**	**155,173**	**155,243**	**155,306**	**155,309**	**155,283**	**155,165**	**155,165**
Total Portfolio	**Total Portfolio**	**1,088,709**	**1,176,749**	**1,280,709**	**1,342,415**	**1,382,376**	**1,403,300**	**1,375,445**	**1,359,634**	**1,368,112**	**1,386,479**	**1,413,291**	**1,591,738**	**1,607,741**	**1,632,173**	**1,646,945**	**1,442,383**	**1,436,190**	**1,431,492**	**1,429,036**	**1,430,854**	**1,456,382**

Table 5-23 – Cumulative Participation by Program

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	11,815	24,132	36,863	49,579	62,276	74,956	87,694	96,981	106,904	114,730	123,198	131,734	140,340	148,933	157,585	165,881	174,441	183,035	191,740	200,240	208,914
Residential	Income Eligible Lighting	4,080	8,413	12,983	17,201	21,128	24,516	27,827	31,055	32,735	34,423	36,136	36,270	36,347	36,436	36,534	37,117	37,326	37,677	38,188	38,970	39,767
Total Residential	**Total Residential**	**15,895**	**32,545**	**49,846**	**66,780**	**83,404**	**99,472**	**115,521**	**128,036**	**139,639**	**149,153**	**159,334**	**168,004**	**176,687**	**185,369**	**194,119**	**202,998**	**211,767**	**220,712**	**229,928**	**239,210**	**248,681**
Commercial	Commercial Prescriptive	806,791	1,663,284	2,558,656	3,484,207	4,432,974	5,399,322	6,279,403	7,109,968	7,916,190	8,714,834	9,516,615	10,412,788	11,329,954	12,262,670	13,206,566	14,139,147	15,050,260	15,937,214	16,801,516	17,646,755	18,508,906
Commercial	Commercial Custom	207,040	418,339	633,294	852,577	1,075,868	1,303,262	1,581,257	1,896,005	2,244,069	2,619,880	3,018,485	3,502,487	3,981,365	4,469,214	4,960,729	5,259,012	5,572,835	5,906,166	6,259,680	6,634,365	7,016,543
Commercial	SBDI	41,419	82,768	124,055	165,102	206,115	247,021	296,048	344,931	393,657	442,217	490,602	538,806	586,820	634,638	682,249	729,646	776,825	823,778	870,499	916,982	964,399
Total Commercial	**Total Commercial**	**1,055,250**	**2,164,391**	**3,316,005**	**4,501,886**	**5,714,957**	**6,949,605**	**8,156,708**	**9,350,904**	**10,553,916**	**11,776,931**	**13,025,702**	**14,454,081**	**15,898,139**	**17,366,522**	**18,849,544**	**20,127,805**	**21,399,920**	**22,667,158**	**23,931,695**	**25,198,102**	**26,489,848**
Portfolio	**EE Programs**	**1,071,145**	**2,196,936**	**3,365,851**	**4,568,666**	**5,798,361**	**7,049,077**	**8,272,229**	**9,478,940**	**10,693,555**	**11,926,084**	**13,185,036**	**14,622,085**	**16,074,826**	**17,551,891**	**19,043,663**	**20,330,803**	**21,611,687**	**22,887,870**	**24,161,623**	**25,437,312**	**26,738,529**
Residential	Battery Storage DLC	17	60	139	256	421	637	920	1,272	1,692	2,193	2,702	3,218	3,741	4,270	4,804	5,344	5,891	6,447	7,013	7,590	8,167
Residential	CPP	2,327	9,299	25,508	46,184	68,950	91,448	113,619	135,848	158,129	180,451	202,817	225,221	247,657	270,103	292,554	315,021	337,503	359,992	382,482	404,962	427,442
Residential	Grid-Interactive WH	21	97	303	601	964	1,354	1,769	2,207	2,665	3,085	3,468	3,817	4,135	4,424	4,687	4,928	5,150	5,351	5,535	5,704	5,873
Residential	Smart Appliances DLC	776	3,053	8,120	14,433	21,297	28,073	34,743	41,437	48,154	54,892	61,648	68,421	75,210	82,015	88,834	95,673	102,532	109,409	116,306	123,221	130,136
Residential	Smart Thermostats DLC	574	1,877	4,068	7,455	12,055	18,034	25,559	33,135	40,756	48,422	56,132	63,887	71,687	79,532	87,423	95,306	103,193	111,085	118,991	126,920	134,849
Residential	TOU Opt-Out	11,116	43,410	113,710	200,172	293,437	385,320	475,538	565,967	656,576	747,321	838,221	929,248	1,020,379	1,111,508	1,202,612	1,293,745	1,384,898	1,476,034	1,567,125	1,658,119	1,749,113
Commercial	Battery Storage DLC	0	1	3	5	9	14	21	29	39	52	65	79	93	108	123	138	154	171	188	206	224
Commercial	CPP	398	1,604	4,443	8,122	12,240	16,385	20,555	24,758	28,993	33,258	37,552	41,874	46,222	50,584	54,959	59,344	63,736	68,134	72,536	76,936	81,336
Commercial	Curtailment - Firm	20	53	94	136	178	221	264	308	352	397	442	487	533	579	626	673	721	769	818	867	916
Commercial	Curtailment - Non-Firm	30	78	139	201	263	326	390	454	519	585	651	718	785	853	922	991	1,061	1,132	1,203	1,275	1,347
Commercial	Grid-Interactive WH	3	13	41	81	128	178	230	284	339	389	434	475	512	545	575	602	627	649	669	687	705
Commercial	Smart Thermostats DLC	12	40	87	160	259	388	551	715	881	1,048	1,217	1,387	1,558	1,731	1,905	2,080	2,256	2,433	2,611	2,791	2,971
Commercial	TOU Opt-Out	2,270	8,937	23,661	42,110	62,396	82,803	103,315	123,983	144,799	165,751	186,834	208,040	229,360	250,728	272,129	293,551	314,980	336,405	357,817	379,181	400,545
Total Demand Response	**Total Demand Response**	**17,564**	**68,522**	**180,316**	**319,916**	**472,597**	**625,181**	**777,474**	**930,397**	**1,083,894**	**1,237,844**	**1,392,183**	**1,546,872**	**1,701,872**	**1,856,980**	**2,012,153**	**2,167,396**	**2,322,702**	**2,478,011**	**2,633,294**	**2,788,459**	**2,943,624**
Total Portfolio	**Total Portfolio**	**1,088,709**	**2,265,458**	**3,546,167**	**4,888,582**	**6,270,958**	**7,674,258**	**9,049,703**	**10,409,337**	**11,777,449**	**13,163,928**	**14,577,219**	**16,168,957**	**17,776,698**	**19,408,871**	**21,055,816**	**22,498,199**	**23,934,389**	**25,365,881**	**26,794,917**	**28,225,771**	**29,682,153**

4. For each year of the planning horizon, an estimate of the incremental and cumulative demand reduction and energy savings due to the potential demand-side program; and

An estimate of the realistic achievable potential incremental and cumulative demand reductions and energy savings due to the DSM Programs is shown in the tables below.

Table 5-24 – Incremental Net Demand Reductions by Program (MW)

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	0.32	0.34	0.35	0.35	0.35	0.35	0.35	0.32	0.33	0.24	0.26	0.26	0.26	0.26	0.26	0.26	0.27	0.27	0.27	0.26	0.26
Residential	Income Eligible Lighting	0.37	0.39	0.42	0.37	0.34	0.29	0.28	0.28	0.10	0.10	0.10	0.01	0.01	0.01	0.01	0.06	0.02	0.03	0.04	0.07	0.07
Total Residential	**Total Residential**	**0.70**	**0.73**	**0.76**	**0.72**	**0.69**	**0.64**	**0.64**	**0.60**	**0.43**	**0.34**	**0.36**	**0.27**	**0.27**	**0.27**	**0.27**	**0.32**	**0.29**	**0.30**	**0.32**	**0.33**	**0.33**
Commercial	Commercial Prescriptive	1.80	1.80	1.80	1.80	1.80	1.80	1.79	1.78	1.77	1.77	1.76	1.76	1.76	1.75	1.74	1.74	1.73	1.72	1.71	1.70	1.74
Commercial	Commercial Custom	0.17	0.21	0.25	0.29	0.33	0.37	0.42	0.46	0.51	0.55	0.59	0.64	0.68	0.73	0.77	0.66	0.67	0.68	0.69	0.70	0.71
Commercial	SBDI	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Total Commercial	**Total Commercial**	**2.04**	**2.08**	**2.12**	**2.16**	**2.20**	**2.24**	**2.28**	**2.31**	**2.36**	**2.39**	**2.43**	**2.47**	**2.51**	**2.55**	**2.59**	**2.47**	**2.47**	**2.47**	**2.47**	**2.48**	**2.52**
Portfolio	**EE Programs**	**2.73**	**2.81**	**2.88**	**2.88**	**2.90**	**2.89**	**2.92**	**2.91**	**2.78**	**2.73**	**2.79**	**2.74**	**2.78**	**2.82**	**2.86**	**2.79**	**2.76**	**2.77**	**2.79**	**2.80**	**2.86**
Residential	Battery Storage DLC	0.11	0.28	0.52	0.77	1.09	1.43	1.87	2.32	2.77	3.31	3.36	3.41	3.45	3.49	3.52	3.56	3.61	3.67	3.74	3.81	3.81
Residential	CPP	1.22	3.62	8.34	10.51	11.44	11.17	10.88	10.80	10.72	10.64	10.57	10.50	10.43	10.36	10.29	10.23	10.17	10.11	10.04	9.97	9.97
Residential	Grid-Interactive WH	0.04	0.13	0.36	0.53	0.64	0.69	0.73	0.77	0.81	0.74	0.68	0.62	0.56	0.51	0.47	0.43	0.39	0.36	0.33	0.30	0.30
Residential	Smart Appliances DLC	0.36	1.05	2.34	2.92	3.17	3.13	3.08	3.09	3.10	3.11	3.12	3.13	3.14	3.14	3.15	3.16	3.17	3.18	3.19	3.19	3.19
Residential	Smart Thermostats DLC	2.80	6.30	10.49	16.02	21.49	27.60	34.35	34.23	34.11	33.99	33.89	33.80	33.74	33.68	33.64	33.39	33.19	33.02	32.83	32.72	32.72
Residential	TOU Opt-Out	1.91	5.50	11.85	14.40	15.34	14.94	14.50	14.39	14.28	14.17	14.07	13.97	13.88	13.78	13.68	13.59	13.51	13.43	13.32	13.22	13.22
Commercial	Battery Storage DLC	0.00	0.02	0.04	0.04	0.07	0.09	0.13	0.15	0.18	0.24	0.24	0.25	0.25	0.27	0.27	0.27	0.29	0.31	0.31	0.33	0.33
Commercial	CPP	3.21	9.60	22.30	28.50	31.50	31.30	31.10	30.96	30.80	30.66	30.51	30.38	30.24	30.02	29.81	29.59	29.35	29.11	28.84	28.56	28.56
Commercial	Curtailment - Firm	0.52	0.85	1.04	1.05	1.04	1.05	1.04	1.05	1.03	1.05	1.03	1.02	1.03	1.02	1.03	1.02	1.04	1.03	1.04	1.03	1.03
Commercial	Curtailment - Non-Firm	0.78	1.23	1.55	1.55	1.53	1.54	1.54	1.52	1.53	1.53	1.52	1.52	1.51	1.51	1.52	1.50	1.51	1.52	1.50	1.51	1.51
Commercial	Grid-Interactive WH	0.01	0.05	0.14	0.19	0.23	0.24	0.25	0.26	0.27	0.24	0.22	0.20	0.18	0.16	0.15	0.13	0.12	0.11	0.10	0.09	0.09
Commercial	Smart Thermostats DLC	0.07	0.15	0.25	0.39	0.52	0.67	0.83	0.83	0.83	0.82	0.82	0.82	0.81	0.82	0.81	0.81	0.81	0.80	0.80	0.80	0.80
Commercial	TOU Opt-Out	4.96	14.37	31.32	38.72	42.03	41.74	41.44	41.24	41.00	40.79	40.58	40.37	40.17	39.84	39.50	39.15	38.79	38.41	38.00	37.56	37.56
Total Demand Respo	**Total Demand Response**	**16.00**	**43.16**	**90.55**	**115.59**	**130.09**	**135.58**	**141.75**	**141.61**	**141.43**	**141.30**	**140.60**	**139.98**	**139.39**	**138.61**	**137.84**	**136.84**	**135.95**	**135.04**	**134.03**	**133.09**	**133.09**
Total Portfolio	**Total Portfolio**	**18.73**	**45.96**	**93.43**	**118.47**	**132.99**	**138.47**	**144.67**	**144.51**	**144.21**	**144.03**	**143.39**	**142.72**	**142.17**	**141.43**	**140.70**	**139.63**	**138.71**	**137.80**	**136.82**	**135.89**	**135.95**

Table 5-25 – Cumulative Net Demand Reductions by Program (MW)

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	0.32	0.66	1.01	1.36	1.71	2.07	2.42	2.71	3.01	3.18	3.36	3.35	3.31	3.27	3.22	3.18	3.13	3.08	3.04	2.97	2.99
Residential	Income Eligible Lighting	0.37	0.77	1.18	1.55	1.52	1.41	1.28	1.19	0.95	0.76	0.58	0.32	0.23	0.13	0.04	0.08	0.09	0.11	0.15	0.16	0.21
Total Residential	**Total Residential**	**0.70**	**1.42**	**2.19**	**2.91**	**3.23**	**3.48**	**3.70**	**3.89**	**3.96**	**3.94**	**3.94**	**3.67**	**3.54**	**3.40**	**3.26**	**3.26**	**3.23**	**3.20**	**3.19**	**3.13**	**3.21**
Commercial	Commercial Prescriptive	1.80	3.60	5.40	7.20	8.99	10.79	12.57	14.34	16.10	17.86	19.54	21.23	22.92	24.60	26.27	26.21	26.14	26.07	25.99	25.90	25.84
Commercial	Commercial Custom	0.17	0.38	0.63	0.91	1.24	1.62	2.03	2.49	3.00	3.55	4.14	4.77	5.44	6.16	6.91	7.40	7.86	8.29	8.68	9.05	9.39
Commercial	SBDI	0.07	0.14	0.21	0.28	0.36	0.43	0.51	0.58	0.65	0.71	0.78	0.84	0.90	0.96	1.02	1.01	1.01	1.00	1.00	1.00	1.00
Total Commercial	**Total Commercial**	**2.04**	**4.11**	**6.24**	**8.39**	**10.59**	**12.83**	**15.11**	**17.40**	**19.75**	**22.12**	**24.46**	**26.84**	**29.26**	**31.71**	**34.20**	**34.62**	**35.01**	**35.36**	**35.67**	**35.94**	**36.23**
Portfolio	**EE Programs**	**2.73**	**5.54**	**8.42**	**11.30**	**13.82**	**16.31**	**18.81**	**21.30**	**23.70**	**26.06**	**28.40**	**30.50**	**32.79**	**35.11**	**37.46**	**37.88**	**38.24**	**38.56**	**38.86**	**39.08**	**39.43**
Residential	Battery Storage DLC	0.11	0.28	0.52	0.77	1.09	1.43	1.87	2.32	2.77	3.31	3.36	3.41	3.45	3.49	3.52	3.56	3.61	3.67	3.74	3.81	3.81
Residential	CPP	1.22	3.62	8.34	10.51	11.44	11.17	10.88	10.80	10.72	10.64	10.57	10.50	10.43	10.36	10.29	10.23	10.17	10.11	10.04	9.97	9.97
Residential	Grid-Interactive WH	0.04	0.13	0.36	0.53	0.64	0.69	0.73	0.77	0.81	0.74	0.68	0.62	0.56	0.51	0.47	0.43	0.39	0.36	0.33	0.30	0.30
Residential	Smart Appliances DLC	0.36	1.05	2.34	2.92	3.17	3.13	3.08	3.09	3.10	3.11	3.12	3.13	3.14	3.14	3.15	3.16	3.17	3.18	3.19	3.19	3.19
Residential	Smart Thermostats DLC	2.80	6.30	10.49	16.02	21.49	27.60	34.35	34.23	34.11	33.99	33.89	33.80	33.74	33.68	33.64	33.39	33.19	33.02	32.83	32.72	32.72
Residential	TOU Opt-Out	1.91	5.50	11.85	14.40	15.34	14.94	14.50	14.39	14.28	14.17	14.07	13.97	13.88	13.78	13.68	13.59	13.51	13.43	13.32	13.22	13.22
Commercial	Battery Storage DLC	0.00	0.02	0.04	0.04	0.07	0.09	0.13	0.15	0.18	0.24	0.24	0.25	0.25	0.27	0.27	0.27	0.29	0.31	0.31	0.33	0.33
Commercial	CPP	3.21	9.60	22.30	28.50	31.50	31.30	31.10	30.96	30.80	30.66	30.51	30.38	30.24	30.02	29.81	29.59	29.35	29.11	28.84	28.56	28.56
Commercial	Curtailment - Firm	0.52	0.85	1.04	1.05	1.04	1.05	1.04	1.05	1.03	1.05	1.03	1.02	1.03	1.02	1.03	1.02	1.04	1.03	1.04	1.03	1.03
Commercial	Curtailment - Non-Firm	0.78	1.23	1.55	1.55	1.53	1.54	1.54	1.52	1.53	1.53	1.52	1.52	1.51	1.51	1.52	1.50	1.51	1.52	1.50	1.51	1.51
Commercial	Grid-Interactive WH	0.01	0.05	0.14	0.19	0.23	0.24	0.25	0.26	0.27	0.24	0.22	0.20	0.18	0.16	0.15	0.13	0.12	0.11	0.10	0.09	0.09
Commercial	Smart Thermostats DLC	0.07	0.15	0.25	0.39	0.52	0.67	0.83	0.83	0.83	0.82	0.82	0.82	0.81	0.82	0.81	0.81	0.81	0.80	0.80	0.80	0.80
Commercial	TOU Opt-Out	4.96	14.37	31.32	38.72	42.03	41.74	41.44	41.24	41.00	40.79	40.58	40.37	40.17	39.84	39.50	39.15	38.79	38.41	38.00	37.56	37.56
Total Demand Response	**Total Demand Response**	**16.00**	**43.16**	**90.55**	**115.59**	**130.09**	**135.58**	**141.75**	**141.61**	**141.43**	**141.30**	**140.60**	**139.98**	**139.39**	**138.61**	**137.84**	**136.84**	**135.95**	**135.04**	**134.03**	**133.09**	**133.09**
Total Portfolio	**Total Portfolio**	**18.73**	**64.70**	**158.13**	**276.60**	**409.58**	**548.05**	**692.72**	**837.24**	**981.45**	**1,125.48**	**1,268.87**	**1,411.59**	**1,553.76**	**1,695.19**	**1,835.89**	**1,975.52**	**2,114.23**	**2,252.03**	**2,388.86**	**2,524.75**	**2,660.70**

Table 5-26 – Incremental Net Energy Savings by Program (MWh)

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	801	810	820	893	902	908	915	877	890	832	854	857	865	871	881	888	899	908	919	913	932
Residential	Income Eligible Lighting	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Residential	**Total Residential**	**802**	**812**	**820**	**894**	**902**	**908**	**915**	**878**	**890**	**832**	**854**	**857**	**865**	**871**	**881**	**888**	**899**	**908**	**919**	**913**	**932**
Commercial	Commercial Prescriptive	2,982	2,979	2,974	2,960	2,959	2,949	2,916	2,869	2,840	2,824	2,809	2,806	2,795	2,783	2,767	2,749	2,728	2,701	2,674	2,654	2,710
Commercial	Commercial Custom	337	396	467	534	611	678	751	821	915	983	1,028	1,102	1,189	1,259	1,325	1,133	1,155	1,170	1,194	1,216	1,235
Commercial	SBDI	335	334	373	372	387	385	393	387	378	375	374	372	371	369	367	353	352	350	348	346	361
Total Commercial	**Total Commercial**	**3,654**	**3,709**	**3,814**	**3,867**	**3,957**	**4,011**	**4,060**	**4,077**	**4,134**	**4,182**	**4,212**	**4,280**	**4,354**	**4,410**	**4,459**	**4,236**	**4,234**	**4,221**	**4,216**	**4,217**	**4,305**
Portfolio	**EE Programs**	**4,456**	**4,521**	**4,635**	**4,760**	**4,859**	**4,920**	**4,975**	**4,955**	**5,024**	**5,014**	**5,065**	**5,137**	**5,219**	**5,282**	**5,341**	**5,124**	**5,134**	**5,129**	**5,134**	**5,130**	**5,237**
Residential	Battery Storage DLC	2	4	8	12	16	21	28	35	42	50	50	51	52	52	53	53	54	55	56	57	57
Residential	CPP	24	72	167	210	229	223	218	216	214	213	211	210	209	207	206	205	203	202	201	199	199
Residential	Grid-Interactive WH	1	4	10	15	18	19	21	22	23	21	19	17	16	14	13	12	11	10	9	8	8
Residential	Smart Appliances DLC	242	711	1,582	1,972	2,144	2,116	2,083	2,091	2,098	2,104	2,110	2,115	2,120	2,125	2,130	2,136	2,142	2,148	2,154	2,160	2,160
Residential	Smart Thermostats DLC	112	252	420	641	860	1,104	1,374	1,369	1,364	1,360	1,355	1,352	1,349	1,347	1,346	1,335	1,328	1,321	1,313	1,309	1,309
Residential	TOU Opt-Out	1,010	2,903	6,259	7,602	8,102	7,887	7,658	7,596	7,539	7,482	7,428	7,376	7,328	7,274	7,221	7,176	7,132	7,089	7,033	6,981	6,981
Commercial	Battery Storage DLC	0	0	1	1	1	1	2	2	3	4	4	4	4	4	4	4	4	5	5	5	5
Commercial	CPP	64	192	446	570	630	626	622	619	616	613	610	608	605	600	596	592	587	582	577	571	571
Commercial	Curtailment - Firm	25	41	50	50	50	50	50	50	50	50	50	49	50	49	50	49	50	49	50	49	49
Commercial	Curtailment - Non-Firm	38	59	74	74	74	74	74	73	73	74	73	73	72	73	73	72	73	73	72	72	72
Commercial	Grid-Interactive WH	0	1	4	5	6	7	7	7	7	7	6	6	5	4	4	4	3	3	3	2	2
Commercial	Smart Thermostats DLC	3	6	10	15	21	27	33	33	33	33	33	33	33	33	32	32	32	32	32	32	32
Commercial	TOU Opt-Out	2,618	7,586	16,538	20,442	22,191	22,039	21,880	21,773	21,650	21,539	21,426	21,316	21,208	21,034	20,857	20,674	20,480	20,279	20,065	19,833	19,833
Total Demand Respo	**Total Demand Response**	**4,140**	**11,832**	**25,569**	**31,610**	**34,341**	**34,195**	**34,049**	**33,887**	**33,712**	**33,548**	**33,376**	**33,210**	**33,050**	**32,818**	**32,584**	**32,344**	**32,100**	**31,847**	**31,569**	**31,280**	**31,280**
Total Portfolio	**Total Portfolio**	**8,596**	**16,353**	**30,203**	**36,370**	**39,200**	**39,115**	**39,024**	**38,842**	**38,736**	**38,562**	**38,441**	**38,347**	**38,269**	**38,100**	**37,925**	**37,467**	**37,233**	**36,976**	**36,704**	**36,410**	**36,517**

Table 5-27 – Cumulative Net Energy Savings by Program (MWh)

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	801	1,611	2,431	3,325	4,227	5,135	6,050	6,707	7,375	7,950	8,542	8,744	8,878	9,011	9,092	9,171	9,197	9,221	9,253	9,268	9,356
Residential	Income Eligible Lighting	1	3	3	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Residential	**Total Residential**	**802**	**1,614**	**2,434**	**3,328**	**4,229**	**5,136**	**6,051**	**6,708**	**7,375**	**7,951**	**8,542**	**8,744**	**8,878**	**9,011**	**9,093**	**9,171**	**9,197**	**9,221**	**9,253**	**9,268**	**9,356**
Commercial	Commercial Prescriptive	2,982	5,961	8,935	11,896	14,814	17,722	20,598	23,391	26,156	28,903	31,469	34,049	36,623	39,190	41,746	41,578	41,391	41,183	40,962	40,730	40,545
Commercial	Commercial Custom	337	733	1,200	1,735	2,345	3,023	3,773	4,594	5,501	6,476	7,483	8,558	9,715	10,941	12,227	13,005	13,759	14,461	15,114	15,719	16,285
Commercial	SBDI	335	669	1,042	1,414	1,801	2,180	2,568	2,913	3,250	3,584	3,888	4,182	4,474	4,725	4,975	4,938	4,901	4,864	4,827	4,790	4,768
Total Commercial	**Total Commercial**	**3,654**	**7,363**	**11,178**	**15,044**	**18,960**	**22,925**	**26,939**	**30,898**	**34,907**	**38,963**	**42,840**	**46,790**	**50,813**	**54,856**	**58,949**	**59,521**	**60,051**	**60,508**	**60,903**	**61,239**	**61,599**
Portfolio	**EE Programs**	**4,456**	**8,977**	**13,612**	**18,372**	**23,189**	**28,061**	**32,990**	**37,606**	**42,282**	**46,914**	**51,382**	**55,534**	**59,691**	**63,868**	**68,041**	**68,693**	**69,248**	**69,729**	**70,155**	**70,507**	**70,954**
Residential	Battery Storage DLC	2	4	8	12	16	21	28	35	42	50	50	51	52	52	53	53	54	55	56	57	57
Residential	CPP	24	72	167	210	229	223	218	216	214	213	211	210	209	207	206	205	203	202	201	199	199
Residential	Grid-Interactive WH	1	4	10	15	18	19	21	22	23	21	19	17	16	14	13	12	11	10	9	8	8
Residential	Smart Appliances DLC	242	711	1,582	1,972	2,144	2,116	2,083	2,091	2,098	2,104	2,110	2,115	2,120	2,125	2,130	2,136	2,142	2,148	2,154	2,160	2,160
Residential	Smart Thermostats DLC	112	252	420	641	860	1,104	1,374	1,369	1,364	1,360	1,355	1,352	1,349	1,347	1,346	1,335	1,328	1,321	1,313	1,309	1,309
Residential	TOU Opt-Out	1,010	2,903	6,259	7,602	8,102	7,887	7,658	7,596	7,539	7,482	7,428	7,376	7,328	7,274	7,221	7,176	7,132	7,089	7,033	6,981	6,981
Commercial	Battery Storage DLC	0	0	1	1	1	1	2	2	3	4	4	4	4	4	4	4	4	5	5	5	5
Commercial	CPP	64	192	446	570	630	626	622	619	616	613	610	608	605	600	596	592	587	582	577	571	571
Commercial	Curtailment - Firm	25	41	50	50	50	50	50	50	50	50	50	49	50	49	50	49	50	49	50	49	49
Commercial	Curtailment - Non-Firm	38	59	74	74	74	74	74	73	73	74	73	73	72	73	73	72	73	73	72	72	72
Commercial	Grid-Interactive WH	0	1	4	5	6	7	7	7	7	7	6	6	5	4	4	4	3	3	3	2	2
Commercial	Smart Thermostats DLC	3	6	10	15	21	27	33	33	33	33	33	33	33	33	32	32	32	32	32	32	32
Commercial	TOU Opt-Out	2,618	7,586	16,538	20,442	22,191	22,039	21,880	21,773	21,650	21,539	21,426	21,316	21,208	21,034	20,857	20,674	20,480	20,279	20,065	19,833	19,833
Total Demand Response	**Total Demand Response**	**4,140**	**11,832**	**25,569**	**31,610**	**34,341**	**34,195**	**34,049**	**33,887**	**33,712**	**33,548**	**33,376**	**33,210**	**33,050**	**32,818**	**32,584**	**32,344**	**32,100**	**31,847**	**31,569**	**31,280**	**31,280**
Total Portfolio	**Total Portfolio**	**8,596**	**20,809**	**39,181**	**49,982**	**57,530**	**62,257**	**67,039**	**71,493**	**75,994**	**80,462**	**84,758**	**88,744**	**92,742**	**96,686**	**100,625**	**101,036**	**101,347**	**101,577**	**101,724**	**101,787**	**102,234**

5. For each year of the planning horizon, an estimate of the costs, including:

A. The incremental cost of each stand-alone end-use measure;

The incremental costs of each end-use measure are shown in Table 5-19 – Measure Details for DSM IRP Bundles.

B. The cost of incentives paid by the utility to customers or utility financing to encourage participation in the potential demand-side program. The utility shall consider multiple levels of incentives paid by the utility for each end-use measure within a potential demand-side program, with corresponding adjustments to the maximum achievable potential and the realistic achievable potential of that potential demand-side program;

AEG developed two DSM scenarios for consideration during the integration phase of Liberty-Empire's IRP process to determine which DSM portfolio was the optimal decision based on Liberty-Empire's supply options.

- RAP Scenario – DSM Potential Study RAP participation. Incentives vary from 50% to 100% of incremental costs, depending on the bundle and customer segment.
- MAP Scenario – DSM Potential Study MAP participation. As with the RAP Scenario, incentives vary from 50% to 100% of incremental costs, depending on the bundle and customer segment.

AEG considered multiple levels of incentives as a part of the MAP bundle scenario.

- Level 1. Incentives were set to match the RAP Scenario, which varied from 50% to 100% of incremental costs depending on the bundle and customer segment
- Level 2. Increased incentives by 25%, up to 100% of measure incremental costs. A change in incentives impacts program non-incentive costs, which impacts program cost-effectiveness. A moderate increase in incentives causes the TRC benefit-cost ratio to decrease, particularly for the Residential Prescriptive Program.

- Level 3. Increased incentives to 100% of incremental costs for all measures. A change in incentives impacts program non-incentive costs, which impacts program cost-effectiveness. An increase in incentives to cover 100% of the incremental costs causes the TRC benefit-cost ratio to decrease, particularly for the Residential Prescriptive Program. As a result, the Residential Prescriptive Program has a TRC benefit-cost ratio of less than 1.0 until 2030.

C. The cost of incentives to customers to participate in the potential demand-side program paid by the entities other than the utility;

The RAP Scenario cost of incentives to customers to participate in the DSM Programs is shown in the table below.

Table 5-28 – Total Incentives per Program

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	$ 268,417	$ 273,328	$ 278,142	$ 280,243	$ 284,465	$ 287,826	$ 291,304	$ 291,675	$ 295,675	$ 287,426	$ 293,492	$ 296,280	$ 299,861	$ 303,218	$ 307,312	$ 311,073	$ 315,165	$ 318,626	$ 322,458	$ 323,563	$ 330,209
Residential	Income Eligible Lighting	$ 17,346	$ 18,304	$ 19,066	$ 21,387	$ 19,910	$ 17,200	$ 17,067	$ 16,671	$ 16,700	$ 16,550	$ 16,776	$ 582	$ 385	$ 534	$ 747	$ 3,534	$ 1,254	$ 2,710	$ 3,457	$ 4,083	$ 4,161
Total Residential	**Total Residential**	**$ 285,763**	**$ 291,632**	**$ 297,208**	**$ 301,630**	**$ 304,375**	**$ 305,026**	**$ 308,371**	**$ 308,346**	**$ 312,375**	**$ 303,976**	**$ 310,268**	**$ 296,862**	**$ 300,246**	**$ 303,752**	**$ 308,059**	**$ 314,607**	**$ 316,419**	**$ 321,336**	**$ 325,915**	**$ 327,646**	**$ 334,370**
Commercial	Commercial Prescriptive	$ 458,316	$ 465,878	$ 471,927	$ 475,094	$ 482,637	$ 485,221	$ 471,274	$ 462,192	$ 456,828	$ 454,935	$ 454,980	$ 468,550	$ 471,204	$ 473,178	$ 472,835	$ 470,375	$ 465,880	$ 460,507	$ 456,104	$ 452,278	$ 460,666
Commercial	Commercial Custom	$ 72,249	$ 81,165	$ 91,715	$ 100,367	$ 111,607	$ 120,685	$ 136,636	$ 151,090	$ 168,780	$ 182,974	$ 188,510	$ 207,636	$ 216,850	$ 228,044	$ 236,336	$ 191,453	$ 196,044	$ 200,955	$ 207,184	$ 213,565	$ 216,906
Commercial	SBDI	$ 165,113	$ 165,105	$ 174,960	$ 99,949	$ 105,981	$ 105,966	$ 107,430	$ 106,947	$ 105,526	$ 104,924	$ 104,858	$ 104,828	$ 104,796	$ 104,764	$ 104,729	$ 103,520	$ 103,485	$ 103,447	$ 103,392	$ 103,352	$ 105,586
Total Commercial	**Total Commercial**	**$ 695,679**	**$ 712,149**	**$ 738,602**	**$ 675,411**	**$ 700,225**	**$ 711,873**	**$ 715,341**	**$ 720,230**	**$ 731,134**	**$ 742,833**	**$ 748,348**	**$ 781,014**	**$ 792,850**	**$ 805,986**	**$ 813,901**	**$ 765,348**	**$ 765,409**	**$ 764,909**	**$ 766,680**	**$ 769,195**	**$ 783,159**
Portfolio	**EE Programs**	**$ 981,442**	**$ 1,003,781**	**$ 1,035,810**	**$ 977,041**	**$ 1,004,600**	**$ 1,016,899**	**$ 1,023,712**	**$ 1,028,576**	**$ 1,043,509**	**$ 1,046,809**	**$ 1,058,616**	**$ 1,077,876**	**$ 1,093,097**	**$ 1,109,739**	**$ 1,121,960**	**$ 1,079,955**	**$ 1,081,828**	**$ 1,086,245**	**$ 1,092,595**	**$ 1,096,841**	**$ 1,117,528**
Residential	Battery Storage DLC	$ 14,247	$ 36,883	$ 69,353	$ 105,127	$ 151,741	$ 203,310	$ 272,634	$ 347,076	$ 423,856	$ 517,483	$ 538,100	$ 558,317	$ 579,191	$ 599,600	$ 619,493	$ 641,174	$ 664,753	$ 691,564	$ 720,546	$ 751,814	$ 769,481
Residential	CPP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Residential	Grid-Interactive WH	$ 550	$ 2,037	$ 5,651	$ 8,368	$ 10,433	$ 11,470	$ 12,496	$ 13,495	$ 14,445	$ 13,558	$ 12,654	$ 11,800	$ 11,006	$ 10,236	$ 9,534	$ 8,944	$ 8,432	$ 7,813	$ 7,320	$ 6,882	$ 7,042
Residential	Smart Appliances DLC	$ 10,569	$ 31,741	$ 72,306	$ 92,170	$ 102,548	$ 103,673	$ 104,386	$ 107,238	$ 110,159	$ 113,064	$ 116,068	$ 119,069	$ 122,202	$ 125,348	$ 128,538	$ 131,924	$ 135,465	$ 138,984	$ 142,699	$ 146,391	$ 149,848
Residential	Smart Thermostats DLC	$ 15,033	$ 34,920	$ 60,099	$ 95,107	$ 132,204	$ 175,842	$ 226,578	$ 233,417	$ 240,366	$ 247,458	$ 254,738	$ 262,197	$ 269,958	$ 277,870	$ 286,049	$ 292,538	$ 299,548	$ 306,762	$ 314,501	$ 322,869	$ 330,401
Residential	TOU Opt-Out	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commercial	Battery Storage DLC	$ -	$ 858	$ 1,756	$ 1,797	$ 3,679	$ 4,706	$ 6,744	$ 7,888	$ 10,092	$ 13,428	$ 13,743	$ 15,148	$ 15,504	$ 17,002	$ 17,402	$ 17,810	$ 19,444	$ 21,145	$ 21,642	$ 23,453	$ 24,005
Commercial	CPP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commercial	Curtailment - Firm	$ 1,374	$ 2,281	$ 2,855	$ 2,948	$ 2,973	$ 3,070	$ 3,099	$ 3,201	$ 3,233	$ 3,342	$ 3,378	$ 3,417	$ 3,536	$ 3,582	$ 3,707	$ 3,756	$ 3,887	$ 3,939	$ 4,075	$ 4,130	$ 4,188
Commercial	Curtailment - Non-Firm	$ 2,060	$ 3,317	$ 4,247	$ 4,352	$ 4,389	$ 4,498	$ 4,612	$ 4,655	$ 4,776	$ 4,901	$ 4,955	$ 5,088	$ 5,150	$ 5,294	$ 5,442	$ 5,514	$ 5,668	$ 5,826	$ 5,904	$ 6,068	$ 6,153
Commercial	Grid-Interactive WH	$ 79	$ 268	$ 768	$ 1,123	$ 1,351	$ 1,471	$ 1,566	$ 1,664	$ 1,735	$ 1,614	$ 1,487	$ 1,386	$ 1,281	$ 1,169	$ 1,088	$ 1,002	$ 950	$ 855	$ 796	$ 733	$ 750
Commercial	Smart Thermostats DLC	$ 314	$ 750	$ 1,289	$ 2,050	$ 2,845	$ 3,794	$ 4,908	$ 5,053	$ 5,236	$ 5,391	$ 5,584	$ 5,748	$ 5,918	$ 6,128	$ 6,308	$ 6,494	$ 6,684	$ 6,880	$ 7,081	$ 7,330	$ 7,501
Commercial	TOU Opt-Out	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Demand Response	**Total Demand Response**	**$ 44,226**	**$ 113,055**	**$ 218,324**	**$ 313,041**	**$ 412,162**	**$ 511,834**	**$ 637,020**	**$ 723,685**	**$ 813,896**	**$ 920,238**	**$ 950,707**	**$ 982,170**	**$ 1,013,746**	**$ 1,046,229**	**$ 1,077,559**	**$ 1,109,157**	**$ 1,144,831**	**$ 1,183,768**	**$ 1,224,563**	**$ 1,269,669**	**$ 1,299,369**
Total Portfolio	**Total Portfolio**	**$ 1,025,667**	**$ 1,116,836**	**$ 1,254,134**	**$ 1,290,082**	**$ 1,416,762**	**$ 1,528,733**	**$ 1,660,733**	**$ 1,752,261**	**$ 1,857,406**	**$ 1,967,047**	**$ 2,009,323**	**$ 2,060,046**	**$ 2,106,843**	**$ 2,155,968**	**$ 2,199,520**	**$ 2,189,112**	**$ 2,226,659**	**$ 2,270,013**	**$ 2,317,158**	**$ 2,366,510**	**$ 2,416,897**

D. The cost to the customer and to the utility of technology to implement a potential demand-side program;

The RAP Scenario cost to the customer and utility to implement the DSM Programs is shown in the tables below. Budget categories for the total utility costs include program delivery, administration, education/marketing, tracking/reporting, and evaluation. Incentives are not included in this total. Customers do not have any costs associated with the demand response / demand side rates, the program absorbs all the costs.

Table 5-29 – Total Utility Costs per Program

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	$ 355,519	$ 362,024	$ 368,400	$ 371,183	$ 376,775	$ 381,226	$ 385,834	$ 386,325	$ 391,622	$ 380,697	$ 388,731	$ 392,424	$ 397,167	$ 401,614	$ 407,036	$ 412,018	$ 417,438	$ 422,021	$ 427,097	$ 428,560	$ 437,363
Residential	Income Eligible Lighting	$ 61,950	$ 65,371	$ 68,093	$ 76,382	$ 71,107	$ 61,429	$ 60,954	$ 59,539	$ 59,643	$ 59,107	$ 59,914	$ 2,079	$ 1,375	$ 1,907	$ 2,668	$ 12,621	$ 4,479	$ 9,679	$ 12,346	$ 14,582	$ 14,861
Total Residential	**Total Residential**	**$ 417,469**	**$ 427,395**	**$ 436,493**	**$ 447,565**	**$ 447,883**	**$ 442,655**	**$ 446,787**	**$ 445,864**	**$ 451,265**	**$ 439,804**	**$ 448,645**	**$ 394,502**	**$ 398,542**	**$ 403,521**	**$ 409,704**	**$ 424,639**	**$ 421,916**	**$ 431,699**	**$ 439,443**	**$ 443,143**	**$ 452,223**
Commercial	Commercial Prescriptive	$ 625,441	$ 635,761	$ 644,016	$ 648,337	$ 658,631	$ 662,158	$ 643,124	$ 630,731	$ 623,411	$ 620,827	$ 620,888	$ 639,407	$ 643,029	$ 645,723	$ 645,255	$ 641,897	$ 635,763	$ 628,431	$ 622,423	$ 617,201	$ 628,648
Commercial	Commercial Custom	$ 118,706	$ 133,355	$ 150,688	$ 164,904	$ 183,370	$ 198,286	$ 224,494	$ 248,242	$ 277,306	$ 300,627	$ 309,722	$ 341,145	$ 356,285	$ 374,677	$ 388,301	$ 314,558	$ 322,100	$ 330,169	$ 340,404	$ 350,887	$ 356,377
Commercial	SBDI	$ 232,605	$ 232,593	$ 246,476	$ 140,804	$ 149,301	$ 149,281	$ 151,343	$ 150,662	$ 148,661	$ 147,812	$ 147,720	$ 147,678	$ 147,632	$ 147,587	$ 147,538	$ 145,834	$ 145,785	$ 145,732	$ 145,654	$ 145,598	$ 148,745
Total Commercial	**Total Commercial**	**$ 976,751**	**$ 1,001,709**	**$ 1,041,179**	**$ 954,045**	**$ 991,302**	**$ 1,009,724**	**$ 1,018,961**	**$ 1,029,635**	**$ 1,049,377**	**$ 1,069,266**	**$ 1,078,330**	**$ 1,128,230**	**$ 1,146,946**	**$ 1,167,987**	**$ 1,181,094**	**$ 1,102,289**	**$ 1,103,648**	**$ 1,104,332**	**$ 1,108,481**	**$ 1,113,686**	**$ 1,133,771**
Portfolio	**EE Programs**	**$ 1,394,220**	**$ 1,429,104**	**$ 1,477,672**	**$ 1,401,610**	**$ 1,439,184**	**$ 1,452,379**	**$ 1,465,749**	**$ 1,475,499**	**$ 1,500,642**	**$ 1,509,070**	**$ 1,526,976**	**$ 1,522,732**	**$ 1,545,488**	**$ 1,571,507**	**$ 1,590,798**	**$ 1,526,929**	**$ 1,525,565**	**$ 1,536,032**	**$ 1,547,924**	**$ 1,556,829**	**$ 1,585,994**
Residential	Battery Storage DLC	$ 34,157	$ 63,589	$ 102,759	$ 139,347	$ 193,349	$ 247,174	$ 327,157	$ 402,842	$ 479,968	$ 581,894	$ 554,524	$ 574,996	$ 595,156	$ 615,620	$ 635,695	$ 657,650	$ 682,554	$ 710,456	$ 740,937	$ 772,815	$ 789,519
Residential	CPP	$ 191,366	$ 380,099	$ 762,428	$ 383,358	$ 189,798	$ 12,044	$ 12,327	$ 17,946	$ 17,705	$ 17,181	$ 17,853	$ 17,640	$ 17,478	$ 16,149	$ 16,132	$ 17,672	$ 17,999	$ 17,636	$ 17,515	$ 17,703	$ 21,778
Residential	Grid-Interactive WH	$ 29,658	$ 47,474	$ 86,262	$ 71,883	$ 62,308	$ 46,615	$ 46,898	$ 47,263	$ 47,560	$ 37,682	$ 37,345	$ 37,071	$ 36,871	$ 36,709	$ 36,629	$ 36,675	$ 36,815	$ 36,863	$ 37,053	$ 37,314	$ 38,189
Residential	Smart Appliances DLC	$ 77,430	$ 139,054	$ 252,882	$ 190,270	$ 163,010	$ 133,137	$ 134,542	$ 139,615	$ 143,203	$ 146,709	$ 150,386	$ 154,107	$ 157,982	$ 161,906	$ 165,916	$ 170,542	$ 175,028	$ 179,329	$ 184,126	$ 188,673	$ 193,026
Residential	Smart Thermostats DLC	$ 53,086	$ 82,196	$ 117,177	$ 170,838	$ 210,701	$ 265,912	$ 328,876	$ 245,931	$ 252,815	$ 260,198	$ 267,767	$ 275,535	$ 283,609	$ 291,893	$ 300,462	$ 304,598	$ 312,453	$ 319,930	$ 328,462	$ 337,634	$ 345,946
Residential	TOU Opt-Out	$ 225,922	$ 429,428	$ 778,735	$ 346,334	$ 156,856	$ 13,503	$ 13,820	$ 18,904	$ 18,648	$ 18,090	$ 18,913	$ 18,713	$ 18,672	$ 17,148	$ 17,478	$ 18,873	$ 19,127	$ 18,943	$ 19,314	$ 19,724	$ 23,346
Commercial	Battery Storage DLC	$ 514	$ 1,553	$ 2,622	$ 2,691	$ 4,774	$ 5,938	$ 8,270	$ 9,484	$ 11,743	$ 15,343	$ 14,534	$ 15,946	$ 16,260	$ 17,727	$ 18,147	$ 18,560	$ 20,277	$ 22,051	$ 22,648	$ 24,501	$ 24,985
Commercial	CPP	$ 33,112	$ 66,418	$ 135,089	$ 72,331	$ 39,800	$ 4,837	$ 4,723	$ 5,616	$ 5,634	$ 5,575	$ 5,602	$ 5,609	$ 5,575	$ 4,496	$ 4,352	$ 4,196	$ 4,046	$ 3,914	$ 3,826	$ 3,422	$ 7,045
Commercial	Curtailment - Firm	$ 9,456	$ 10,553	$ 11,321	$ 11,613	$ 11,842	$ 12,148	$ 12,389	$ 12,710	$ 12,965	$ 13,303	$ 13,574	$ 13,852	$ 14,216	$ 14,513	$ 14,895	$ 15,207	$ 15,607	$ 15,934	$ 16,352	$ 16,696	$ 17,049
Commercial	Curtailment - Non-Firm	$ 9,995	$ 11,438	$ 12,559	$ 12,859	$ 13,096	$ 13,410	$ 13,733	$ 13,991	$ 14,331	$ 14,681	$ 14,964	$ 15,333	$ 15,636	$ 16,026	$ 16,426	$ 16,756	$ 17,174	$ 17,603	$ 17,958	$ 18,405	$ 18,780
Commercial	Grid-Interactive WH	$ 4,136	$ 6,516	$ 11,645	$ 9,472	$ 7,987	$ 5,826	$ 5,706	$ 5,673	$ 5,598	$ 4,962	$ 4,913	$ 4,893	$ 4,870	$ 4,843	$ 4,848	$ 4,851	$ 4,889	$ 4,887	$ 4,922	$ 4,956	$ 5,073
Commercial	Smart Thermostats DLC	$ 984	$ 1,613	$ 2,360	$ 3,522	$ 4,378	$ 5,579	$ 6,963	$ 5,166	$ 5,352	$ 5,509	$ 5,706	$ 5,872	$ 6,046	$ 6,257	$ 6,442	$ 6,598	$ 6,799	$ 6,988	$ 7,202	$ 7,458	$ 7,637
Commercial	TOU Opt-Out	$ 46,107	$ 89,095	$ 164,954	$ 79,457	$ 41,452	$ 5,334	$ 5,130	$ 6,372	$ 6,352	$ 6,236	$ 6,229	$ 6,194	$ 6,109	$ 4,518	$ 4,262	$ 3,992	$ 3,757	$ 3,632	$ 3,699	$ 3,774	$ 7,827
Total Demand Response	**Total Demand Response**	**$ 715,923**	**$ 1,329,026**	**$ 2,440,793**	**$ 1,493,975**	**$ 1,099,353**	**$ 771,457**	**$ 920,535**	**$ 931,514**	**$ 1,021,874**	**$ 1,127,363**	**$ 1,112,310**	**$ 1,145,761**	**$ 1,178,482**	**$ 1,207,804**	**$ 1,241,686**	**$ 1,276,170**	**$ 1,316,524**	**$ 1,358,166**	**$ 1,404,014**	**$ 1,453,074**	**$ 1,500,200**
Total Portfolio Costs	**Total Portfolio Costs**	**$ 316,522**	**$ 413,720**	**$ 587,770**	**$ 434,338**	**$ 380,781**	**$ 333,575**	**$ 357,943**	**$ 361,052**	**$ 378,377**	**$ 395,465**	**$ 395,893**	**$ 400,274**	**$ 408,596**	**$ 416,897**	**$ 424,873**	**$ 420,465**	**$ 426,313**	**$ 434,130**	**$ 442,791**	**$ 451,485**	**$ 462,929**
Total Portfolio	**Total Portfolio**	**$ 2,426,665**	**$ 3,171,850**	**$ 4,506,235**	**$ 3,329,923**	**$ 2,919,318**	**$ 2,557,412**	**$ 2,744,226**	**$ 2,768,064**	**$ 2,900,894**	**$ 3,031,897**	**$ 3,035,179**	**$ 3,068,767**	**$ 3,132,566**	**$ 3,196,208**	**$ 3,257,356**	**$ 3,223,563**	**$ 3,268,402**	**$ 3,328,328**	**$ 3,394,729**	**$ 3,461,388**	**$ 3,549,124**

Table 5-30 – Total Customer Incremental Costs per Program (NPV)

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	$ 401,400	$ 408,822	$ 416,182	$ 422,828	$ 429,418	$ 434,863	$ 440,488	$ 441,543	$ 448,029	$ 436,865	$ 446,176	$ 450,792	$ 456,594	$ 462,009	$ 468,511	$ 474,539	$ 480,949	$ 486,563	$ 492,745	$ 495,018	$ 505,118
Residential	Income Eligible Lighting	$ 15,130	$ 15,941	$ 16,650	$ 16,930	$ 17,181	$ 15,131	$ 14,932	$ 14,532	$ 13,589	$ 13,566	$ 13,625	$ 489	$ 346	$ 469	$ 601	$ 3,005	$ 1,087	$ 2,252	$ 2,878	$ 3,249	$ 3,311
Total Residential	**Total Residential**	**$ 416,530**	**$ 424,763**	**$ 432,832**	**$ 439,758**	**$ 446,599**	**$ 449,993**	**$ 455,420**	**$ 456,076**	**$ 461,618**	**$ 450,432**	**$ 459,801**	**$ 451,281**	**$ 456,940**	**$ 462,478**	**$ 469,111**	**$ 477,544**	**$ 482,035**	**$ 488,815**	**$ 495,623**	**$ 498,267**	**$ 508,429**
Commercial	Commercial Prescriptive	$ 751,565	$ 763,726	$ 773,459	$ 778,492	$ 790,800	$ 794,952	$ 772,490	$ 757,820	$ 749,125	$ 746,047	$ 746,101	$ 767,890	$ 772,135	$ 775,292	$ 774,654	$ 770,665	$ 763,386	$ 754,673	$ 747,552	$ 741,358	$ 755,101
Commercial	Commercial Custom	$ 117,917	$ 132,607	$ 149,999	$ 164,257	$ 182,785	$ 197,749	$ 223,752	$ 247,374	$ 276,359	$ 299,610	$ 308,609	$ 339,627	$ 354,873	$ 373,298	$ 386,968	$ 314,127	$ 321,606	$ 329,585	$ 339,735	$ 350,128	$ 355,596
Commercial	SBDI	$ 147,112	$ 147,103	$ 157,944	$ 96,057	$ 102,692	$ 102,676	$ 104,287	$ 103,756	$ 102,194	$ 101,531	$ 101,460	$ 101,428	$ 101,393	$ 101,358	$ 101,320	$ 99,990	$ 99,952	$ 99,912	$ 99,851	$ 99,809	$ 102,264
Total Commercial	**Total Commercial**	**$1,016,594**	**$1,043,436**	**$1,081,401**	**$1,038,806**	**$1,076,277**	**$1,095,377**	**$1,100,529**	**$1,108,951**	**$1,127,677**	**$1,147,189**	**$1,156,169**	**$1,208,944**	**$1,228,400**	**$1,249,948**	**$1,262,942**	**$1,184,782**	**$1,184,944**	**$1,184,170**	**$1,187,138**	**$1,191,294**	**$1,212,961**
Total Portfolio	**Total Portfolio**	**$1,433,124**	**$1,468,199**	**$1,514,234**	**$1,478,564**	**$1,522,877**	**$1,545,371**	**$1,555,949**	**$1,565,026**	**$1,589,295**	**$1,597,621**	**$1,615,971**	**$1,660,225**	**$1,685,340**	**$1,712,426**	**$1,732,054**	**$1,662,327**	**$1,666,979**	**$1,672,985**	**$1,682,761**	**$1,689,561**	**$1,721,390**

E. The utility's cost to administer the potential demand-side program; and

The RAP Scenario utility's cost to administer the DSM Programs is shown in the tables below. The utility's costs to administer the programs include administrative costs at the bundle level and portfolio-level costs, which includes evaluation (5%), portfolio administration (5%), and portfolio marketing (5%).

Table 5-31 – Total Utility Non-Incentive Cost per Program

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	$ 87,102	$ 88,696	$ 90,258	$ 90,940	$ 92,310	$ 93,400	$ 94,529	$ 94,650	$ 95,947	$ 93,271	$ 95,239	$ 96,144	$ 97,306	$ 98,395	$ 99,724	$ 100,944	$ 102,272	$ 103,395	$ 104,639	$ 104,997	$ 107,154
Residential	Income Eligible Lighting	$ 44,604	$ 47,067	$ 49,027	$ 54,995	$ 51,197	$ 44,229	$ 43,887	$ 42,868	$ 42,943	$ 42,557	$ 43,138	$ 1,497	$ 990	$ 1,373	$ 1,921	$ 9,087	$ 3,225	$ 6,969	$ 8,889	$ 10,499	$ 10,700
Total Residential	**Total Residential**	**$ 131,706**	**$ 135,763**	**$ 139,285**	**$ 145,935**	**$ 143,507**	**$ 137,629**	**$ 138,416**	**$ 137,518**	**$ 138,890**	**$ 135,828**	**$ 138,377**	**$ 97,640**	**$ 98,296**	**$ 99,768**	**$ 101,645**	**$ 110,032**	**$ 105,497**	**$ 110,364**	**$ 113,528**	**$ 115,496**	**$ 117,854**
Commercial	Commercial Prescriptive	$ 167,125	$ 169,883	$ 172,088	$ 173,243	$ 175,994	$ 176,936	$ 171,850	$ 168,539	$ 166,583	$ 165,892	$ 165,908	$ 170,857	$ 171,825	$ 172,545	$ 172,420	$ 171,522	$ 169,883	$ 167,924	$ 166,319	$ 164,923	$ 167,982
Commercial	Commercial Custom	$ 46,456	$ 52,190	$ 58,973	$ 64,536	$ 71,763	$ 77,601	$ 87,857	$ 97,151	$ 108,526	$ 117,653	$ 121,212	$ 133,510	$ 139,435	$ 146,633	$ 151,965	$ 123,105	$ 126,056	$ 129,214	$ 133,220	$ 137,322	$ 139,471
Commercial	SBDI	$ 67,491	$ 67,488	$ 71,516	$ 40,855	$ 43,320	$ 43,314	$ 43,913	$ 43,715	$ 43,134	$ 42,888	$ 42,862	$ 42,849	$ 42,836	$ 42,823	$ 42,809	$ 42,314	$ 42,300	$ 42,285	$ 42,262	$ 42,246	$ 43,159
Total Commercial	**Total Commercial**	**$ 281,073**	**$ 289,560**	**$ 302,577**	**$ 278,634**	**$ 291,077**	**$ 297,851**	**$ 303,620**	**$ 309,405**	**$ 318,243**	**$ 326,433**	**$ 329,982**	**$ 347,216**	**$ 354,096**	**$ 362,000**	**$ 367,193**	**$ 336,941**	**$ 338,240**	**$ 339,423**	**$ 341,800**	**$ 344,492**	**$ 350,612**
Portfolio	**EE Programs**	**$ 412,779**	**$ 425,323**	**$ 441,862**	**$ 424,569**	**$ 434,584**	**$ 435,480**	**$ 442,036**	**$ 446,923**	**$ 457,133**	**$ 462,261**	**$ 468,360**	**$ 444,857**	**$ 452,392**	**$ 461,769**	**$ 468,838**	**$ 446,973**	**$ 443,737**	**$ 449,787**	**$ 455,328**	**$ 459,988**	**$ 468,466**
Residential	Battery Storage DLC	$ 19,910	$ 26,706	$ 33,406	$ 34,220	$ 41,608	$ 43,864	$ 54,523	$ 55,767	$ 56,113	$ 64,411	$ 16,424	$ 16,679	$ 15,965	$ 16,019	$ 16,202	$ 16,476	$ 17,801	$ 18,892	$ 20,391	$ 21,001	$ 20,038
Residential	CPP	$ 191,366	$ 380,099	$ 762,428	$ 383,358	$ 189,798	$ 12,044	$ 12,327	$ 17,946	$ 17,705	$ 17,181	$ 17,853	$ 17,640	$ 17,478	$ 16,149	$ 16,132	$ 17,672	$ 17,999	$ 17,636	$ 17,515	$ 17,703	$ 21,778
Residential	Grid-Interactive WH	$ 29,108	$ 45,437	$ 80,612	$ 63,515	$ 51,876	$ 35,145	$ 34,403	$ 33,768	$ 33,115	$ 24,124	$ 24,691	$ 25,271	$ 25,865	$ 26,473	$ 27,095	$ 27,732	$ 28,383	$ 29,050	$ 29,733	$ 30,432	$ 31,147
Residential	Smart Appliances DLC	$ 66,861	$ 107,313	$ 180,575	$ 98,100	$ 60,462	$ 29,464	$ 30,156	$ 32,377	$ 33,044	$ 33,645	$ 34,318	$ 35,038	$ 35,780	$ 36,557	$ 37,378	$ 38,617	$ 39,562	$ 40,345	$ 41,427	$ 42,283	$ 43,178
Residential	Smart Thermostats DLC	$ 38,053	$ 47,275	$ 57,078	$ 75,732	$ 78,497	$ 90,069	$ 102,298	$ 12,515	$ 12,448	$ 12,739	$ 13,028	$ 13,338	$ 13,651	$ 14,023	$ 14,413	$ 12,059	$ 12,905	$ 13,168	$ 13,962	$ 14,765	$ 15,545
Residential	TOU Opt-Out	$ 225,922	$ 429,428	$ 778,735	$ 346,334	$ 156,856	$ 13,503	$ 13,820	$ 18,904	$ 18,648	$ 18,090	$ 18,913	$ 18,713	$ 18,672	$ 17,148	$ 17,478	$ 18,873	$ 19,127	$ 18,943	$ 19,314	$ 19,724	$ 23,346
Commercial	Battery Storage DLC	$ 514	$ 696	$ 866	$ 894	$ 1,096	$ 1,232	$ 1,526	$ 1,596	$ 1,651	$ 1,916	$ 790	$ 797	$ 756	$ 725	$ 746	$ 750	$ 833	$ 906	$ 1,006	$ 1,048	$ 980
Commercial	CPP	$ 33,112	$ 66,418	$ 135,089	$ 72,331	$ 39,800	$ 4,837	$ 4,723	$ 5,616	$ 5,634	$ 5,575	$ 5,602	$ 5,609	$ 5,575	$ 4,496	$ 4,352	$ 4,196	$ 4,046	$ 3,914	$ 3,826	$ 3,422	$ 7,045
Commercial	Curtailment - Firm	$ 8,082	$ 8,272	$ 8,467	$ 8,665	$ 8,869	$ 9,078	$ 9,291	$ 9,509	$ 9,733	$ 9,961	$ 10,195	$ 10,435	$ 10,680	$ 10,931	$ 11,188	$ 11,451	$ 11,720	$ 11,996	$ 12,277	$ 12,566	$ 12,861
Commercial	Curtailment - Non-Firm	$ 7,935	$ 8,121	$ 8,312	$ 8,507	$ 8,707	$ 8,912	$ 9,121	$ 9,336	$ 9,555	$ 9,780	$ 10,009	$ 10,245	$ 10,485	$ 10,732	$ 10,984	$ 11,242	$ 11,506	$ 11,777	$ 12,053	$ 12,337	$ 12,627
Commercial	Grid-Interactive WH	$ 4,057	$ 6,248	$ 10,877	$ 8,348	$ 6,636	$ 4,356	$ 4,141	$ 4,009	$ 3,863	$ 3,348	$ 3,427	$ 3,507	$ 3,590	$ 3,674	$ 3,760	$ 3,849	$ 3,939	$ 4,032	$ 4,126	$ 4,223	$ 4,323
Commercial	Smart Thermostats DLC	$ 670	$ 863	$ 1,071	$ 1,472	$ 1,533	$ 1,785	$ 2,055	$ 113	$ 117	$ 118	$ 122	$ 125	$ 128	$ 129	$ 134	$ 104	$ 115	$ 108	$ 121	$ 128	$ 137
Commercial	TOU Opt-Out	$ 46,107	$ 89,095	$ 164,954	$ 79,457	$ 41,452	$ 5,334	$ 5,130	$ 6,372	$ 6,352	$ 6,236	$ 6,229	$ 6,194	$ 6,109	$ 4,518	$ 4,262	$ 3,992	$ 3,757	$ 3,632	$ 3,699	$ 3,774	$ 7,827
Total Demand Respo	**Total Demand Response**	**$ 671,698**	**$1,215,971**	**$2,222,468**	**$1,180,934**	**$ 687,190**	**$ 259,623**	**$ 283,515**	**$ 207,828**	**$ 207,978**	**$ 207,125**	**$ 161,604**	**$ 163,591**	**$ 164,735**	**$ 161,575**	**$ 164,126**	**$ 167,013**	**$ 171,694**	**$ 174,398**	**$ 179,451**	**$ 183,405**	**$ 200,831**
Total Portfolio Costs	**Total Portfolio Costs**	**$ 321,055**	**$ 425,077**	**$ 608,607**	**$ 466,374**	**$ 426,118**	**$ 393,664**	**$ 436,681**	**$ 452,341**	**$ 482,737**	**$ 515,305**	**$ 519,839**	**$ 528,463**	**$ 541,024**	**$ 553,698**	**$ 565,853**	**$ 565,659**	**$ 576,285**	**$ 589,383**	**$ 603,573**	**$ 618,447**	**$ 633,806**
Total Portfolio	**Total Portfolio**	**$1,405,531**	**$2,066,371**	**$3,272,938**	**$2,071,877**	**$1,547,893**	**$1,088,768**	**$1,162,232**	**$1,107,092**	**$1,147,848**	**$1,184,690**	**$1,149,802**	**$1,136,911**	**$1,158,151**	**$1,177,041**	**$1,198,817**	**$1,179,646**	**$1,191,715**	**$1,213,568**	**$1,238,353**	**$1,261,841**	**$1,303,103**

F. Other costs identified by the utility;

AEG did not identify other costs for the DSM Programs.

3.8 Participants and Impacts

(H) A tabulation of the incremental and cumulative number of participants, load impacts, utility costs, and program participant costs in each year of the planning horizon for each potential demand-side program; and

The realistic achievable potential incremental and cumulative participants, load impacts, utility costs, and program participant costs for each DSM Program can be found in the tables below.

Table 5-32 – Incremental Participation by Program

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	11,815	12,317	12,731	12,716	12,697	12,680	12,738	9,287	9,923	7,826	8,468	8,536	8,606	8,593	8,652	8,296	8,560	8,594	8,705	8,500	8,674
Residential	Income Eligible Lighting	4,080	4,333	4,570	4,218	3,927	3,388	3,311	3,228	1,680	1,688	1,713	134	77	89	98	583	209	351	511	782	797
Total Residential	**Total Residential**	**15,895**	**16,650**	**17,301**	**16,934**	**16,624**	**16,068**	**16,049**	**12,515**	**11,603**	**9,514**	**10,181**	**8,670**	**8,683**	**8,682**	**8,750**	**8,879**	**8,769**	**8,945**	**9,216**	**9,282**	**9,471**
Commercial	Commercial Prescriptive	806,791	856,493	895,372	925,551	948,767	966,348	880,081	830,565	806,222	798,644	801,781	896,173	917,166	932,716	943,896	932,581	911,113	886,954	864,302	845,239	862,151
Commercial	Commercial Custom	207,040	211,299	214,955	219,283	223,291	227,394	277,995	314,748	348,064	375,811	398,605	484,002	478,878	487,849	491,515	298,283	313,823	333,331	353,514	374,685	382,178
Commercial	SBDI	41,419	41,349	41,287	41,047	41,013	40,906	49,027	48,883	48,726	48,560	48,385	48,204	48,014	47,818	47,611	47,397	47,179	46,953	46,721	46,483	47,417
Total Commercial	**Total Commercial**	**1,055,250**	**1,109,141**	**1,151,614**	**1,185,881**	**1,213,071**	**1,234,648**	**1,207,103**	**1,194,196**	**1,203,012**	**1,223,015**	**1,248,771**	**1,428,379**	**1,444,058**	**1,468,383**	**1,483,022**	**1,278,261**	**1,272,115**	**1,267,238**	**1,264,537**	**1,266,407**	**1,291,746**
Portfolio	**EE Programs**	**1,071,145**	**1,125,791**	**1,168,915**	**1,202,815**	**1,229,695**	**1,250,716**	**1,223,152**	**1,206,711**	**1,214,615**	**1,232,529**	**1,258,952**	**1,437,049**	**1,452,741**	**1,477,065**	**1,491,772**	**1,287,140**	**1,280,884**	**1,276,183**	**1,273,753**	**1,275,689**	**1,301,217**
Residential	Battery Storage DLC	17	43	79	117	165	216	283	352	420	501	509	516	523	529	534	540	547	556	566	577	577
Residential	CPP	2,327	6,972	16,209	20,676	22,766	22,498	22,171	22,229	22,281	22,322	22,366	22,404	22,436	22,446	22,451	22,467	22,482	22,489	22,490	22,480	22,480
Residential	Grid-Interactive WH	21	76	206	298	363	390	415	438	458	420	383	349	318	289	263	241	222	201	184	169	169
Residential	Smart Appliances DLC	776	2,277	5,067	6,313	6,864	6,776	6,670	6,694	6,717	6,738	6,756	6,773	6,789	6,805	6,819	6,839	6,859	6,877	6,897	6,915	6,915
Residential	Smart Thermostats DLC	574	1,303	2,191	3,387	4,600	5,979	7,525	7,576	7,621	7,666	7,710	7,755	7,800	7,845	7,891	7,883	7,887	7,892	7,906	7,929	7,929
Residential	TOU Opt-Out	11,116	32,294	70,300	86,462	93,265	91,883	90,218	90,429	90,609	90,745	90,900	91,027	91,131	91,129	91,104	91,133	91,153	91,136	91,091	90,994	90,994
Commercial	Battery Storage DLC	0	1	2	2	4	5	7	8	10	13	13	14	14	15	15	15	16	17	17	18	18
Commercial	CPP	398	1,206	2,839	3,679	4,118	4,145	4,170	4,203	4,235	4,265	4,294	4,322	4,348	4,362	4,375	4,385	4,392	4,398	4,402	4,400	4,400
Commercial	Curtailment - Firm	20	33	41	42	42	43	43	44	44	45	45	45	46	46	47	47	48	48	49	49	49
Commercial	Curtailment - Non-Firm	30	48	61	62	62	63	64	64	65	66	66	67	67	68	69	69	70	71	71	72	72
Commercial	Grid-Interactive WH	3	10	28	40	47	50	52	54	55	50	45	41	37	33	30	27	25	22	20	18	18
Commercial	Smart Thermostats DLC	12	28	47	73	99	129	163	164	166	167	169	170	171	173	174	175	176	177	178	180	180
Commercial	TOU Opt-Out	2,270	6,667	14,724	18,449	20,286	20,407	20,512	20,668	20,816	20,952	21,083	21,206	21,320	21,368	21,401	21,422	21,429	21,425	21,412	21,364	21,364
Total Demand Response	**Total Demand Response**	**17,564**	**50,958**	**111,794**	**139,600**	**152,681**	**152,584**	**152,293**	**152,923**	**153,497**	**153,950**	**154,339**	**154,689**	**155,000**	**155,108**	**155,173**	**155,243**	**155,306**	**155,309**	**155,283**	**155,165**	**155,165**
Total Portfolio	**Total Portfolio**	**1,088,709**	**1,176,749**	**1,280,709**	**1,342,415**	**1,382,376**	**1,403,300**	**1,375,445**	**1,359,634**	**1,368,112**	**1,386,479**	**1,413,291**	**1,591,738**	**1,607,741**	**1,632,173**	**1,646,945**	**1,442,383**	**1,436,190**	**1,431,492**	**1,429,036**	**1,430,854**	**1,456,382**

Table 5-33 – Cumulative Participation by Program

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	11,815	24,132	36,863	49,579	62,276	74,956	87,694	96,981	106,904	114,730	123,198	131,734	140,340	148,933	157,585	165,881	174,441	183,035	191,740	200,240	208,914
Residential	Income Eligible Lighting	4,080	8,413	12,983	17,201	21,128	24,516	27,827	31,055	32,735	34,423	36,136	36,270	36,347	36,436	36,534	37,117	37,326	37,677	38,188	38,970	39,767
Total Residential	**Total Residential**	**15,895**	**32,545**	**49,846**	**66,780**	**83,404**	**99,472**	**115,521**	**128,036**	**139,639**	**149,153**	**159,334**	**168,004**	**176,687**	**185,369**	**194,119**	**202,998**	**211,767**	**220,712**	**229,928**	**239,210**	**248,681**
Commercial	Commercial Prescriptive	806,791	1,663,284	2,558,656	3,484,207	4,432,974	5,399,322	6,279,403	7,109,968	7,916,190	8,714,834	9,516,615	10,412,788	11,329,954	12,262,670	13,206,566	14,139,147	15,050,260	15,937,214	16,801,516	17,646,755	18,508,906
Commercial	Commercial Custom	207,040	418,339	633,294	852,577	1,075,868	1,303,262	1,581,257	1,896,005	2,244,069	2,619,880	3,018,485	3,502,487	3,981,365	4,469,214	4,960,729	5,259,012	5,572,835	5,906,166	6,259,680	6,634,365	7,016,543
Commercial	SBDI	41,419	82,768	124,055	165,102	206,115	247,021	296,048	344,931	393,657	442,217	490,602	538,806	586,820	634,638	682,249	729,646	776,825	823,778	870,499	916,982	964,399
Total Commercial	**Total Commercial**	**1,055,250**	**2,164,391**	**3,316,005**	**4,501,886**	**5,714,957**	**6,949,605**	**8,156,708**	**9,350,904**	**10,553,916**	**11,776,931**	**13,025,702**	**14,454,081**	**15,898,139**	**17,366,522**	**18,849,544**	**20,127,805**	**21,399,920**	**22,667,158**	**23,931,695**	**25,198,102**	**26,489,848**
Portfolio	**EE Programs**	**1,071,145**	**2,196,936**	**3,365,851**	**4,568,666**	**5,798,361**	**7,049,077**	**8,272,229**	**9,478,940**	**10,693,555**	**11,926,084**	**13,185,036**	**14,622,085**	**16,074,826**	**17,551,891**	**19,043,663**	**20,330,803**	**21,611,687**	**22,887,870**	**24,161,623**	**25,437,312**	**26,738,529**
Residential	Battery Storage DLC	17	60	139	256	421	637	920	1,272	1,692	2,193	2,702	3,218	3,741	4,270	4,804	5,344	5,891	6,447	7,013	7,590	8,167
Residential	CPP	2,327	9,299	25,508	46,184	68,950	91,448	113,619	135,848	158,129	180,451	202,817	225,221	247,657	270,103	292,554	315,021	337,503	359,992	382,482	404,962	427,442
Residential	Grid-Interactive WH	21	97	303	601	964	1,354	1,769	2,207	2,665	3,085	3,468	3,817	4,135	4,424	4,687	4,928	5,150	5,351	5,535	5,704	5,873
Residential	Smart Appliances DLC	776	3,053	8,120	14,433	21,297	28,073	34,743	41,437	48,154	54,892	61,648	68,421	75,210	82,015	88,834	95,673	102,532	109,409	116,306	123,221	130,136
Residential	Smart Thermostats DLC	574	1,877	4,068	7,455	12,055	18,034	25,559	33,135	40,756	48,422	56,132	63,887	71,687	79,532	87,423	95,306	103,193	111,085	118,991	126,920	134,849
Residential	TOU Opt-Out	11,116	43,410	113,710	200,172	293,437	385,320	475,538	565,967	656,576	747,321	838,221	929,248	1,020,379	1,111,508	1,202,612	1,293,745	1,384,898	1,476,034	1,567,125	1,658,119	1,749,113
Commercial	Battery Storage DLC	0	1	3	5	9	14	21	29	39	52	65	79	93	108	123	138	154	171	188	206	224
Commercial	CPP	398	1,604	4,443	8,122	12,240	16,385	20,555	24,758	28,993	33,258	37,552	41,874	46,222	50,584	54,959	59,344	63,736	68,134	72,536	76,936	81,336
Commercial	Curtailment - Firm	20	53	94	136	178	221	264	308	352	397	442	487	533	579	626	673	721	769	818	867	916
Commercial	Curtailment - Non-Firm	30	78	139	201	263	326	390	454	519	585	651	718	785	853	922	991	1,061	1,132	1,203	1,275	1,347
Commercial	Grid-Interactive WH	3	13	41	81	128	178	230	284	339	389	434	475	512	545	575	602	627	649	669	687	705
Commercial	Smart Thermostats DLC	12	40	87	160	259	388	551	715	881	1,048	1,217	1,387	1,558	1,731	1,905	2,080	2,256	2,433	2,611	2,791	2,971
Commercial	TOU Opt-Out	2,270	8,937	23,661	42,110	62,396	82,803	103,315	123,983	144,799	165,751	186,834	208,040	229,360	250,728	272,129	293,551	314,980	336,405	357,817	379,181	400,545
Total Demand Response	**Total Demand Response**	**17,564**	**68,522**	**180,316**	**319,916**	**472,597**	**625,181**	**777,474**	**930,397**	**1,083,894**	**1,237,844**	**1,392,183**	**1,546,872**	**1,701,872**	**1,856,980**	**2,012,153**	**2,167,396**	**2,322,702**	**2,478,011**	**2,633,294**	**2,788,459**	**2,943,624**
Total Portfolio	**Total Portfolio**	**1,088,709**	**2,265,458**	**3,546,167**	**4,888,582**	**6,270,958**	**7,674,258**	**9,049,703**	**10,409,337**	**11,777,449**	**13,163,928**	**14,577,219**	**16,168,957**	**17,776,698**	**19,408,871**	**21,055,816**	**22,498,199**	**23,934,389**	**25,365,881**	**26,794,917**	**28,225,771**	**29,682,153**

Table 5-34 – Incremental Net Demand Reductions by Program (MW)

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	0.32	0.34	0.35	0.35	0.35	0.35	0.35	0.32	0.33	0.24	0.26	0.26	0.26	0.26	0.26	0.26	0.27	0.27	0.27	0.26	0.26
Residential	Income Eligible Lighting	0.37	0.39	0.42	0.37	0.34	0.29	0.28	0.28	0.10	0.10	0.10	0.01	0.01	0.01	0.01	0.06	0.02	0.03	0.04	0.07	0.07
Total Residential	**Total Residential**	**0.70**	**0.73**	**0.76**	**0.72**	**0.69**	**0.64**	**0.64**	**0.60**	**0.43**	**0.34**	**0.36**	**0.27**	**0.27**	**0.27**	**0.27**	**0.32**	**0.29**	**0.30**	**0.32**	**0.33**	**0.33**
Commercial	Commercial Prescriptive	1.80	1.80	1.80	1.80	1.80	1.80	1.79	1.78	1.77	1.77	1.76	1.76	1.76	1.75	1.74	1.74	1.73	1.72	1.71	1.70	1.74
Commercial	Commercial Custom	0.17	0.21	0.25	0.29	0.33	0.37	0.42	0.46	0.51	0.55	0.59	0.64	0.68	0.73	0.77	0.66	0.67	0.68	0.69	0.70	0.71
Commercial	SBDI	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Total Commercial	**Total Commercial**	**2.04**	**2.08**	**2.12**	**2.16**	**2.20**	**2.24**	**2.28**	**2.31**	**2.36**	**2.39**	**2.43**	**2.47**	**2.51**	**2.55**	**2.59**	**2.47**	**2.47**	**2.47**	**2.47**	**2.48**	**2.52**
Portfolio	**EE Programs**	**2.73**	**2.81**	**2.88**	**2.88**	**2.90**	**2.89**	**2.92**	**2.91**	**2.78**	**2.73**	**2.79**	**2.74**	**2.78**	**2.82**	**2.86**	**2.79**	**2.76**	**2.77**	**2.79**	**2.80**	**2.86**
Residential	Battery Storage DLC	0.11	0.28	0.52	0.77	1.09	1.43	1.87	2.32	2.77	3.31	3.36	3.41	3.45	3.49	3.52	3.56	3.61	3.67	3.74	3.81	3.81
Residential	CPP	1.22	3.62	8.34	10.51	11.44	11.17	10.88	10.80	10.72	10.64	10.57	10.50	10.43	10.36	10.29	10.23	10.17	10.11	10.04	9.97	9.97
Residential	Grid-Interactive WH	0.04	0.13	0.36	0.53	0.64	0.69	0.73	0.77	0.81	0.74	0.68	0.62	0.56	0.51	0.47	0.43	0.39	0.36	0.33	0.30	0.30
Residential	Smart Appliances DLC	0.36	1.05	2.34	2.92	3.17	3.13	3.08	3.09	3.10	3.11	3.12	3.13	3.14	3.14	3.15	3.16	3.17	3.18	3.19	3.19	3.19
Residential	Smart Thermostats DLC	2.80	6.30	10.49	16.02	21.49	27.60	34.35	34.23	34.11	33.99	33.89	33.80	33.74	33.68	33.64	33.39	33.19	33.02	32.83	32.72	32.72
Residential	TOU Opt-Out	1.91	5.50	11.85	14.40	15.34	14.94	14.50	14.39	14.28	14.17	14.07	13.97	13.88	13.78	13.68	13.59	13.51	13.43	13.32	13.22	13.22
Commercial	Battery Storage DLC	0.00	0.02	0.04	0.04	0.07	0.09	0.13	0.15	0.18	0.24	0.24	0.25	0.25	0.27	0.27	0.27	0.29	0.31	0.31	0.33	0.33
Commercial	CPP	3.21	9.60	22.30	28.50	31.50	31.30	31.10	30.96	30.80	30.66	30.51	30.38	30.24	30.02	29.81	29.59	29.35	29.11	28.84	28.56	28.56
Commercial	Curtailment - Firm	0.52	0.85	1.04	1.05	1.04	1.05	1.04	1.05	1.03	1.05	1.03	1.02	1.03	1.02	1.03	1.02	1.04	1.03	1.04	1.03	1.03
Commercial	Curtailment - Non-Firm	0.78	1.23	1.55	1.55	1.53	1.54	1.54	1.52	1.53	1.53	1.52	1.52	1.51	1.51	1.52	1.50	1.51	1.52	1.50	1.51	1.51
Commercial	Grid-Interactive WH	0.01	0.05	0.14	0.19	0.23	0.24	0.25	0.26	0.27	0.24	0.22	0.20	0.18	0.16	0.15	0.13	0.12	0.11	0.10	0.09	0.09
Commercial	Smart Thermostats DLC	0.07	0.15	0.25	0.39	0.52	0.67	0.83	0.83	0.83	0.82	0.82	0.82	0.81	0.82	0.81	0.81	0.81	0.80	0.80	0.80	0.80
Commercial	TOU Opt-Out	4.96	14.37	31.32	38.72	42.03	41.74	41.44	41.24	41.00	40.79	40.58	40.37	40.17	39.84	39.50	39.15	38.79	38.41	38.00	37.56	37.56
Total Demand Response	**Total Demand Response**	**16.00**	**43.16**	**90.55**	**115.59**	**130.09**	**135.58**	**141.75**	**141.61**	**141.43**	**141.30**	**140.60**	**139.98**	**139.39**	**138.61**	**137.84**	**136.84**	**135.95**	**135.04**	**134.03**	**133.09**	**133.09**
Total Portfolio	**Total Portfolio**	**18.73**	**45.96**	**93.43**	**118.47**	**132.99**	**138.47**	**144.67**	**144.51**	**144.21**	**144.03**	**143.39**	**142.72**	**142.17**	**141.43**	**140.70**	**139.63**	**138.71**	**137.80**	**136.82**	**135.89**	**135.95**

Table 5-35 – Cumulative Net Demand Reductions by Program (MW)

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	0.32	0.66	1.01	1.36	1.71	2.07	2.42	2.71	3.01	3.18	3.36	3.35	3.31	3.27	3.22	3.18	3.13	3.08	3.04	2.97	2.99
Residential	Income Eligible Lighting	0.37	0.77	1.18	1.55	1.52	1.41	1.28	1.19	0.95	0.76	0.58	0.32	0.23	0.13	0.04	0.08	0.09	0.11	0.15	0.16	0.21
Total Residential	**Total Residential**	**0.70**	**1.42**	**2.19**	**2.91**	**3.23**	**3.48**	**3.70**	**3.89**	**3.96**	**3.94**	**3.94**	**3.67**	**3.54**	**3.40**	**3.26**	**3.26**	**3.23**	**3.20**	**3.19**	**3.13**	**3.21**
Commercial	Commercial Prescriptive	1.80	3.60	5.40	7.20	8.99	10.79	12.57	14.34	16.10	17.86	19.54	21.23	22.92	24.60	26.27	26.21	26.14	26.07	25.99	25.90	25.84
Commercial	Commercial Custom	0.17	0.38	0.63	0.91	1.24	1.62	2.03	2.49	3.00	3.55	4.14	4.77	5.44	6.16	6.91	7.40	7.86	8.29	8.68	9.05	9.39
Commercial	SBDI	0.07	0.14	0.21	0.28	0.36	0.43	0.51	0.58	0.65	0.71	0.78	0.84	0.90	0.96	1.02	1.01	1.01	1.00	1.00	1.00	1.00
Total Commercial	**Total Commercial**	**2.04**	**4.11**	**6.24**	**8.39**	**10.59**	**12.83**	**15.11**	**17.40**	**19.75**	**22.12**	**24.46**	**26.84**	**29.26**	**31.71**	**34.20**	**34.62**	**35.01**	**35.36**	**35.67**	**35.94**	**36.23**
Portfolio	**EE Programs**	**2.73**	**5.54**	**8.42**	**11.30**	**13.82**	**16.31**	**18.81**	**21.30**	**23.70**	**26.06**	**28.40**	**30.50**	**32.79**	**35.11**	**37.46**	**37.88**	**38.24**	**38.56**	**38.86**	**39.08**	**39.43**
Residential	Battery Storage DLC	0.11	0.28	0.52	0.77	1.09	1.43	1.87	2.32	2.77	3.31	3.36	3.41	3.45	3.49	3.52	3.56	3.61	3.67	3.74	3.81	3.81
Residential	CPP	1.22	3.62	8.34	10.51	11.44	11.17	10.88	10.80	10.72	10.64	10.57	10.50	10.43	10.36	10.29	10.23	10.17	10.11	10.04	9.97	9.97
Residential	Grid-Interactive WH	0.04	0.13	0.36	0.53	0.64	0.69	0.73	0.77	0.81	0.74	0.68	0.62	0.56	0.51	0.47	0.43	0.39	0.36	0.33	0.30	0.30
Residential	Smart Appliances DLC	0.36	1.05	2.34	2.92	3.17	3.13	3.08	3.09	3.10	3.11	3.12	3.13	3.14	3.14	3.15	3.16	3.17	3.18	3.19	3.19	3.19
Residential	Smart Thermostats DLC	2.80	6.30	10.49	16.02	21.49	27.60	34.35	34.23	34.11	33.99	33.89	33.80	33.74	33.68	33.64	33.39	33.19	33.02	32.83	32.72	32.72
Residential	TOU Opt-Out	1.91	5.50	11.85	14.40	15.34	14.94	14.50	14.39	14.28	14.17	14.07	13.97	13.88	13.78	13.68	13.59	13.51	13.43	13.32	13.22	13.22
Commercial	Battery Storage DLC	0.00	0.02	0.04	0.04	0.07	0.09	0.13	0.15	0.18	0.24	0.24	0.25	0.25	0.27	0.27	0.27	0.29	0.31	0.31	0.33	0.33
Commercial	CPP	3.21	9.60	22.30	28.50	31.50	31.30	31.10	30.96	30.80	30.66	30.51	30.38	30.24	30.02	29.81	29.59	29.35	29.11	28.84	28.56	28.56
Commercial	Curtailment - Firm	0.52	0.85	1.04	1.05	1.04	1.05	1.04	1.05	1.03	1.05	1.03	1.02	1.03	1.02	1.03	1.02	1.04	1.03	1.04	1.03	1.03
Commercial	Curtailment - Non-Firm	0.78	1.23	1.55	1.55	1.53	1.54	1.54	1.52	1.53	1.53	1.52	1.52	1.51	1.51	1.52	1.50	1.51	1.52	1.50	1.51	1.51
Commercial	Grid-Interactive WH	0.01	0.05	0.14	0.19	0.23	0.24	0.25	0.26	0.27	0.24	0.22	0.20	0.18	0.16	0.15	0.13	0.12	0.11	0.10	0.09	0.09
Commercial	Smart Thermostats DLC	0.07	0.15	0.25	0.39	0.52	0.67	0.83	0.83	0.83	0.82	0.82	0.82	0.81	0.82	0.81	0.81	0.81	0.80	0.80	0.80	0.80
Commercial	TOU Opt-Out	4.96	14.37	31.32	38.72	42.03	41.74	41.44	41.24	41.00	40.79	40.58	40.37	40.17	39.84	39.50	39.15	38.79	38.41	38.00	37.56	37.56
Total Demand Response	**Total Demand Response**	**16.00**	**43.16**	**90.55**	**115.59**	**130.09**	**135.58**	**141.75**	**141.61**	**141.43**	**141.30**	**140.60**	**139.98**	**139.39**	**138.61**	**137.84**	**136.84**	**135.95**	**135.04**	**134.03**	**133.09**	**133.09**
Total Portfolio	**Total Portfolio**	**18.73**	**64.70**	**158.13**	**276.60**	**409.58**	**548.05**	**692.72**	**837.24**	**981.45**	**1,125.48**	**1,268.87**	**1,411.59**	**1,553.76**	**1,695.19**	**1,835.89**	**1,975.52**	**2,114.23**	**2,252.03**	**2,388.86**	**2,524.75**	**2,660.70**

Table 5-36 – Total Incentives per Program

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	$ 268,417	$ 273,328	$ 278,142	$ 280,243	$ 284,465	$ 287,826	$ 291,304	$ 291,675	$ 295,675	$ 287,426	$ 293,492	$ 296,280	$ 299,861	$ 303,218	$ 307,312	$ 311,073	$ 315,165	$ 318,626	$ 322,458	$ 323,563	$ 330,209
Residential	Income Eligible Lighting	$ 17,346	$ 18,304	$ 19,066	$ 21,387	$ 19,910	$ 17,200	$ 17,067	$ 16,671	$ 16,700	$ 16,550	$ 16,776	$ 582	$ 385	$ 534	$ 747	$ 3,534	$ 1,254	$ 2,710	$ 3,457	$ 4,083	$ 4,161
Total Residential	**Total Residential**	**$ 285,763**	**$ 291,632**	**$ 297,208**	**$ 301,630**	**$ 304,375**	**$ 305,026**	**$ 308,371**	**$ 308,346**	**$ 312,375**	**$ 303,976**	**$ 310,268**	**$ 296,862**	**$ 300,246**	**$ 303,752**	**$ 308,059**	**$ 314,607**	**$ 316,419**	**$ 321,336**	**$ 325,915**	**$ 327,646**	**$ 334,370**
Commercial	Commercial Prescriptive	$ 458,316	$ 465,878	$ 471,927	$ 475,094	$ 482,637	$ 485,221	$ 471,274	$ 462,192	$ 456,828	$ 454,935	$ 454,980	$ 468,550	$ 471,204	$ 473,178	$ 472,835	$ 470,375	$ 465,880	$ 460,507	$ 456,104	$ 452,278	$ 460,666
Commercial	Commercial Custom	$ 72,249	$ 81,165	$ 91,715	$ 100,367	$ 111,607	$ 120,685	$ 136,636	$ 151,090	$ 168,780	$ 182,974	$ 188,510	$ 207,636	$ 216,850	$ 228,044	$ 236,336	$ 191,453	$ 196,044	$ 200,955	$ 207,184	$ 213,565	$ 216,906
Commercial	SBDI	$ 165,113	$ 165,105	$ 174,960	$ 99,949	$ 105,981	$ 105,966	$ 107,430	$ 106,947	$ 105,526	$ 104,924	$ 104,858	$ 104,828	$ 104,796	$ 104,764	$ 104,729	$ 103,520	$ 103,485	$ 103,447	$ 103,392	$ 103,352	$ 105,586
Total Commercial	**Total Commercial**	**$ 695,679**	**$ 712,149**	**$ 738,602**	**$ 675,411**	**$ 700,225**	**$ 711,873**	**$ 715,341**	**$ 720,230**	**$ 731,134**	**$ 742,833**	**$ 748,348**	**$ 781,014**	**$ 792,850**	**$ 805,986**	**$ 813,901**	**$ 765,348**	**$ 765,409**	**$ 764,909**	**$ 766,680**	**$ 769,195**	**$ 783,159**
Portfolio	**EE Programs**	**$ 981,442**	**$1,003,781**	**$1,035,810**	**$ 977,041**	**$1,004,600**	**$1,016,899**	**$1,023,712**	**$1,028,576**	**$1,043,509**	**$1,046,809**	**$1,058,616**	**$1,077,876**	**$1,093,097**	**$1,109,739**	**$1,121,960**	**$1,079,955**	**$1,081,828**	**$1,086,245**	**$1,092,595**	**$1,096,841**	**$1,117,528**
Residential	Battery Storage DLC	$ 14,247	$ 36,883	$ 69,353	$ 105,127	$ 151,741	$ 203,310	$ 272,634	$ 347,076	$ 423,856	$ 517,483	$ 538,100	$ 558,317	$ 579,191	$ 599,600	$ 619,493	$ 641,174	$ 664,753	$ 691,564	$ 720,546	$ 751,814	$ 769,481
Residential	CPP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Residential	Grid-Interactive WH	$ 550	$ 2,037	$ 5,651	$ 8,368	$ 10,433	$ 11,470	$ 12,496	$ 13,495	$ 14,445	$ 13,558	$ 12,654	$ 11,800	$ 11,006	$ 10,236	$ 9,534	$ 8,944	$ 8,432	$ 7,813	$ 7,320	$ 6,882	$ 7,042
Residential	Smart Appliances DLC	$ 10,569	$ 31,741	$ 72,306	$ 92,170	$ 102,548	$ 103,673	$ 104,386	$ 107,238	$ 110,159	$ 113,064	$ 116,068	$ 119,069	$ 122,202	$ 125,348	$ 128,538	$ 131,924	$ 135,465	$ 138,984	$ 142,699	$ 146,391	$ 149,848
Residential	Smart Thermostats DLC	$ 15,033	$ 34,920	$ 60,099	$ 95,107	$ 132,204	$ 175,842	$ 226,578	$ 233,417	$ 240,366	$ 247,458	$ 254,738	$ 262,197	$ 269,958	$ 277,870	$ 286,049	$ 292,538	$ 299,548	$ 306,762	$ 314,501	$ 322,869	$ 330,401
Residential	TOU Opt-Out	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commercial	Battery Storage DLC	$ -	$ 858	$ 1,756	$ 1,797	$ 3,679	$ 4,706	$ 6,744	$ 7,888	$ 10,092	$ 13,428	$ 13,743	$ 15,148	$ 15,504	$ 17,002	$ 17,402	$ 17,810	$ 19,444	$ 21,145	$ 21,642	$ 23,453	$ 24,005
Commercial	CPP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commercial	Curtailment - Firm	$ 1,374	$ 2,281	$ 2,855	$ 2,948	$ 2,973	$ 3,070	$ 3,099	$ 3,201	$ 3,233	$ 3,342	$ 3,378	$ 3,417	$ 3,536	$ 3,582	$ 3,707	$ 3,756	$ 3,887	$ 3,939	$ 4,075	$ 4,130	$ 4,188
Commercial	Curtailment - Non-Firm	$ 2,060	$ 3,317	$ 4,247	$ 4,352	$ 4,389	$ 4,498	$ 4,612	$ 4,655	$ 4,776	$ 4,901	$ 4,955	$ 5,088	$ 5,150	$ 5,294	$ 5,442	$ 5,514	$ 5,668	$ 5,826	$ 5,904	$ 6,068	$ 6,153
Commercial	Grid-Interactive WH	$ 79	$ 268	$ 768	$ 1,123	$ 1,351	$ 1,471	$ 1,566	$ 1,664	$ 1,735	$ 1,614	$ 1,487	$ 1,386	$ 1,281	$ 1,169	$ 1,088	$ 1,002	$ 950	$ 855	$ 796	$ 733	$ 750
Commercial	Smart Thermostats DLC	$ 314	$ 750	$ 1,289	$ 2,050	$ 2,845	$ 3,794	$ 4,908	$ 5,053	$ 5,236	$ 5,391	$ 5,584	$ 5,748	$ 5,918	$ 6,128	$ 6,308	$ 6,494	$ 6,684	$ 6,880	$ 7,081	$ 7,330	$ 7,501
Commercial	TOU Opt-Out	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Demand Response	**Total Demand Response**	**$ 44,226**	**$ 113,055**	**$ 218,324**	**$ 313,041**	**$ 412,162**	**$ 511,834**	**$ 637,020**	**$ 723,685**	**$ 813,896**	**$ 920,238**	**$ 950,707**	**$ 982,170**	**$1,013,746**	**$1,046,229**	**$1,077,559**	**$1,109,157**	**$1,144,831**	**$1,183,768**	**$1,224,563**	**$1,269,669**	**$1,299,369**
Total Portfolio	**Total Portfolio**	**$1,025,667**	**$1,116,836**	**$1,254,134**	**$1,290,082**	**$1,416,762**	**$1,528,733**	**$1,660,733**	**$1,752,261**	**$1,857,406**	**$1,967,047**	**$2,009,323**	**$2,060,046**	**$2,106,843**	**$2,155,968**	**$2,199,520**	**$2,189,112**	**$2,226,659**	**$2,270,013**	**$2,317,158**	**$2,366,510**	**$2,416,897**

Table 5-37 – Total Utility Administrative Costs per Program

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	$ 355,519	$ 362,024	$ 368,400	$ 371,183	$ 376,775	$ 381,226	$ 385,834	$ 386,325	$ 391,622	$ 380,697	$ 388,731	$ 392,424	$ 397,167	$ 401,614	$ 407,036	$ 412,018	$ 417,438	$ 422,021	$ 427,097	$ 428,560	$ 437,363
Residential	Income Eligible Lighting	$ 61,950	$ 65,371	$ 68,093	$ 76,382	$ 71,107	$ 61,429	$ 60,954	$ 59,539	$ 59,643	$ 59,107	$ 59,914	$ 2,079	$ 1,375	$ 1,907	$ 2,668	$ 12,621	$ 4,479	$ 9,679	$ 12,346	$ 14,582	$ 14,861
Total Residential	**Total Residential**	**$ 417,469**	**$ 427,395**	**$ 436,493**	**$ 447,565**	**$ 447,883**	**$ 442,655**	**$ 446,787**	**$ 445,864**	**$ 451,265**	**$ 439,804**	**$ 448,645**	**$ 394,502**	**$ 398,542**	**$ 403,521**	**$ 409,704**	**$ 424,639**	**$ 421,916**	**$ 431,699**	**$ 439,443**	**$ 443,143**	**$ 452,223**
Commercial	Commercial Prescriptive	$ 625,441	$ 635,761	$ 644,016	$ 648,337	$ 658,631	$ 662,158	$ 643,124	$ 630,731	$ 623,411	$ 620,827	$ 620,888	$ 639,407	$ 643,029	$ 645,723	$ 645,255	$ 641,897	$ 635,763	$ 628,431	$ 622,423	$ 617,201	$ 628,648
Commercial	Commercial Custom	$ 118,706	$ 133,355	$ 150,688	$ 164,904	$ 183,370	$ 198,286	$ 224,494	$ 248,242	$ 277,306	$ 300,627	$ 309,722	$ 341,145	$ 356,285	$ 374,677	$ 388,301	$ 314,558	$ 322,100	$ 330,169	$ 340,404	$ 350,887	$ 356,377
Commercial	SBDI	$ 232,605	$ 232,593	$ 246,476	$ 140,804	$ 149,301	$ 149,281	$ 151,343	$ 150,662	$ 148,661	$ 147,812	$ 147,720	$ 147,678	$ 147,632	$ 147,587	$ 147,538	$ 145,834	$ 145,785	$ 145,732	$ 145,654	$ 145,598	$ 148,745
Total Commercial	**Total Commercial**	**$ 976,751**	**$1,001,709**	**$1,041,179**	**$ 954,045**	**$ 991,302**	**$1,009,724**	**$1,018,961**	**$1,029,635**	**$1,049,377**	**$1,069,266**	**$1,078,330**	**$1,128,230**	**$1,146,946**	**$1,167,987**	**$1,181,094**	**$1,102,289**	**$1,103,648**	**$1,104,332**	**$1,108,481**	**$1,113,686**	**$1,133,771**
Portfolio	**EE Programs**	**$1,394,220**	**$1,429,104**	**$1,477,672**	**$1,401,610**	**$1,439,184**	**$1,452,379**	**$1,465,749**	**$1,475,499**	**$1,500,642**	**$1,509,070**	**$1,526,976**	**$1,522,732**	**$1,545,488**	**$1,571,507**	**$1,590,798**	**$1,526,929**	**$1,525,565**	**$1,536,032**	**$1,547,924**	**$1,556,829**	**$1,585,994**
Residential	Battery Storage DLC	$ 34,157	$ 63,589	$ 102,759	$ 139,347	$ 193,349	$ 247,174	$ 327,157	$ 402,842	$ 479,968	$ 581,894	$ 554,524	$ 574,996	$ 595,156	$ 615,620	$ 635,695	$ 657,650	$ 682,554	$ 710,456	$ 740,937	$ 772,815	$ 789,519
Residential	CPP	$ 191,366	$ 380,099	$ 762,428	$ 383,358	$ 189,798	$ 12,044	$ 12,327	$ 17,946	$ 17,705	$ 17,181	$ 17,853	$ 17,640	$ 17,478	$ 16,149	$ 16,132	$ 17,672	$ 17,999	$ 17,636	$ 17,515	$ 17,703	$ 21,778
Residential	Grid-Interactive WH	$ 29,658	$ 47,474	$ 86,262	$ 71,883	$ 62,308	$ 46,615	$ 46,898	$ 47,263	$ 47,560	$ 37,682	$ 37,345	$ 37,071	$ 36,871	$ 36,709	$ 36,629	$ 36,675	$ 36,815	$ 36,863	$ 37,053	$ 37,314	$ 38,189
Residential	Smart Appliances DLC	$ 77,430	$ 139,054	$ 252,882	$ 190,270	$ 163,010	$ 133,137	$ 134,542	$ 139,615	$ 143,203	$ 146,709	$ 150,386	$ 154,107	$ 157,982	$ 161,906	$ 165,916	$ 170,542	$ 175,028	$ 179,329	$ 184,126	$ 188,673	$ 193,026
Residential	Smart Thermostats DLC	$ 53,086	$ 82,196	$ 117,177	$ 170,838	$ 210,701	$ 265,912	$ 328,876	$ 245,931	$ 252,815	$ 260,198	$ 267,767	$ 275,535	$ 283,609	$ 291,893	$ 300,462	$ 304,598	$ 312,453	$ 319,930	$ 328,462	$ 337,634	$ 345,946
Residential	TOU Opt-Out	$ 225,922	$ 429,428	$ 778,735	$ 346,334	$ 156,856	$ 13,503	$ 13,820	$ 18,904	$ 18,648	$ 18,090	$ 18,913	$ 18,713	$ 18,672	$ 17,148	$ 17,478	$ 18,873	$ 19,127	$ 18,943	$ 19,314	$ 19,724	$ 23,346
Commercial	Battery Storage DLC	$ 514	$ 1,553	$ 2,622	$ 2,691	$ 4,774	$ 5,938	$ 8,270	$ 9,484	$ 11,743	$ 15,343	$ 14,534	$ 15,946	$ 16,260	$ 17,727	$ 18,147	$ 18,560	$ 20,277	$ 22,051	$ 22,648	$ 24,501	$ 24,985
Commercial	CPP	$ 33,112	$ 66,418	$ 135,089	$ 72,331	$ 39,800	$ 4,837	$ 4,723	$ 5,616	$ 5,634	$ 5,575	$ 5,602	$ 5,609	$ 5,575	$ 4,496	$ 4,352	$ 4,196	$ 4,046	$ 3,914	$ 3,826	$ 3,422	$ 7,045
Commercial	Curtailment - Firm	$ 9,456	$ 10,553	$ 11,321	$ 11,613	$ 11,842	$ 12,148	$ 12,389	$ 12,710	$ 12,965	$ 13,303	$ 13,574	$ 13,852	$ 14,216	$ 14,513	$ 14,895	$ 15,207	$ 15,607	$ 15,934	$ 16,352	$ 16,696	$ 17,049
Commercial	Curtailment - Non-Firm	$ 9,995	$ 11,438	$ 12,559	$ 12,859	$ 13,096	$ 13,410	$ 13,733	$ 13,991	$ 14,331	$ 14,681	$ 14,964	$ 15,333	$ 15,636	$ 16,026	$ 16,426	$ 16,756	$ 17,174	$ 17,603	$ 17,958	$ 18,405	$ 18,780
Commercial	Grid-Interactive WH	$ 4,136	$ 6,516	$ 11,645	$ 9,472	$ 7,987	$ 5,826	$ 5,706	$ 5,673	$ 5,598	$ 4,962	$ 4,913	$ 4,893	$ 4,870	$ 4,843	$ 4,848	$ 4,851	$ 4,889	$ 4,887	$ 4,922	$ 4,956	$ 5,073
Commercial	Smart Thermostats DLC	$ 984	$ 1,613	$ 2,360	$ 3,522	$ 4,378	$ 5,579	$ 6,963	$ 5,166	$ 5,352	$ 5,509	$ 5,706	$ 5,872	$ 6,046	$ 6,257	$ 6,442	$ 6,598	$ 6,799	$ 6,988	$ 7,202	$ 7,458	$ 7,637
Commercial	TOU Opt-Out	$ 46,107	$ 89,095	$ 164,954	$ 79,457	$ 41,452	$ 5,334	$ 5,130	$ 6,372	$ 6,352	$ 6,236	$ 6,229	$ 6,194	$ 6,109	$ 4,518	$ 4,262	$ 3,992	$ 3,757	$ 3,632	$ 3,699	$ 3,774	$ 7,827
Total Demand Response	**Total Demand Response**	**$ 715,923**	**$1,329,026**	**$2,440,793**	**$1,493,975**	**$1,099,353**	**$ 771,457**	**$ 920,535**	**$ 931,514**	**$1,021,874**	**$1,127,363**	**$1,112,310**	**$1,145,761**	**$1,178,482**	**$1,207,804**	**$1,241,686**	**$1,276,170**	**$1,316,524**	**$1,358,166**	**$1,404,014**	**$1,453,074**	**$1,500,200**
Total Portfolio Costs	**Total Portfolio Costs**	**$ 316,522**	**$ 413,720**	**$ 587,770**	**$ 434,338**	**$ 380,781**	**$ 333,575**	**$ 357,943**	**$ 361,052**	**$ 378,377**	**$ 395,465**	**$ 395,893**	**$ 400,274**	**$ 408,596**	**$ 416,897**	**$ 424,873**	**$ 420,465**	**$ 426,313**	**$ 434,130**	**$ 442,791**	**$ 451,485**	**$ 462,929**
Total Portfolio	**Total Portfolio**	**$2,426,665**	**$3,171,850**	**$4,506,235**	**$3,329,923**	**$2,919,318**	**$2,557,412**	**$2,744,226**	**$2,768,064**	**$2,900,894**	**$3,031,897**	**$3,035,179**	**$3,068,767**	**$3,132,566**	**$3,196,208**	**$3,257,356**	**$3,223,563**	**$3,268,402**	**$3,328,328**	**$3,394,729**	**$3,461,388**	**$3,549,124**

There is no customer incremental cost for demand response/demand side rate programs, the costs are captured in the program costs.

Table 5-38 – Customer Incremental Costs (NPV)

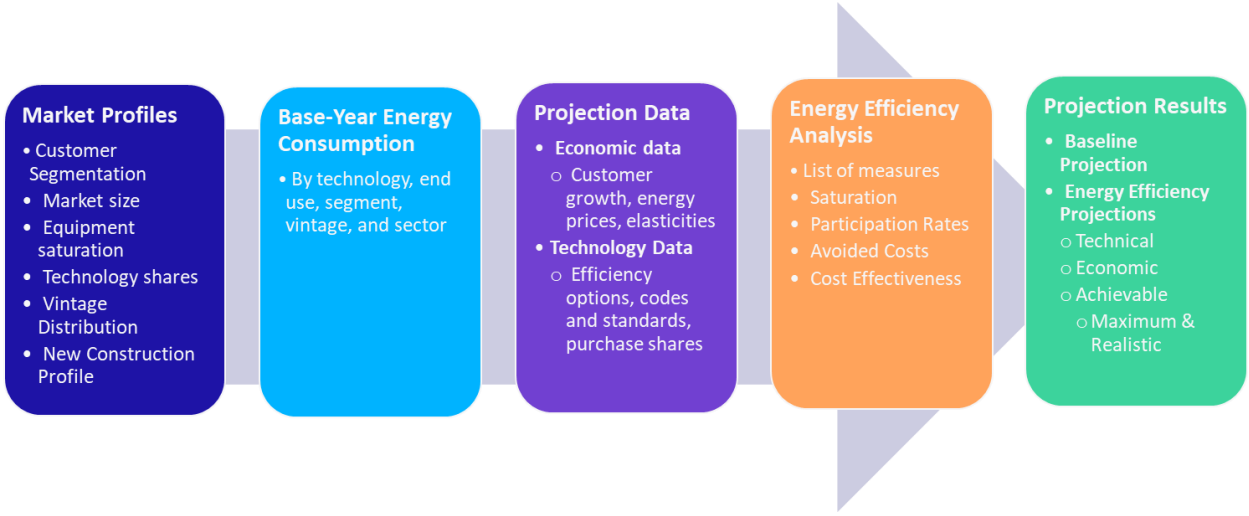
Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	$ 401,400	$ 408,822	$ 416,182	$ 422,828	$ 429,418	$ 434,863	$ 440,488	$ 441,543	$ 448,029	$ 436,865	$ 446,176	$ 450,792	$ 456,594	$ 462,009	$ 468,511	$ 474,539	$ 480,949	$ 486,563	$ 492,745	$ 495,018	$ 505,118
Residential	Income Eligible Lighting	$ 15,130	$ 15,941	$ 16,650	$ 16,930	$ 17,181	$ 15,131	$ 14,932	$ 14,532	$ 13,589	$ 13,566	$ 13,625	$ 489	$ 346	$ 469	$ 601	$ 3,005	$ 1,087	$ 2,252	$ 2,878	$ 3,249	$ 3,311
Total Residential	**Total Residential**	**$ 416,530**	**$ 424,763**	**$ 432,832**	**$ 439,758**	**$ 446,599**	**$ 449,993**	**$ 455,420**	**$ 456,076**	**$ 461,618**	**$ 450,432**	**$ 459,801**	**$ 451,281**	**$ 456,940**	**$ 462,478**	**$ 469,111**	**$ 477,544**	**$ 482,035**	**$ 488,815**	**$ 495,623**	**$ 498,267**	**$ 508,429**
Commercial	Commercial Prescriptive	$ 751,565	$ 763,726	$ 773,459	$ 778,492	$ 790,800	$ 794,952	$ 772,490	$ 757,820	$ 749,125	$ 746,047	$ 746,101	$ 767,890	$ 772,135	$ 775,292	$ 774,654	$ 770,665	$ 763,386	$ 754,673	$ 747,552	$ 741,358	$ 755,101
Commercial	Commercial Custom	$ 117,917	$ 132,607	$ 149,999	$ 164,257	$ 182,785	$ 197,749	$ 223,752	$ 247,374	$ 276,359	$ 299,610	$ 308,609	$ 339,627	$ 354,873	$ 373,298	$ 386,968	$ 314,127	$ 321,606	$ 329,585	$ 339,735	$ 350,128	$ 355,596
Commercial	SBDI	$ 147,112	$ 147,103	$ 157,944	$ 96,057	$ 102,692	$ 102,676	$ 104,287	$ 103,756	$ 102,194	$ 101,531	$ 101,460	$ 101,428	$ 101,393	$ 101,358	$ 101,320	$ 99,990	$ 99,952	$ 99,912	$ 99,851	$ 99,809	$ 102,264
Total Commercial	**Total Commercial**	**$1,016,594**	**$1,043,436**	**$1,081,401**	**$1,038,806**	**$1,076,277**	**$1,095,377**	**$1,100,529**	**$1,108,951**	**$1,127,677**	**$1,147,189**	**$1,156,169**	**$1,208,944**	**$1,228,400**	**$1,249,948**	**$1,262,942**	**$1,184,782**	**$1,184,944**	**$1,184,170**	**$1,187,138**	**$1,191,294**	**$1,212,961**
Total Portfolio	**Total Portfolio**	**$1,433,124**	**$1,468,199**	**$1,514,234**	**$1,478,564**	**$1,522,877**	**$1,545,371**	**$1,555,949**	**$1,565,026**	**$1,589,295**	**$1,597,621**	**$1,615,971**	**$1,660,225**	**$1,685,340**	**$1,712,426**	**$1,732,054**	**$1,662,327**	**$1,666,979**	**$1,672,985**	**$1,682,761**	**$1,689,561**	**$1,721,390**

3.9 Sources and Quality of Information

(I) The utility shall describe and document how it performed the assessments and developed the estimates pursuant to subsection (3)(G) and shall provide documentation of its sources and quality of information.

Liberty-Empire engaged AEG to conduct a DSM Market Potential Study to assess the remaining opportunity for energy efficiency within its service territory to inform the IRP and future program design. The primary steps of the analysis are summarized in Figure 5-11, with detailed descriptions of key data sources used to inform each step provided in Section 2.

Figure 5-11 – Potential Analysis Framework



The process to characterize Liberty-Empire's customers and their energy consumption is described above in Section 1.1. The remainder of this section describes how AEG projects that energy consumption into the future to develop a baseline projection and then estimates the available energy efficiency potential relative to that baseline.

Baseline End-Use Projection

Prior to developing estimates of energy efficiency potential, AEG developed a baseline end-use projection to quantify what the consumption is likely to be in the future in the absence of new or continued energy efficiency programs. The savings from past programs are embedded in the forecast, but the baseline projection assumes that those

past programs cease to exist in the future. Thus, the potential analysis captures all possible savings from future programs.

The baseline projection incorporates assumptions regarding:

- Customer population and economic growth
- Appliance/equipment standards and building codes already mandated
- Forecasts of future electricity prices and other drivers of consumption
- Trends in fuel shares and appliance saturations and assumptions about miscellaneous electricity growth
- Naturally occurring energy efficiency, which reflects the manufacturing of more efficient options in response to new appliance standards and purchases of high-efficiency appliances and equipment by early adopters outside of utility programs
- Future consumption of specific customer groups, such as nonresidential opt-out customers and contracted municipalities

Although AEG took steps to align with Liberty's IR forecast, the baseline projection is not Liberty-Empire's forecast. Rather it was developed as an integral component of AEG's modeling construct to serve as the metric against which energy efficiency potentials are measured. Table 5-39 provides a summary of the baseline projection for annual energy use by sector for the entire Liberty-Empire service territory.

Table 5-39 – Baseline Projection Summary (GWh)

Sector	2023	2027	2028	2029	2030	2040	2046	% Change ('23-'46)	Avg. Growth
Residential	1,721	1,722	1,694	1,675	1,656	1,500	1,440	-16.3%	-0.8%
Commercial	1,631	1,593	1,583	1,576	1,569	1,521	1,508	-7.5%	-0.3%
Industrial	917	1,089	1,100	1,106	1,115	1,211	1,278	39.3%	1.4%
Total	**4,269**	**4,404**	**4,378**	**4,357**	**4,340**	**4,232**	**4,225**	**-1.0%**	**0.0%**

Figure 5-12, Figure 5-13, and Figure 5-14 present end-use level baseline projections for the residential, commercial, and industrial sectors, respectively. These exhibits omit the impact of private generation for clarity and represent total use of electricity regardless of whether it is privately generated or sourced from the grid.

Figure 5-12 – Residential Baseline Consumption by End Use (Net GWh)

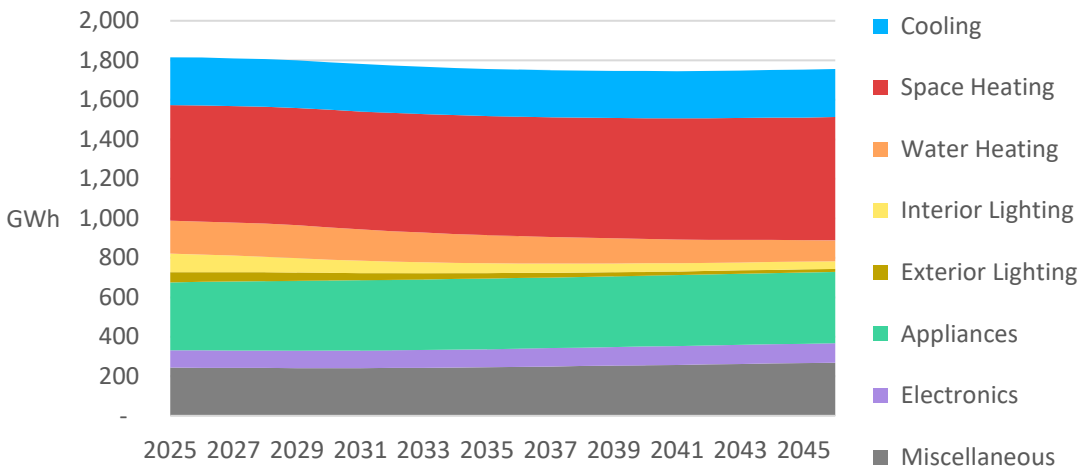


Figure 5-13 – Commercial Baseline Consumption by End Use (GWh)

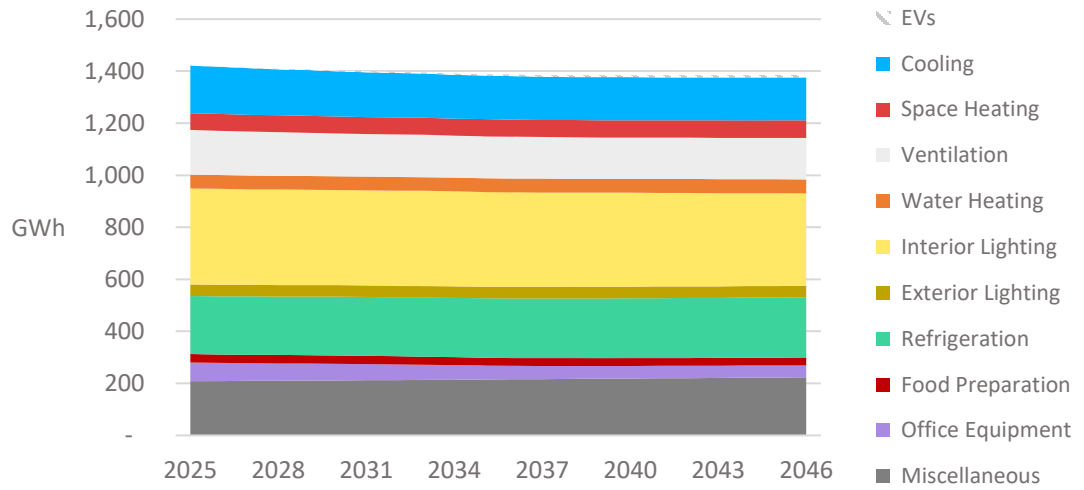
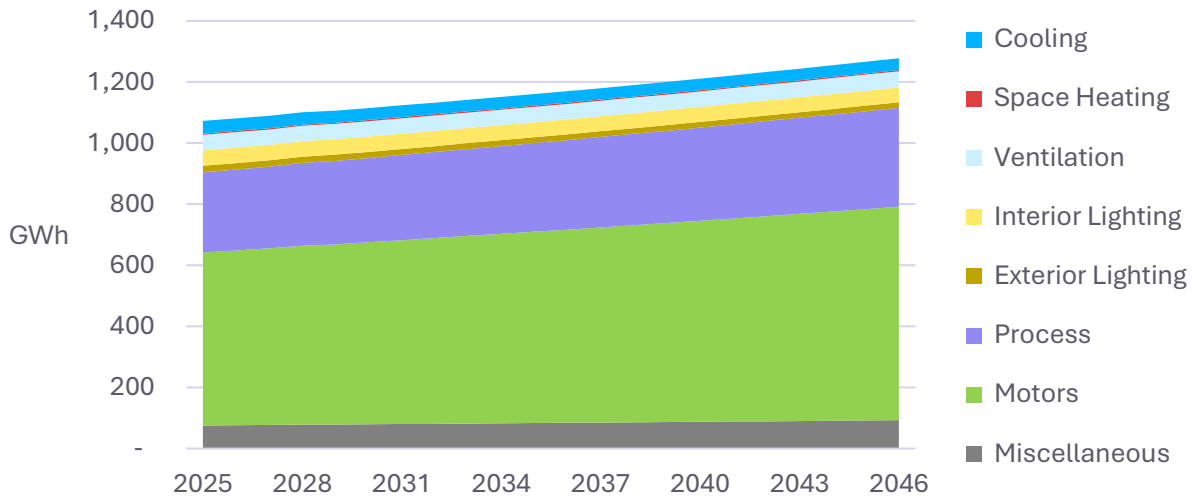


Figure 5-14 – Industrial Baseline Projection by End Use (GWh)



Energy Efficiency Potential

In this study, the energy efficiency potential estimates represent net savings[7] for four types of potential: technical, economic, maximum achievable, and realistic achievable. Technical and economic potential are both theoretical limits to efficiency savings that do not reflect market barriers or expected customer adoption. Achievable potential embodies a set of assumptions about the decisions consumers make regarding the efficiency of the equipment they purchase, the maintenance activities they undertake, the controls they use for energy-consuming equipment, and the elements of building construction. These levels of potential are described in more detail below.

- **Technical Potential** is defined as the theoretical upper limit of conservation potential. It assumes that customers adopt all feasible measures regardless of their cost. At the time of existing equipment failure, customers replace their equipment with the most efficient option available. In new construction, customers and developers also choose the most efficient equipment option. Technical potential also assumes the adoption of measures that don't consume energy, also known as non-equipment measures. For example, it includes installation of high-efficiency

[7] Savings in "net" terms instead of "gross" terms mean that the baseline forecast does include naturally occurring efficiency. In other words, the baseline assumes that energy efficiency levels reflect that some customers are already purchasing more efficient option.

windows in all new construction opportunities and air conditioner maintenance in all existing buildings with central and room air conditioning. These retrofit measures are phased in over several years to align with the stock turnover of related equipment units, rather than modeled as immediately available all at once.

- **Economic Potential** assumes all customers adopt all measures that are cost-effective from a Total Resource Cost (TRC) test perspective, which compares lifetime energy and capacity benefits to the costs of delivering the measure through a utility program. These costs are the incremental cost of the given efficiency measure relative to the relevant baseline course of action, plus any administrative costs that are incurred by the program to deliver and implement the measure. If the benefits outweigh the costs (that is, if the TRC ratio is greater than 1.0), a given measure is included in the economic potential.
- **Maximum Achievable Potential ("MAP")** refines economic potential by applying customer participation rates that account for market barriers, customer awareness and attitudes, program maturity, and other factors that affect market penetration of efficiency measures. It is the maximum amount of savings that can be realized under ideal market, implementation, and customer preference conditions.
- **Realistic Achievable Potential ("RAP")** further refines achievable potential to reflect expected program participation given barriers to customer acceptance, non-ideal implementation conditions, and limited program budgets. This represents a lower bound on achievable potential.

Table 5-40 and Figure 5-15 summarize the energy efficiency savings in terms of annual energy use for the four levels of potential, described above. Savings are represented in cumulative terms, which reflect the effects of persistent savings in prior years in addition to new savings in year. Key highlights are as follows:

Table 5-40 – Summary of Energy Efficiency Potential (Energy)

Summary of Energy Savings	2027	2028	2029	2030	2040	2046
Baseline Projection (GWh)	4,404	4,378	4,357	4,340	4,232	4,225
Cumulative Potential (GWh)						
Realistic Achievable Potential	19	38	58	75	237	326
Maximum Achievable Potential	28	56	83	106	312	408
Economic Potential	52	103	154	198	579	753
Technical Potential	136	267	390	504	1,372	1,699
Energy Savings (% of Baseline)						
Realistic Achievable Potential	0.4%	0.9%	1.3%	1.7%	5.6%	7.7%
Maximum Achievable Potential	0.6%	1.3%	1.9%	2.5%	7.4%	9.6%
Economic Potential	1.2%	2.4%	3.5%	4.6%	13.7%	17.8%
Technical Potential	3.1%	6.1%	9.0%	11.6%	32.4%	40.2%

Figure 5-15 – Cumulative Energy Efficiency Potential as a Percent of Liberty-Empire Baseline Projection (Energy)

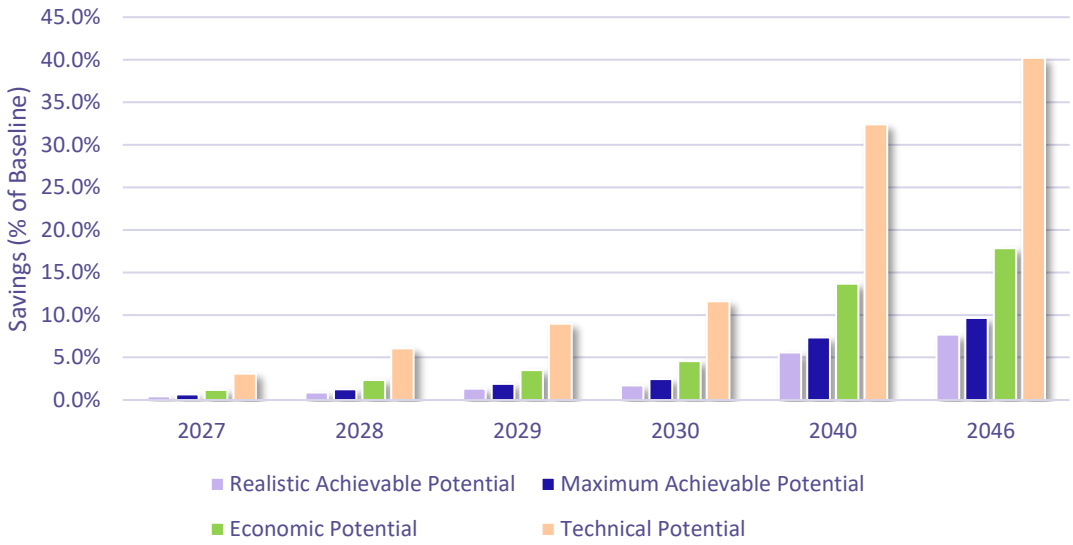


Table 5-41 and Figure 5-16 summarize the winter peak demand savings from all energy efficiency measures for four levels of potential *relative to the baseline projection.*

Table 5-41 – Summary of Energy Efficiency Potential (Peak Demand)

Summary of Energy Savings	2027	2028	2029	2030	2040	2046
Baseline Projection (MW)	960	957	954	951	921	915
Cumulative Savings (MW)						
Realistic Achievable Potential	7	14	21	27	85	117
Maximum Achievable Potential	10	20	31	39	114	148
Economic Potential	19	38	56	72	211	274
Technical Potential	43	84	123	158	422	515
Energy Savings (% of Baseline)						
Realistic Achievable Potential	0.7%	1.4%	2.2%	2.8%	9.3%	12.8%
Maximum Achievable Potential	1.1%	2.1%	3.2%	4.1%	12.4%	16.2%
Economic Potential	2.0%	3.9%	5.9%	7.6%	22.9%	29.9%
Technical Potential	4.5%	8.8%	12.9%	16.6%	45.8%	56.3%

Figure 5-16 – Cumulative Energy Efficiency Potential as a Percent of Liberty-Empire Baseline Projection (Peak Demand)

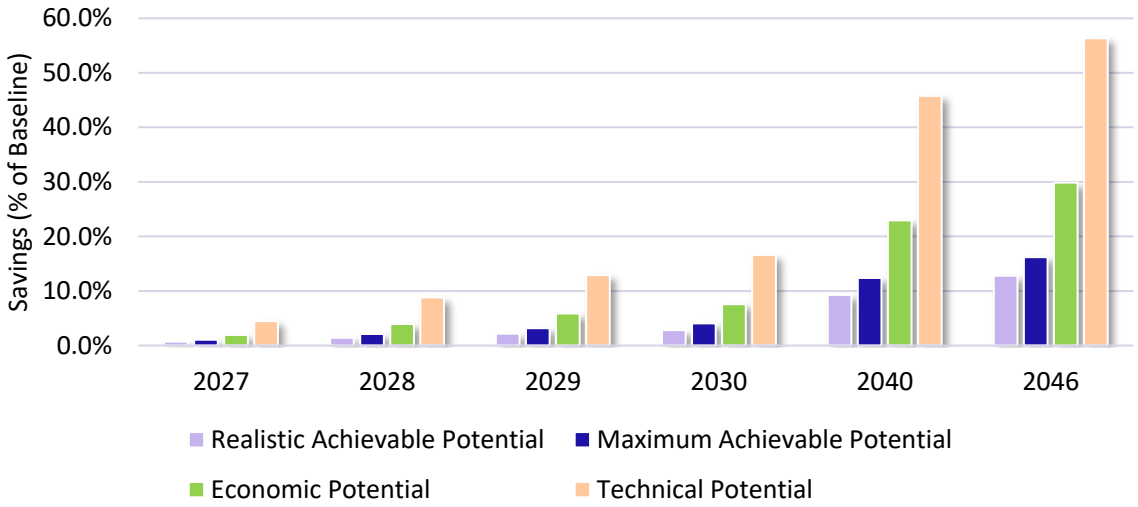


Table 5-42,

Figure 5-17, Figure 5-18 summarize the residential energy efficiency potential in terms of cumulative energy savings over the study period. Table 5-43 presents the winter peak demand impacts for the residential sector.

Table 5-42– Residential Energy Efficiency Potential (Annual Energy)

Summary of Energy Savings	2027	2028	2029	2030	2040	2046
Baseline Projection (GWh)	1,722	1,694	1,675	1,656	1,500	1,440
Cumulative Savings (GWh)						
Realistic Achievable Potential	4.5	8.7	13.0	15.5	37.0	46.8
Maximum Achievable Potential	6.8	13.2	19.5	23.1	51.8	62.4
Economic Potential	11.2	21.9	32.4	39.3	92.2	112.7
Technical Potential	68.9	134.8	196.0	250.5	662.2	814.4
Energy Savings (% of Baseline)						
Realistic Achievable Potential	0.3%	0.5%	0.8%	0.9%	2.5%	3.3%
Maximum Achievable Potential	0.4%	0.8%	1.2%	1.4%	3.5%	4.3%
Economic Potential	0.7%	1.3%	1.9%	2.4%	6.1%	7.8%
Technical Potential	4.0%	8.0%	11.7%	15.1%	44.2%	56.6%

Figure 5-17 – Residential Cumulative Energy Efficiency Savings as a Percent of Baseline Projection (Energy)

Figure 5-18 – Residential Cumulative Realistic Achievable Potential by End Use (Energy)

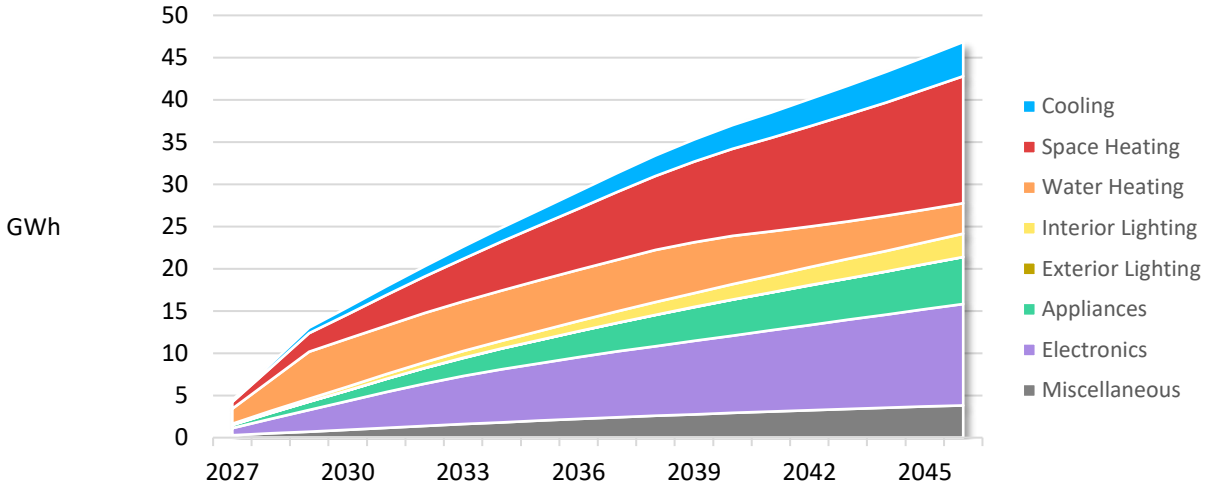


Table 5-43 – Residential Energy Efficiency Potential (Winter Peak)

Summary of Energy Savings	2027	2028	2029	2030	2040	2046
Baseline Projection (MW)	574	571	569	566	536	526
Cumulative Savings (MW)						
Realistic Achievable Potential	3	5	8	9	25	32
Maximum Achievable Potential	4	8	12	14	35	43
Economic Potential	6	12	18	22	54	67
Technical Potential	25	49	72	91	245	302
Energy Savings (% of Baseline)						
Realistic Achievable Potential	0.4%	0.9%	1.4%	1.6%	4.6%	6.1%
Maximum Achievable Potential	0.7%	1.4%	2.1%	2.5%	6.6%	8.1%
Economic Potential	1.0%	2.1%	3.1%	3.8%	10.2%	12.7%
Technical Potential	4.3%	8.6%	12.6%	16.2%	45.7%	57.4%

Table 5-44,

Figure 5-19, and Figure 5-20 summarize the commercial energy efficiency potential in terms of cumulative energy savings over the study period. Table 5-45 presents the winter peak demand impacts for the commercial sector.

Table 5-44 – Commercial Energy Efficiency Potential (Energy)

Summary of Energy Savings	2027	2028	2029	2030	2040	2046
Baseline Projection (GWh)	1,593	1,583	1,576	1,569	1,521	1,508
Cumulative Savings (GWh)						
Realistic Achievable Potential	11.3	22.5	33.8	44.5	143.8	196.4
Maximum Achievable Potential	16.3	32.3	48.1	62.8	187.4	243.5
Economic Potential	32.1	63.4	94.3	123.3	362.7	467.4
Technical Potential	56.9	111.3	163.6	212.5	567.5	687.2
Energy Savings (% of Baseline)						
Realistic Achievable Potential	0.7%	1.4%	2.1%	2.8%	9.5%	13.0%
Maximum Achievable Potential	1.0%	2.0%	3.0%	4.0%	12.3%	16.2%
Economic Potential	2.0%	4.0%	6.0%	7.9%	23.8%	31.0%
Technical Potential	3.6%	7.0%	10.4%	13.5%	37.3%	45.6%

Figure 5-19 – Commercial Cumulative Energy Efficiency Potential as a Percent of Baseline Projection (Energy)

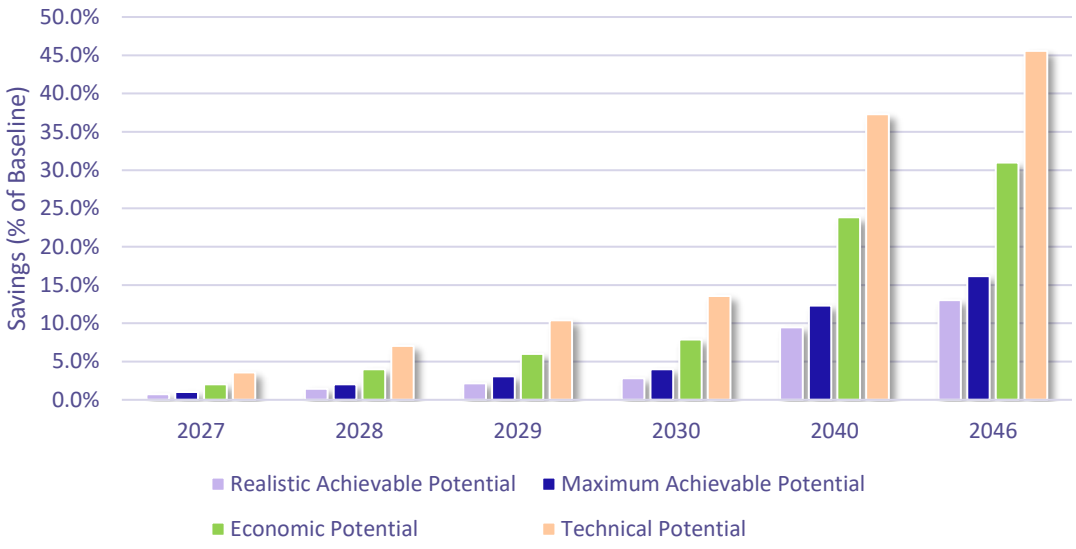


Figure 5-20 – Commercial Cumulative Realistic Achievable Potential by End Use (Energy)

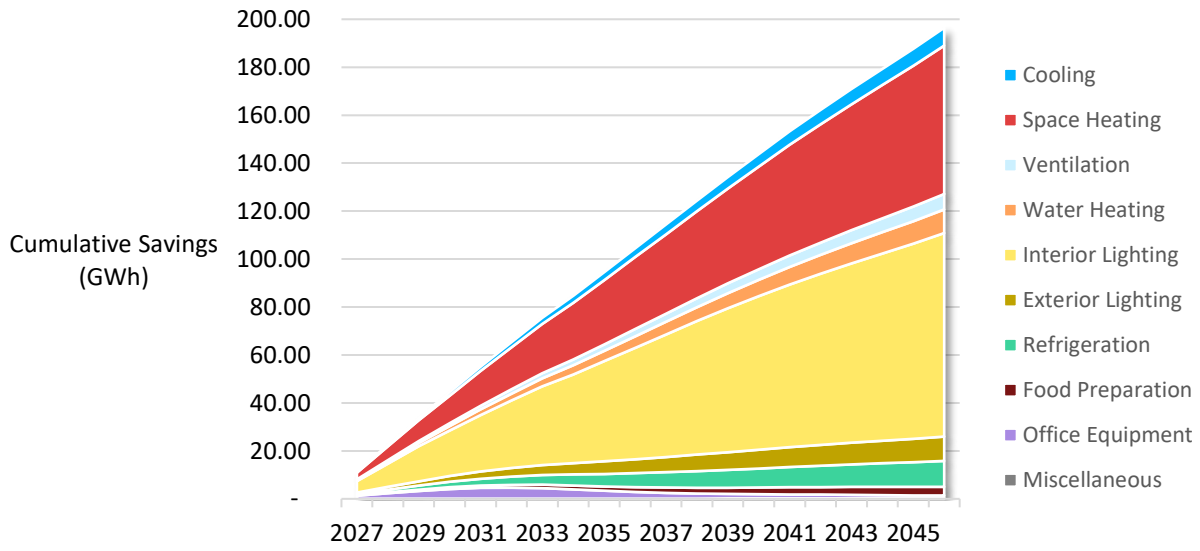


Table 5-45 – Commercial Energy Efficiency Potential (Winter Peak Demand)

Summary of Energy Savings	2027	2028	2029	2030	2040	2046
Baseline Projection (MW)	299	298	297	295	288	285
Cumulative Savings (MW)						
Realistic Achievable Potential	4.1	8.1	12.2	16.2	55.8	78.3
Maximum Achievable Potential	5.9	11.7	17.4	22.9	72.7	97.1
Economic Potential	12.2	24.3	36.1	47.4	146.5	192.2
Technical Potential	17.3	33.6	49.0	63.5	165.9	197.4
Energy Savings (% of Baseline)						
Realistic Achievable Potential	1.4%	2.7%	4.1%	5.5%	19.4%	27.5%
Maximum Achievable Potential	2.0%	3.9%	5.9%	7.7%	25.3%	34.1%
Economic Potential	4.1%	8.2%	12.2%	16.1%	51.0%	67.4%
Technical Potential	5.8%	11.3%	16.5%	21.5%	57.7%	69.3%

Tables 5-46,

Figure 5-21, and Figure 5-22 summarize the industrial energy efficiency potential in terms of cumulative energy savings over the study period. Table 5-47 presents the winter peak demand impacts for the industrial sector.

Table 5-46 – Industrial Energy Efficiency Potential (Energy)

Summary of Energy Savings	2027	2028	2029	2030	2040	2046
Baseline Projection (GWh)	1,089	1,100	1,106	1,115	1,211	1,278
Cumulative Savings (GWh)						
Realistic Achievable Potential	3.5	7.1	10.8	14.6	56.0	82.4
Maximum Achievable Potential	5.1	10.2	15.4	20.6	72.5	101.6
Economic Potential	8.8	17.8	26.8	35.7	124.3	173.4
Technical Potential	10.1	20.4	30.7	40.8	142.0	197.8
Energy Savings (% of Baseline)						
Realistic Achievable Potential	0.3%	0.6%	1.0%	1.3%	4.6%	6.4%
Maximum Achievable Potential	0.5%	0.9%	1.4%	1.8%	6.0%	8.0%
Economic Potential	0.8%	1.6%	2.4%	3.2%	10.3%	13.6%
Technical Potential	0.9%	1.9%	2.8%	3.7%	11.7%	15.5%

Figure 5-21 – Industrial Cumulative Energy Efficiency Potential as a Percent of Baseline Projection (Energy)

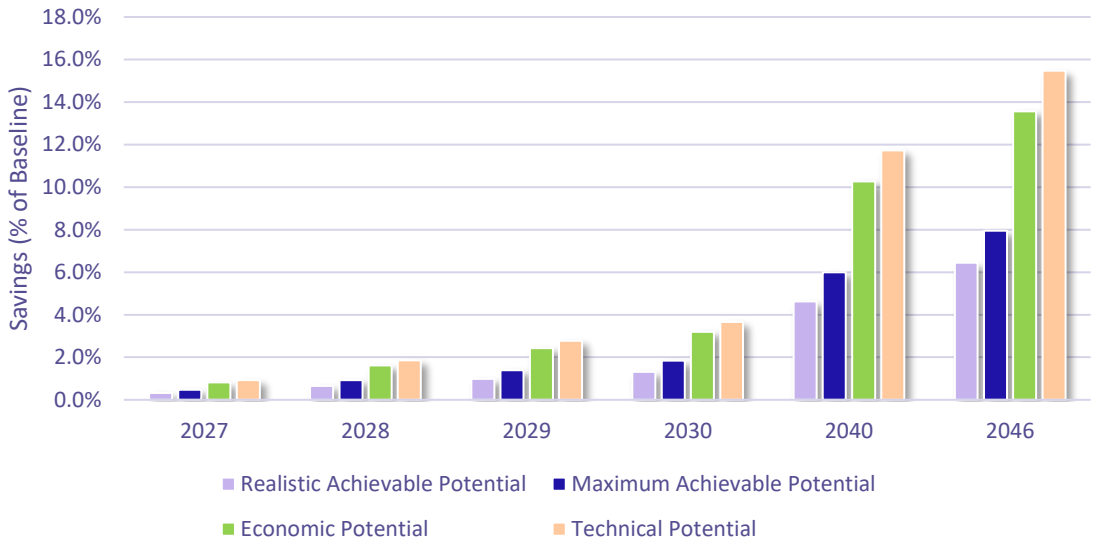


Figure 5-22 – Industrial Cumulative Realistic Achievable Potential (Energy)

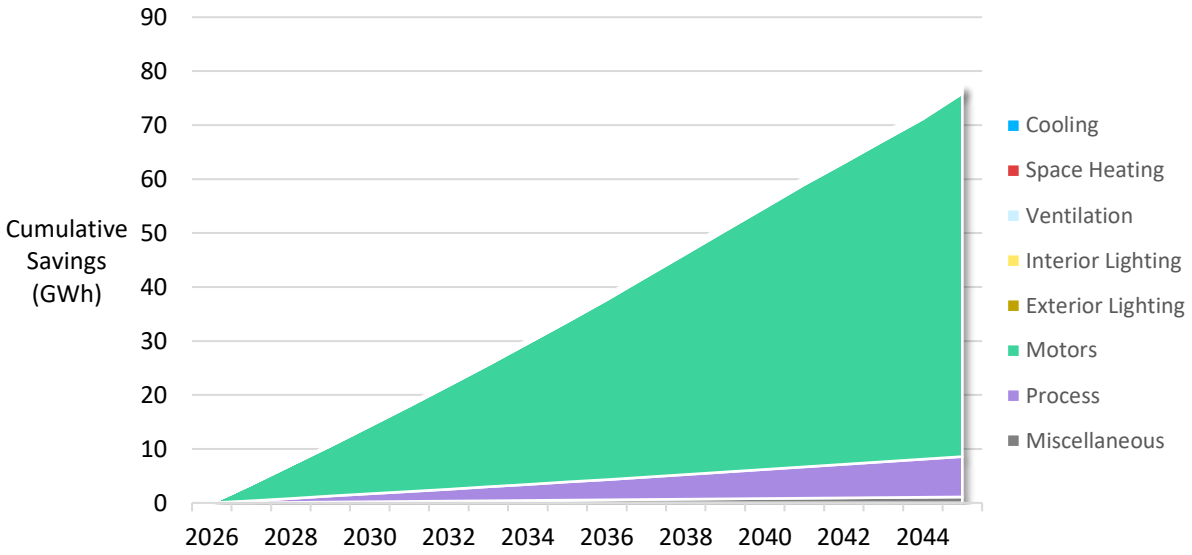


Table 5-47 – Industrial Energy Efficiency Potential (Winter Peak Demand)

Summary of Energy Savings	2027	2028	2029	2030	2040	2046
Baseline Projection (MW)	87	88	89	90	98	104
Cumulative Savings (MW)						
Realistic Achievable Potential	0.3	0.6	0.9	1.2	4.7	7.0
Maximum Achievable Potential	0.4	0.9	1.3	1.7	6.1	8.6
Economic Potential	0.7	1.5	2.2	2.9	10.3	14.3
Technical Potential	0.8	1.6	2.5	3.3	11.4	15.8
Energy Savings (% of Baseline)						
Realistic Achievable Potential	0.3%	0.7%	1.0%	1.4%	4.8%	6.7%
Maximum Achievable Potential	0.5%	1.0%	1.5%	1.9%	6.3%	8.3%
Economic Potential	0.8%	1.7%	2.5%	3.3%	10.5%	13.8%
Technical Potential	0.9%	1.9%	2.8%	3.7%	11.6%	15.3%

SECTION 4 DEMAND-SIDE RATE DEVELOPMENT

(4) The utility shall develop potential demand-side rates designed for each market segment to reduce the net consumption of electricity or modify the timing of its use. The utility shall describe and document its demand-side rate planning and design process and shall include at least the following activities and elements:

4.1 Demand-Side Rate Review

(A) Review demand-side rates that have been implemented by other utilities and identify whether similar demand-side rates would be applicable for the utility taking into account factors such as similarity in electric prices and customer makeup;

AEG reviewed demand-side rates that have been implemented and/or piloted by other utilities. The table below details the different rate options in the region. Almost all of the options below require advanced metering technology.

Table 5-48 – Comparison of Demand-Side Rates

State	Utility	Rate Type	Status	Sector	Description
Missouri	Evergy	Time of Use	Active	Residential	Varying prices for seasonal peaks. On-Peak: 4-8pm M-F excluding holidays, Super Off-Peak: 12-6am, Off-Peak: all other hours.[8]
Missouri	Evergy	Time of Day	Frozen	Residential	Varying prices for seasonal peaks. Summer: On-Peak 1-8pm M-F, Off-Peak 10pm-6am. Winter: On-Peak 7am-10pm M-F, Off-Peak 10pm-7am M-F and weekends. Shoulder: all other hours.[9]
Missouri	Evergy	Time of Day	Frozen	C&I	Varying prices for seasonal peaks. Summer: On-Peak 1-8pm M-F, Off-Peak 10pm-6am. Winter: On-Peak 7am-10pm M-F, Off-Peak 10pm-7am M-F and weekends. Shoulder: all other hours.[10]
Missouri	Evergy	Real Time Pricing	Frozen	C&I	24-hour hourly prices released by 4pm for the following day. [11]
Missouri	Ameren	Time of Use	Active	Residential	Varying prices for seasonal peaks and TOU rate (summer only). Summer: On-Peak 2-8pm M-F

[8] www.evergy.com/-/media/documents/billing/missouri/detailed_tariffs_mo/gmo/residential-time-of-use-040519.pdf?la=en
[9] www.evergy.com/-/media/documents/billing/missouri/detailed_tariffs_mo/gmo/residential-service-time-of-day-frozen-081419.pdf?la=en
[10] www.evergy.com/-/media/documents/billing/missouri/detailed_tariffs_mo/gmo/general-service-time-of-day-frozen-081419.pdf?la=en
[11] www.evergy.com/-/media/documents/billing/missouri/detailed_tariffs_mo/gmo/real-time-pricing-program-frozen-022217.pdf?la=en

State	Utility	Rate Type	Status	Sector	Description
					excluding holidays, Off-Peak 10pm-6am. Winter: On-Peak 6-8am and 6-8pm M-F excluding holidays, Off-Peak 10pm-6am. Shoulder: all other hours.[12]
Missouri	Ameren	Time of Use	Active	Residential	Varying prices for seasonal peaks and TOU rate (summer only). On-Peak 6am-10pm, Off-Peak 10pm-6am.
Missouri	Ameren	Time of Use	Active	Residential	Varying prices for seasonal peaks. Summer: On-Peak 3-7pm M-F excluding holidays. Winter: On-Peak 6-8am and 6-8pm M-F excluding holidays. Off-Peak all other hours.
Missouri	Ameren	Time of Day	Active	C&I	Optional TOD rates (adjustments to rates). Varying prices for different service rate classifications and seasons. On Peak 10am-10pm M-F excluding holidays.[13]
Illinois	Ameren	Real Time Pricing	Active	Residential	Day ahead, hourly supply pricing.[14]
Illinois	Ameren	Peak Time Rebate	Active	Residential	Customers earn bill credits for participating in Peak Events.[15]
Illinois	Ameren	Real Time Pricing	Active	C&I	Day ahead, hourly supply pricing.[16]
Illinois	ComEd	Time of Use	Active	Residential	Pilot 2020-2024. On-Peak: 6am-2pm and 7-10 pm, Super Peak: 2-7pm, Off-Peak: all other hours.[17]
Illinois	ComEd	Real Time Pricing	Active	Residential	Real-time hourly pricing.
Illinois	ComEd	Peak Time Rebate	Active	Residential	Customers earn bill credits for participating in Peak Events. Typically called between 11am-7pm, 3-6 days in the summer.

This review provided a general sense of what kind of rates are implemented by utilities in the region. The utilities supply different rate options depending on the type of service territory, customer population, and the utilities' needs. To fully assess the applicability of a rate, a detailed rate design and pilot would have to be implemented. For the purposes of this IRP, AEG assessed potential using inputs from secondary data in regional demand-side rate impact evaluations.

[12] www.ameren.com/missouri/residential/rates/electric-rates
[13] www.ameren.com/-/media/rates/files/missouri/uecdsheet55rate2msgs.pdf
[14] www.ameren.com/illinois/account/customer-service/bill/power-smart-pricing
[15] www.ameren.com/-/media/rates/files/illinois/aiel51rdptr.pdf
[16] www.ameren.com/-/media/rates/files/illinois/aiel27rdrtp.pdf
[17] www.comed.com/WaysToSave/ForYourHome/Pages/ManageMyEnergy.aspx

(B) Identify demand-side rates applicable to the major classes and decision-makers identified in subsection (1)(A). When appropriate, consider multiple demand-side rate designs for the same major classes;

AEG assessed the three most common demand-side rate options for the Liberty-Empire service territory across different customer segments.

- **Time-of-Use**. Customers pay a higher price during the designated peak period and lower prices during off-peak periods. The designated peak and off-peak periods are typically defined by the season, day and time of day. Requires an interval meter.
- **Critical Peak Price**. Customers pay higher peak period prices during a critical peak event day and pay a discounted off-peak price for the remainder of the year. A critical peak event day occurs multiple times a year and is typically called a day in advanced when it wholesale prices are forecasted to be highest. Requires an interval meter.
- **Real Time Pricing**. Customers pay for energy at a rate that is linked to the hourly market price for electricity. Depending on their size, participants are typically made aware of the hourly prices on either a day-ahead or hour-ahead basis. Typically, only the largest customers — above one megawatt of load — face hour-ahead prices. Requires an interval meter.

(C) Assess how technological advancements that may be reasonably anticipated to occur during the planning horizon, including advanced metering and distribution systems, affect the ability to implement demand-side rates;

Demand-side rates are most effective with the use of two-way communicating meters and internet-enabled devices such as connected thermostats, which allow utilities to communicate with customers in real-time. While connected thermostats are not yet prevalent throughout Liberty-Empire's territory, advanced metering infrastructure (AMI) has been rolled out to the majority of customers. Widespread AMI implementation has laid the groundwork for Liberty-Empire to begin exploring many demand response

options. Aside from the TOU opt-in rate, which was modeled to start in 2025 in alignment with Liberty-Empire's Time Choice Plus Rate, all demand response options were modeled to start in 2027 to allow for the necessary time to complete the planning/regulatory phase for new demand response and demand-side rate options.

(D) Estimate the input data and other characteristics needed for the twenty (20)-year planning horizon to assess the cost effectiveness of each potential demand-side rate, including:

1. An assessment of the demand and energy reduction impacts of each potential demand-side rate;

The per-participant impacts for all demand response options included in this study are summarized in the table below.

Table 5-49 – Demand Response Impacts Per-Participant (Potential kW Savings)

Customer Class	Option	Peak Season	Unit	Per Unit Reduction	
				RAP	MAP
Residential	Battery Energy Storage	Summer Peak	kW @meter	2.00	2.00
Residential	Battery Energy Storage	Winter Peak	kW @meter	2.00	2.00
Residential	Behavioral	Summer Peak	% of Peak	2.30%	2.30%
Residential	Behavioral	Winter Peak	% of Peak	2.30%	2.30%
Residential	Critical Peak Pricing Rates	Summer Peak	% of Peak	10.75%	11.13%
Residential	Critical Peak Pricing Rates	Winter Peak	% of Peak	5.38%	5.56%
Residential	DLC Smart Thermostats - Heating	Winter Peak	% of Peak	50.00%	50.00%
Residential	DLC Smart Thermostats - Cooling	Summer Peak	% of Peak	50.00%	50.00%
Residential	DLC Smart Appliances	Summer Peak	kW @meter	0.14	0.14
Residential	DLC Smart Appliances	Winter Peak	kW @meter	0.14	0.14
Residential	DLC Electric Vehicle Charging	Summer Peak	kW @meter	0.34	0.34
Residential	DLC Electric Vehicle Charging	Winter Peak	kW @meter	0.34	0.34
Residential	Grid-Interactive Water Heater	Summer Peak	kW @meter	0.54	0.54
Residential	Grid-Interactive Water Heater	Winter Peak	kW @meter	0.54	0.54
Residential	Time-of-Use[18]	Summer Peak	% of Peak	4.17%	6.55%
Residential	Time-of-Use	Winter Peak	% of Peak	1.76%	2.77%
Commercial	Battery Energy Storage	Summer Peak	kW @meter	2.00	2.00

[18] MAP and RAP scenarios represent an Opt-out TOU rate with maximum and minimum price differentials for a typical TOU program by season.

Commercial	Battery Energy Storage	Winter Peak	kW @meter	2.00	2.00
Commercial	Critical Peak Pricing Rates	Summer Peak	% of Peak	13.00%	14.50%
Commercial	Critical Peak Pricing Rates	Winter Peak	% of Peak	6.50%	7.25%
Commercial	Curtailment - Firm	Summer Peak	% of Peak	21.00%	21.00%
Commercial	Curtailment - Firm	Winter Peak	% of Peak	21.00%	21.00%
Commercial	Curtailment - Non Firm	Summer Peak	% of Peak	21.00%	21.00%
Commercial	Curtailment - Non Firm	Winter Peak	% of Peak	21.00%	21.00%
Commercial	DLC Electric Vehicle Charging	Winter Peak	kW @meter	0.34	0.34
Commercial	DLC Smart Thermostats - Heating	Winter Peak	% of Peak	4.45%	4.45%
Commercial	DLC Smart Thermostats - Cooling	Summer Peak	% of Peak	23.26%	23.26%
Commercial	Real Time Pricing	Summer Peak	% of Peak	13.00%	14.50%
Commercial	Real Time Pricing	Winter Peak	% of Peak	6.50%	7.25%
Commercial	Thermal Energy Storage	Summer Peak	% of Peak	50.00%	50.00%
Commercial	Time-of-Use	Summer Peak	% of Peak	4.17%	6.55%
Commercial	Time-of-Use	Summer Peak	% of Peak	1.76%	2.77%
Industrial	Critical Peak Pricing Rates	Summer Peak	% of Peak	10.00%	10.00%
Industrial	Critical Peak Pricing Rates	Winter Peak	% of Peak	5.00%	5.00%
Industrial	Curtailment - Firm	Summer Peak	% of Peak	21.00%	21.00%
Industrial	Curtailment - Firm	Winter Peak	% of Peak	21.00%	21.00%
Industrial	Curtailment - Non Firm	Summer Peak	% of Peak	21.00%	21.00%
Industrial	Curtailment - Non Firm	Winter Peak	% of Peak	21.00%	21.00%
Industrial	Real Time Pricing	Summer Peak	% of Peak	10.00%	10.00%
Industrial	Real Time Pricing	Winter Peak	% of Peak	5.00%	5.00%
Industrial	Thermal Energy Storage	Summer Peak	% of Peak	50.00%	50.00%
Industrial	Time-of-Use	Summer Peak	% of Peak	4.17%	6.55%
Industrial	Time-of-Use	Winter Peak	% of Peak	1.76%	2.77%

2. An assessment of how the interactions between multiple potential demand-side rates, if offered simultaneously, would affect the impact estimates;

All DR/DSR Programs were screened for cost-effectiveness as stand-alone pilot programs. Programs that were determined to be cost-effective by customer class were bundled together to assess overall impacts. To avoid double-counting of load reduction impacts, program-eligibility criteria were defined to ensure that customers do not participate in mutually exclusive programs at the same time. For example, residential customers cannot participate in both a Time of Use Rate and a Critical Peak Pricing option. A program hierarchy, or loading order, was developed to prevent double counting the potential estimates among programs. Table 5-50 the participation hierarchy by

customer sector for applicable DR/DSR options. With the hierarchy activated, each successive resource that is run in the model stack has a newly updated pool of eligible participants where customers enrolled in previously-stacked, competing resource options have been removed. The participation rate for that resource is then applied to the new pool of eligible participants, rather than the entire, original pool.

Table 5-50 – Program Hierarchy by Segment

	Customer Class	Residential	Commercial	Industrial
Loaded First	DLC Smart Thermostats	x	x	
	Grid-Interactive Water Heater	x		
	DLC Smart Appliances	x		
	DLC Electric Vehicle Charging	x		
	Curtailment - Firm		x	x
	Curtailment – Non Firm		x	x
	Time of Use Rates	x	x	x
	Critical Peak Pricing Rates	x	x	x
	Real Time Pricing		x	x
	Behavioral	x		
	Battery Energy Storage	x	x	
Loaded Last	Thermal Energy Storage		x	x

3. An assessment of how the interactions between potential demand-side rates and potential demand-side programs would affect the impact estimates of the potential demand-side programs and potential demand-side rates;

The interactions between potential demand-side rates and potential demand-side options were considered within the assessment. To avoid double counting of load reduction impacts, program-eligibility criteria were defined to ensure that customers do not participate in mutually exclusive programs at the same time.

4. For each year of the planning horizon, an estimate of the incremental and cumulative demand reduction and energy savings due to the potential demand-side rate; and

The realistic achievable potential demand savings due to the cost-effective smart thermostat DLC and demand-side rate options can be found in Table 5-51 through Table 5-54, separately for the winter and summer peak forecasts. These savings are estimated using an average demand reduction per unit. A detailed rate design study would need to be performed to assess the precise impact of the demand side rate options within the Liberty-Empire service territory. While resources were identified as cost-effective and included in the modeling, it is recommended that Liberty-Empire follow up with additional scoping studies and/or pilots to further study implementation designs.

Table 5-51 – Summer Realistic Achievable Potential Incremental Net Coincident Demand Savings (MW)

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Battery Storage DLC	0.02	0.06	0.11	0.16	0.22	0.29	0.37	0.46	0.54	0.64	0.65	0.66	0.66	0.67	0.67	0.68	0.69	0.70	0.71	0.72	0.72
Residential	CPP	0.35	1.03	2.38	3.00	3.27	3.21	3.13	3.12	3.10	3.09	3.08	3.07	3.06	3.05	3.05	3.04	3.04	3.04	3.03	3.03	3.03
Residential	Grid-Interactive WH	0.01	0.04	0.10	0.14	0.17	0.19	0.20	0.21	0.22	0.20	0.18	0.17	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.08
Residential	Smart Appliances DLC	0.10	0.28	0.63	0.79	0.86	0.85	0.83	0.84	0.84	0.84	0.84	0.85	0.85	0.85	0.85	0.86	0.86	0.86	0.86	0.86	0.86
Residential	Smart Thermostats DLC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Residential	TOU Opt-Out	0.64	1.85	4.00	4.87	5.20	5.08	4.94	4.92	4.89	4.87	4.85	4.83	4.82	4.81	4.79	4.78	4.78	4.77	4.76	4.75	4.75
Commercial	Battery Storage DLC	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Commercial	CPP	0.40	1.18	2.72	3.45	3.79	3.75	3.70	3.67	3.63	3.60	3.57	3.54	3.52	3.49	3.46	3.42	3.39	3.36	3.32	3.29	3.29
Commercial	Curtailment - Firm	0.03	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Commercial	Curtailment - Non-Firm	0.05	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Commercial	Grid-Interactive WH	0.00	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Commercial	Smart Thermostats DLC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial	TOU Opt-Out	0.72	2.09	4.52	5.55	5.99	5.92	5.84	5.78	5.73	5.67	5.62	5.58	5.54	5.48	5.42	5.36	5.30	5.24	5.18	5.12	5.12
Total Demand Response	**Total Demand Response**	**2.32**	**6.66**	**14.64**	**18.15**	**19.70**	**19.45**	**19.22**	**19.18**	**19.15**	**19.11**	**19.00**	**18.89**	**18.80**	**18.67**	**18.56**	**18.44**	**18.34**	**18.24**	**18.14**	**18.04**	**18.04**

Table 5-52 – Winter Realistic Achievable Potential Incremental Net Coincident Demand Savings (MW)

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Battery Storage DLC	0.12	0.31	0.57	0.83	1.18	1.54	2.02	2.51	3.00	3.58	3.64	3.69	3.74	3.78	3.82	3.86	3.91	3.97	4.04	4.12	4.12
Residential	CPP	1.32	3.92	9.03	11.38	12.38	12.09	11.78	11.69	11.61	11.52	11.44	11.36	11.29	11.22	11.14	11.07	11.01	10.95	10.87	10.80	10.80
Residential	Grid-Interactive WH	0.04	0.15	0.40	0.57	0.69	0.75	0.80	0.84	0.88	0.80	0.73	0.67	0.61	0.55	0.50	0.46	0.43	0.39	0.35	0.32	0.32
Residential	Smart Appliances DLC	0.39	1.14	2.53	3.16	3.43	3.39	3.34	3.35	3.36	3.37	3.38	3.39	3.40	3.40	3.41	3.42	3.43	3.44	3.45	3.46	3.46
Residential	Smart Thermostats DLC	3.04	6.82	11.36	17.34	23.27	29.89	37.20	37.06	36.93	36.80	36.69	36.59	36.52	36.47	36.42	36.15	35.94	35.75	35.55	35.43	35.43
Residential	TOU Opt-Out	2.07	5.95	12.83	15.59	16.61	16.17	15.70	15.58	15.46	15.34	15.23	15.13	15.03	14.92	14.81	14.71	14.63	14.54	14.42	14.31	14.31
Commercial	Battery Storage DLC	0.01	0.02	0.03	0.05	0.07	0.09	0.13	0.16	0.20	0.25	0.26	0.27	0.28	0.29	0.29	0.30	0.31	0.33	0.34	0.36	0.36
Commercial	CPP	3.48	10.39	24.14	30.86	34.10	33.89	33.67	33.52	33.35	33.19	33.04	32.89	32.74	32.51	32.28	32.03	31.78	31.51	31.23	30.92	30.92
Commercial	Curtailment - Firm	0.57	0.91	1.14	1.14	1.13	1.13	1.13	1.13	1.12	1.12	1.12	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Commercial	Curtailment - Non-Firm	0.84	1.34	1.67	1.67	1.67	1.66	1.66	1.65	1.65	1.65	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.63	1.63
Commercial	Grid-Interactive WH	0.02	0.06	0.15	0.21	0.25	0.26	0.28	0.28	0.29	0.26	0.24	0.22	0.20	0.18	0.16	0.14	0.13	0.12	0.11	0.10	0.10
Commercial	Smart Thermostats DLC	0.07	0.17	0.27	0.42	0.56	0.72	0.90	0.90	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.87	0.87	0.87	0.86	0.86
Commercial	TOU Opt-Out	5.37	15.56	33.91	41.92	45.50	45.19	44.87	44.65	44.39	44.17	43.94	43.71	43.49	43.13	42.77	42.39	42.00	41.58	41.14	40.67	40.67
Total Demand Response	**Total Demand Response**	**17.33**	**46.73**	**98.04**	**125.14**	**140.86**	**146.79**	**153.47**	**153.32**	**153.13**	**152.95**	**152.24**	**151.56**	**150.93**	**150.08**	**149.24**	**148.18**	**147.18**	**146.19**	**145.12**	**144.10**	**144.10**

Table 5-53 – Summer Realistic Achievable Potential Cumulative Net Coincident Demand Savings (MW)

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Battery Storage DLC	0.02	0.06	0.11	0.16	0.22	0.29	0.37	0.46	0.54	0.64	0.65	0.66	0.66	0.67	0.67	0.68	0.69	0.70	0.71	0.72	0.72
Residential	CPP	0.35	1.03	2.38	3.00	3.27	3.21	3.13	3.12	3.10	3.09	3.08	3.07	3.06	3.05	3.05	3.04	3.04	3.04	3.03	3.03	3.03
Residential	Grid-Interactive WH	0.01	0.04	0.10	0.14	0.17	0.19	0.20	0.21	0.22	0.20	0.18	0.17	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.08
Residential	Smart Appliances DLC	0.10	0.28	0.63	0.79	0.86	0.85	0.83	0.84	0.84	0.84	0.84	0.85	0.85	0.85	0.85	0.86	0.86	0.86	0.86	0.86	0.86
Residential	Smart Thermostats DLC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Residential	TOU Opt-Out	0.64	1.85	4.00	4.87	5.20	5.08	4.94	4.92	4.89	4.87	4.85	4.83	4.82	4.81	4.79	4.78	4.78	4.77	4.76	4.75	4.75
Commercial	Battery Storage DLC	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Commercial	CPP	0.40	1.18	2.72	3.45	3.79	3.75	3.70	3.67	3.63	3.60	3.57	3.54	3.52	3.49	3.46	3.42	3.39	3.36	3.32	3.29	3.29
Commercial	Curtailment - Firm	0.03	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Commercial	Curtailment - Non-Firm	0.05	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Commercial	Grid-Interactive WH	0.00	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Commercial	Smart Thermostats DLC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial	TOU Opt-Out	0.72	2.09	4.52	5.55	5.99	5.92	5.84	5.78	5.73	5.67	5.62	5.58	5.54	5.48	5.42	5.36	5.30	5.24	5.18	5.12	5.12
Total Demand Response	**Total Demand Response**	**2.32**	**6.66**	**14.64**	**18.15**	**19.70**	**19.45**	**19.22**	**19.18**	**19.15**	**19.11**	**19.00**	**18.89**	**18.80**	**18.67**	**18.56**	**18.44**	**18.34**	**18.24**	**18.14**	**18.04**	**18.04**

Table 5-54 – Winter Realistic Achievable Potential Cumulative Net Coincident Demand Savings (MW)

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Battery Storage DLC	0.12	0.31	0.57	0.83	1.18	1.54	2.02	2.51	3.00	3.58	3.64	3.69	3.74	3.78	3.82	3.86	3.91	3.97	4.04	4.12	4.12
Residential	CPP	1.32	3.92	9.03	11.38	12.38	12.09	11.78	11.69	11.61	11.52	11.44	11.36	11.29	11.22	11.14	11.07	11.01	10.95	10.87	10.80	10.80
Residential	Grid-Interactive WH	0.04	0.15	0.40	0.57	0.69	0.75	0.80	0.84	0.88	0.80	0.73	0.67	0.61	0.55	0.50	0.46	0.43	0.39	0.35	0.32	0.32
Residential	Smart Appliances DLC	0.39	1.14	2.53	3.16	3.43	3.39	3.34	3.35	3.36	3.37	3.38	3.39	3.40	3.40	3.41	3.42	3.43	3.44	3.45	3.46	3.46
Residential	Smart Thermostats DLC	3.04	6.82	11.36	17.34	23.27	29.89	37.20	37.06	36.93	36.80	36.69	36.59	36.52	36.47	36.42	36.15	35.94	35.75	35.55	35.43	35.43
Residential	TOU Opt-Out	2.07	5.95	12.83	15.59	16.61	16.17	15.70	15.58	15.46	15.34	15.23	15.13	15.03	14.92	14.81	14.71	14.63	14.54	14.42	14.31	14.31
Commercial	Battery Storage DLC	0.01	0.02	0.03	0.05	0.07	0.09	0.13	0.16	0.20	0.25	0.26	0.27	0.28	0.29	0.29	0.30	0.31	0.33	0.34	0.36	0.36
Commercial	CPP	3.48	10.39	24.14	30.86	34.10	33.89	33.67	33.52	33.35	33.19	33.04	32.89	32.74	32.51	32.28	32.03	31.78	31.51	31.23	30.92	30.92
Commercial	Curtailment - Firm	0.57	0.91	1.14	1.14	1.13	1.13	1.13	1.13	1.12	1.12	1.12	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Commercial	Curtailment - Non-Firm	0.84	1.34	1.67	1.67	1.67	1.66	1.66	1.65	1.65	1.65	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.63	1.63
Commercial	Grid-Interactive WH	0.02	0.06	0.15	0.21	0.25	0.26	0.28	0.28	0.29	0.26	0.24	0.22	0.20	0.18	0.16	0.14	0.13	0.12	0.11	0.10	0.10
Commercial	Smart Thermostats DLC	0.07	0.17	0.27	0.42	0.56	0.72	0.90	0.90	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.87	0.87	0.87	0.86	0.86
Commercial	TOU Opt-Out	5.37	15.56	33.91	41.92	45.50	45.19	44.87	44.65	44.39	44.17	43.94	43.71	43.49	43.13	42.77	42.39	42.00	41.58	41.14	40.67	40.67
Total Demand Response	**Total Demand Response**	**17.33**	**46.73**	**98.04**	**125.14**	**140.86**	**146.79**	**153.47**	**153.32**	**153.13**	**152.95**	**152.24**	**151.56**	**150.93**	**150.08**	**149.24**	**148.18**	**147.18**	**146.19**	**145.12**	**144.10**	**144.10**

5. For each year of the planning horizon, an estimate of the costs of each potential demand-side rate, including:

A. The cost of incentives to customers to participate in the potential demand-side rate paid by the utility. The utility shall consider multiple levels of incentives to achieve customer participation in each potential demand-side rate, with corresponding adjustments to the maximum achievable potential and the realistic achievable potentials of that potential demand-side rate;

The demand ride rates that were found to be cost effective do not include a direct incentive to customers paid by the utility.

B. The cost to the customer and to the utility of technology to implement the potential demand-side rate;

AEG did not identify any costs to the customer for participating in demand-side rate programs. The total cost to the utility to implement the potential demand side rate is displayed in Table 5-55 below for the realistic achievable potential scenarios.

Table 5-55 – Non-Incentive Costs for DR and DSR Options for Realistic Achievable Potential

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Battery Storage DLC	$19,910	$26,706	$33,406	$34,220	$41,608	$43,864	$54,523	$55,767	$56,113	$64,411	$16,424	$16,679	$15,965	$16,019	$16,202	$16,476	$17,801	$18,892	$20,391	$21,001	$20,038
Residential	CPP	$191,366	$380,099	$762,428	$383,358	$189,798	$12,044	$12,327	$17,946	$17,705	$17,181	$17,853	$17,640	$17,478	$16,149	$16,132	$17,672	$17,999	$17,636	$17,515	$17,703	$21,778
Residential	Grid-Interactive WH	$29,108	$45,437	$80,612	$63,515	$51,876	$35,145	$34,403	$33,768	$33,115	$24,124	$24,691	$25,271	$25,865	$26,473	$27,095	$27,732	$28,383	$29,050	$29,733	$30,432	$31,147
Residential	Smart Appliances DLC	$66,861	$107,313	$180,575	$98,100	$60,462	$29,464	$30,156	$32,377	$33,044	$33,645	$34,318	$35,038	$35,780	$36,557	$37,378	$38,617	$39,562	$40,345	$41,427	$42,283	$43,178
Residential	Smart Thermostats DLC	$38,053	$47,275	$57,078	$75,732	$78,497	$90,069	$102,298	$12,515	$12,448	$12,739	$13,028	$13,338	$13,651	$14,023	$14,413	$12,059	$12,905	$13,168	$13,962	$14,765	$15,545
Residential	TOU Opt-Out	$225,922	$429,428	$778,735	$346,334	$156,856	$13,503	$13,820	$18,904	$18,648	$18,090	$18,913	$18,713	$18,672	$17,148	$17,478	$18,873	$19,127	$18,943	$19,314	$19,724	$23,346
Commercial	Battery Storage DLC	$514	$696	$866	$894	$1,096	$1,232	$1,526	$1,596	$1,651	$1,916	$790	$797	$756	$725	$746	$750	$833	$906	$1,006	$1,048	$980
Commercial	CPP	$33,112	$66,418	$135,089	$72,331	$39,800	$4,837	$4,723	$5,616	$5,634	$5,575	$5,602	$5,609	$5,575	$4,496	$4,352	$4,196	$4,046	$3,914	$3,826	$3,422	$7,045
Commercial	Curtailment - Firm	$8,082	$8,272	$8,467	$8,665	$8,869	$9,078	$9,291	$9,509	$9,733	$9,961	$10,195	$10,435	$10,680	$10,931	$11,188	$11,451	$11,720	$11,996	$12,277	$12,566	$12,861
Commercial	Curtailment - Non-Firm	$7,935	$8,121	$8,312	$8,507	$8,707	$8,912	$9,121	$9,336	$9,555	$9,780	$10,009	$10,245	$10,485	$10,732	$10,984	$11,242	$11,506	$11,777	$12,053	$12,337	$12,627
Commercial	Grid-Interactive WH	$4,057	$6,248	$10,877	$8,348	$6,636	$4,356	$4,141	$4,009	$3,863	$3,348	$3,427	$3,507	$3,590	$3,674	$3,760	$3,849	$3,939	$4,032	$4,126	$4,223	$4,323
Commercial	Smart Thermostats DLC	$670	$863	$1,071	$1,472	$1,533	$1,785	$2,055	$113	$117	$118	$122	$125	$128	$129	$134	$104	$115	$108	$121	$128	$137
Commercial	TOU Opt-Out	$46,107	$89,095	$164,954	$79,457	$41,452	$5,334	$5,130	$6,372	$6,352	$6,236	$6,229	$6,194	$6,109	$4,518	$4,262	$3,992	$3,757	$3,632	$3,699	$3,774	$7,827
Total Demand Response	**Total Demand Response**	**$671,698**	**$1,215,971**	**$2,222,468**	**$1,180,934**	**$687,190**	**$259,623**	**$283,515**	**$207,828**	**$207,978**	**$207,125**	**$161,604**	**$163,591**	**$164,735**	**$161,575**	**$164,126**	**$167,013**	**$171,694**	**$174,398**	**$179,451**	**$183,405**	**$200,831**

C. The utility's cost to administer the potential demand-side rate; and

Below are the cost assumptions for the different components of a utility's cost to implement potential demand-side rates and demand response options. The different cost categories per option include development, administration, annual marketing and recruitment, equipment and installation, and customer incentives. Inputs were developed using secondary research.

Table 5-56 – Program Cost Assumptions for DR and DSR Options

Option	Cost Type	Unit	RAP Cost ($)	MAP Cost ($)
Battery Energy Storage	Option Development Cost	$/option	$75,000	$75,000
	Annual Option Administration Cost	$/year	$75,000	$75,000
	Per Customer Annual Marketing/Recruitment Cost	$/new participant/year	$50	$60
	Cost of Equip + Install	$/tech	$660	$660
	Per kW Annual Incentive	$/kW @meter/year	$400	$400
Behavioral	Option Development Cost	$/option	$100,000	$100,000
	Per Customer Annual Marketing/Recruitment Cost	$/new participant/year	$21	$21
	Annual O&M Cost	$/participant/year	$4	$4
Critical Peak Pricing	Option Development Cost	$/option	$100,000	$100,000
	Annual Option Administration Cost	$/year	$75,000	$75,000
	Per Customer Annual Marketing/Recruitment Cost	$/new participant/year	$74	$89
DLC Smart Thermostats - Heating	Option Development Cost	$/option	$75,000	$75,000
	Annual Option Administration Cost	$/year	$75,000	$75,000
	Per Customer Annual Marketing/Recruitment Cost	$/new participant/year	$50	$50
	Per Participant Annual Incentive	$/participant/year	$25	$25
DLC Smart Thermostats - Cooling	Option Development Cost	$/option	$75,000	$75,000
	Annual Option Administration Cost	$/year	$75,000	$75,000
	Per Customer Annual Marketing/Recruitment Cost	$/new participant/year	$50	$50
	Per Participant Annual Incentive	$/participant/year	$25	$25
DLC Smart Appliances	Option Development Cost	$/option	$75,000	$75,000
	Annual Option Administration Cost	$/year	$75,000	$75,000
	Per Customer Annual Marketing/Recruitment Cost	$/new participant/year	$50	$60
	Per Participant Annual Incentive	$/participant/year	$13	$13
DLC Electric Vehicle Charging	Option Development Cost	$/option	$75,000	$75,000
	Annual Option Administration Cost	$/year	$75,000	$75,000
	Per Customer Annual Marketing/Recruitment Cost	$/new participant/year	$50	$50
	Annual O&M Cost	$/participant/year	$10	$10
	Cost of Equip + Install	$/tech	$280	$280

Grid-Interactive Water Heater	Option Development Cost	$/option	$75,000	$75,000
	Annual Option Administration Cost	$/year	$75,000	$75,000
	Per Customer Annual Marketing/Recruitment Cost	$/new participant/year	$125	$150
	Cost of Equip + Install	$/tech	$325	$325
	Per Participant Annual Incentive	$/participant/year	$25	$25
Time-of-Use	Option Development Cost	$/option	$100,000	$100,000
	Annual Option Administration Cost	$/year	$75,000	$75,000
	Per Customer Annual Marketing/Recruitment Cost	$/new participant/year	$18	$20
Curtailment - Firm, Non-Firm	Option Development Cost	$/option	$75,000	$75,000
	Annual Option Administration Cost	$/year	$75,000	$75,000
	Per kW Annual Incentive	$/kW @meter/year	$25	$25
Real Time Pricing	Option Development Cost	$/option	$100,000	$100,000
	Annual Option Administration Cost	$/year	$75,000	$75,000
	Per Customer Annual Marketing/Recruitment Cost	$/new participant/year	$74	$89
Thermal Energy Storage	Option Development Cost	$/option	$75,000	$75,000
	Annual Option Administration Cost	$/year	$75,000	$75,000
	Per Customer Annual Marketing/Recruitment Cost	$/new participant/year	$50	$60
	Cost of Equip + Install	$/tech	$2,000	$2,000
	Per kW Annual Incentive	$/kW @meter/year	$875	$875

D. Other costs identified by the utility;

AEG did not identify any other costs for the demand-side rates.

(E) A tabulation of the incremental and cumulative number of participants, load impacts, utility costs, and program participant costs in each year of the planning horizon for each potential demand-side program;

Table 5-57 through Table 5-64 detail the number of participants, load reductions, and program costs for the realistic achievable scenario. Incremental participants for DR and DSRs represent the number of new customers each year. The cumulative number of participants is used to calculate savings due to the nature of continued enrollment within the program or rate.

Table 5-57 – Incremental Participants for DR and DSR Options

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Battery Storage DLC	17	43	79	117	165	216	283	352	420	501	509	516	523	529	534	540	547	556	566	577	577
Residential	CPP	2,327	6,972	16,209	20,676	22,766	22,498	22,171	22,229	22,281	22,322	22,366	22,404	22,436	22,446	22,451	22,467	22,482	22,489	22,490	22,480	22,480
Residential	Grid-Interactive WH	21	76	206	298	363	390	415	438	458	420	383	349	318	289	263	241	222	201	184	169	169
Residential	Smart Appliances DLC	776	2,277	5,067	6,313	6,864	6,776	6,670	6,694	6,717	6,738	6,756	6,773	6,789	6,805	6,819	6,839	6,859	6,877	6,897	6,915	6,915
Residential	Smart Thermostats DLC	574	1,303	2,191	3,387	4,600	5,979	7,525	7,576	7,621	7,666	7,710	7,755	7,800	7,845	7,891	7,883	7,887	7,892	7,906	7,929	7,929
Residential	TOU Opt-Out	11,116	32,294	70,300	86,462	93,265	91,883	90,218	90,429	90,609	90,745	90,900	91,027	91,131	91,129	91,104	91,133	91,153	91,136	91,091	90,994	90,994
Commercial	Battery Storage DLC	-	1	2	2	4	5	7	8	10	13	13	14	14	15	15	15	16	17	17	18	18
Commercial	CPP	398	1,206	2,839	3,679	4,118	4,145	4,170	4,203	4,235	4,265	4,294	4,322	4,348	4,362	4,375	4,385	4,392	4,398	4,402	4,400	4,400
Commercial	Curtailment - Firm	20	33	41	42	42	43	43	44	44	45	45	45	46	46	47	47	48	48	49	49	49
Commercial	Curtailment - Non-Firm	30	48	61	62	62	63	64	64	65	66	66	67	67	68	69	69	70	71	71	72	72
Commercial	Grid-Interactive WH	3	10	28	40	47	50	52	54	55	50	45	41	37	33	30	27	25	22	20	18	18
Commercial	Smart Thermostats DLC	12	28	47	73	99	129	163	164	166	167	169	170	171	173	174	175	176	177	178	180	180
Commercial	TOU Opt-Out	2,270	6,667	14,724	18,449	20,286	20,407	20,512	20,668	20,816	20,952	21,083	21,206	21,320	21,368	21,401	21,422	21,429	21,425	21,412	21,364	21,364
Total Demand Response	**Total Demand Response**	**17,564**	**50,958**	**111,794**	**139,600**	**152,681**	**152,584**	**152,293**	**152,923**	**153,497**	**153,950**	**154,339**	**154,689**	**155,000**	**155,108**	**155,173**	**155,243**	**155,306**	**155,309**	**155,283**	**155,165**	**155,165**

Table 5-58 – Cumulative Participants for DR and DSR Options

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Battery Storage DLC	17	60	139	256	421	637	920	1,272	1,692	2,193	2,702	3,218	3,741	4,270	4,804	5,344	5,891	6,447	7,013	7,590	8,167
Residential	CPP	2,327	9,299	25,508	46,184	68,950	91,448	113,619	135,848	158,129	180,451	202,817	225,221	247,657	270,103	292,554	315,021	337,503	359,992	382,482	404,962	427,442
Residential	Grid-Interactive WH	21	97	303	601	964	1,354	1,769	2,207	2,665	3,085	3,468	3,817	4,135	4,424	4,687	4,928	5,150	5,351	5,535	5,704	5,873
Residential	Smart Appliances DLC	776	3,053	8,120	14,433	21,297	28,073	34,743	41,437	48,154	54,892	61,648	68,421	75,210	82,015	88,834	95,673	102,532	109,409	116,306	123,221	130,136
Residential	Smart Thermostats DLC	574	1,877	4,068	7,455	12,055	18,034	25,559	33,135	40,756	48,422	56,132	63,887	71,687	79,532	87,423	95,306	103,193	111,085	118,991	126,920	134,849
Residential	TOU Opt-Out	11,116	43,410	113,710	200,172	293,437	385,320	475,538	565,967	656,576	747,321	838,221	929,248	1,020,379	1,111,508	1,202,612	1,293,745	1,384,898	1,476,034	1,567,125	1,658,119	1,749,113
Commercial	Battery Storage DLC	-	1	3	5	9	14	21	29	39	52	65	79	93	108	123	138	154	171	188	206	224
Commercial	CPP	398	1,604	4,443	8,122	12,240	16,385	20,555	24,758	28,993	33,258	37,552	41,874	46,222	50,584	54,959	59,344	63,736	68,134	72,536	76,936	81,336
Commercial	Curtailment - Firm	20	53	94	136	178	221	264	308	352	397	442	487	533	579	626	673	721	769	818	867	916
Commercial	Curtailment - Non-Firm	30	78	139	201	263	326	390	454	519	585	651	718	785	853	922	991	1,061	1,132	1,203	1,275	1,347
Commercial	Grid-Interactive WH	3	13	41	81	128	178	230	284	339	389	434	475	512	545	575	602	627	649	669	687	705
Commercial	Smart Thermostats DLC	12	40	87	160	259	388	551	715	881	1,048	1,217	1,387	1,558	1,731	1,905	2,080	2,256	2,433	2,611	2,791	2,971
Commercial	TOU Opt-Out	2,270	8,937	23,661	42,110	62,396	82,803	103,315	123,983	144,799	165,751	186,834	208,040	229,360	250,728	272,129	293,551	314,980	336,405	357,817	379,181	400,545
Total Demand Response	**Total Demand Response**	**17,564**	**68,522**	**180,316**	**319,916**	**472,597**	**625,181**	**777,474**	**930,397**	**1,083,894**	**1,237,844**	**1,392,183**	**1,546,872**	**1,701,872**	**1,856,980**	**2,012,153**	**2,167,396**	**2,322,702**	**2,478,011**	**2,633,294**	**2,788,459**	**2,943,624**

Table 5-59 – Incremental Summer Peak Reduction @Generation (MW) for DR and DSR Options

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Battery Storage DLC	0.02	0.06	0.11	0.16	0.22	0.29	0.37	0.46	0.54	0.64	0.65	0.66	0.66	0.67	0.67	0.68	0.69	0.70	0.71	0.72	0.72
Residential	CPP	0.35	1.03	2.38	3.00	3.27	3.21	3.13	3.12	3.10	3.09	3.08	3.07	3.06	3.05	3.05	3.04	3.04	3.04	3.03	3.03	3.03
Residential	Grid-Interactive WH	0.01	0.04	0.10	0.14	0.17	0.19	0.20	0.21	0.22	0.20	0.18	0.17	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.08
Residential	Smart Appliances DLC	0.10	0.28	0.63	0.79	0.86	0.85	0.83	0.84	0.84	0.84	0.84	0.85	0.85	0.85	0.85	0.86	0.86	0.86	0.86	0.86	0.86
Residential	Smart Thermostats DLC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Residential	TOU Opt-Out	0.64	1.85	4.00	4.87	5.20	5.08	4.94	4.92	4.89	4.87	4.85	4.83	4.82	4.81	4.79	4.78	4.78	4.77	4.76	4.75	4.75
Commercial	Battery Storage DLC	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Commercial	CPP	0.40	1.18	2.72	3.45	3.79	3.75	3.70	3.67	3.63	3.60	3.57	3.54	3.52	3.49	3.46	3.42	3.39	3.36	3.32	3.29	3.29
Commercial	Curtailment - Firm	0.03	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Commercial	Curtailment - Non-Firm	0.05	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Commercial	Grid-Interactive WH	0.00	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Commercial	Smart Thermostats DLC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial	TOU Opt-Out	0.72	2.09	4.52	5.55	5.99	5.92	5.84	5.78	5.73	5.67	5.62	5.58	5.54	5.48	5.42	5.36	5.30	5.24	5.18	5.12	5.12
Total Demand Response	**Total Demand Response**	**2.32**	**6.66**	**14.64**	**18.15**	**19.70**	**19.45**	**19.22**	**19.18**	**19.15**	**19.11**	**19.00**	**18.89**	**18.80**	**18.67**	**18.56**	**18.44**	**18.34**	**18.24**	**18.14**	**18.04**	**18.04**

Table 5-60 – Cumulative Summer Peak Reduction @Generation (MW) for DR and DR Options

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Battery Storage DLC	0.02	0.06	0.11	0.16	0.22	0.29	0.37	0.46	0.54	0.64	0.65	0.66	0.66	0.67	0.67	0.68	0.69	0.70	0.71	0.72	0.72
Residential	CPP	0.35	1.03	2.38	3.00	3.27	3.21	3.13	3.12	3.10	3.09	3.08	3.07	3.06	3.05	3.05	3.04	3.04	3.04	3.03	3.03	3.03
Residential	Grid-Interactive WH	0.01	0.04	0.10	0.14	0.17	0.19	0.20	0.21	0.22	0.20	0.18	0.17	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.08
Residential	Smart Appliances DLC	0.10	0.28	0.63	0.79	0.86	0.85	0.83	0.84	0.84	0.84	0.84	0.85	0.85	0.85	0.85	0.86	0.86	0.86	0.86	0.86	0.86
Residential	Smart Thermostats DLC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Residential	TOU Opt-Out	0.64	1.85	4.00	4.87	5.20	5.08	4.94	4.92	4.89	4.87	4.85	4.83	4.82	4.81	4.79	4.78	4.78	4.77	4.76	4.75	4.75
Commercial	Battery Storage DLC	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Commercial	CPP	0.40	1.18	2.72	3.45	3.79	3.75	3.70	3.67	3.63	3.60	3.57	3.54	3.52	3.49	3.46	3.42	3.39	3.36	3.32	3.29	3.29
Commercial	Curtailment - Firm	0.03	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Commercial	Curtailment - Non-Firm	0.05	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Commercial	Grid-Interactive WH	0.00	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Commercial	Smart Thermostats DLC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial	TOU Opt-Out	0.72	2.09	4.52	5.55	5.99	5.92	5.84	5.78	5.73	5.67	5.62	5.58	5.54	5.48	5.42	5.36	5.30	5.24	5.18	5.12	5.12
Total Demand Response	**Total Demand Response**	**2.32**	**6.66**	**14.64**	**18.15**	**19.70**	**19.45**	**19.22**	**19.18**	**19.15**	**19.11**	**19.00**	**18.89**	**18.80**	**18.67**	**18.56**	**18.44**	**18.34**	**18.24**	**18.14**	**18.04**	**18.04**

Table 5-61 – Incremental Winter Peak Reduction @Generation (MW) for DR and DR Options

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Battery Storage DLC	0.12	0.31	0.57	0.83	1.18	1.54	2.02	2.51	3.00	3.58	3.64	3.69	3.74	3.78	3.82	3.86	3.91	3.97	4.04	4.12	4.12
Residential	CPP	1.32	3.92	9.03	11.38	12.38	12.09	11.78	11.69	11.61	11.52	11.44	11.36	11.29	11.22	11.14	11.07	11.01	10.95	10.87	10.80	10.80
Residential	Grid-Interactive WH	0.04	0.15	0.40	0.57	0.69	0.75	0.80	0.84	0.88	0.80	0.73	0.67	0.61	0.55	0.50	0.46	0.43	0.39	0.35	0.32	0.32
Residential	Smart Appliances DLC	0.39	1.14	2.53	3.16	3.43	3.39	3.34	3.35	3.36	3.37	3.38	3.39	3.40	3.40	3.41	3.42	3.43	3.44	3.45	3.46	3.46
Residential	Smart Thermostats DLC	3.04	6.82	11.36	17.34	23.27	29.89	37.20	37.06	36.93	36.80	36.69	36.59	36.52	36.47	36.42	36.15	35.94	35.75	35.55	35.43	35.43
Residential	TOU Opt-Out	2.07	5.95	12.83	15.59	16.61	16.17	15.70	15.58	15.46	15.34	15.23	15.13	15.03	14.92	14.81	14.71	14.63	14.54	14.42	14.31	14.31
Commercial	Battery Storage DLC	0.01	0.02	0.03	0.05	0.07	0.09	0.13	0.16	0.20	0.25	0.26	0.27	0.28	0.29	0.29	0.30	0.31	0.33	0.34	0.36	0.36
Commercial	CPP	3.48	10.39	24.14	30.86	34.10	33.89	33.67	33.52	33.35	33.19	33.04	32.89	32.74	32.51	32.28	32.03	31.78	31.51	31.23	30.92	30.92
Commercial	Curtailment - Firm	0.57	0.91	1.14	1.14	1.13	1.13	1.13	1.13	1.12	1.12	1.12	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Commercial	Curtailment - Non-Firm	0.84	1.34	1.67	1.67	1.67	1.66	1.66	1.65	1.65	1.65	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.63	1.63
Commercial	Grid-Interactive WH	0.02	0.06	0.15	0.21	0.25	0.26	0.28	0.28	0.29	0.26	0.24	0.22	0.20	0.18	0.16	0.14	0.13	0.12	0.11	0.10	0.10
Commercial	Smart Thermostats DLC	0.07	0.17	0.27	0.42	0.56	0.72	0.90	0.90	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.87	0.87	0.87	0.86	0.86
Commercial	TOU Opt-Out	5.37	15.56	33.91	41.92	45.50	45.19	44.87	44.65	44.39	44.17	43.94	43.71	43.49	43.13	42.77	42.39	42.00	41.58	41.14	40.67	40.67
Total Demand Response	**Total Demand Response**	**17.33**	**46.73**	**98.04**	**125.14**	**140.86**	**146.79**	**153.47**	**153.32**	**153.13**	**152.95**	**152.24**	**151.56**	**150.93**	**150.08**	**149.24**	**148.18**	**147.18**	**146.19**	**145.12**	**144.10**	**144.10**

Table 5-62 – Cumulative Winter Peak Reduction @Generation (MW) for DR and DR Options

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Battery Storage DLC	0.12	0.31	0.57	0.83	1.18	1.54	2.02	2.51	3.00	3.58	3.64	3.69	3.74	3.78	3.82	3.86	3.91	3.97	4.04	4.12	4.12
Residential	CPP	1.32	3.92	9.03	11.38	12.38	12.09	11.78	11.69	11.61	11.52	11.44	11.36	11.29	11.22	11.14	11.07	11.01	10.95	10.87	10.80	10.80
Residential	Grid-Interactive WH	0.04	0.15	0.40	0.57	0.69	0.75	0.80	0.84	0.88	0.80	0.73	0.67	0.61	0.55	0.50	0.46	0.43	0.39	0.35	0.32	0.32
Residential	Smart Appliances DLC	0.39	1.14	2.53	3.16	3.43	3.39	3.34	3.35	3.36	3.37	3.38	3.39	3.40	3.40	3.41	3.42	3.43	3.44	3.45	3.46	3.46
Residential	Smart Thermostats DLC	3.04	6.82	11.36	17.34	23.27	29.89	37.20	37.06	36.93	36.80	36.69	36.59	36.52	36.47	36.42	36.15	35.94	35.75	35.55	35.43	35.43
Residential	TOU Opt-Out	2.07	5.95	12.83	15.59	16.61	16.17	15.70	15.58	15.46	15.34	15.23	15.13	15.03	14.92	14.81	14.71	14.63	14.54	14.42	14.31	14.31
Commercial	Battery Storage DLC	0.01	0.02	0.03	0.05	0.07	0.09	0.13	0.16	0.20	0.25	0.26	0.27	0.28	0.29	0.29	0.30	0.31	0.33	0.34	0.36	0.36
Commercial	CPP	3.48	10.39	24.14	30.86	34.10	33.89	33.67	33.52	33.35	33.19	33.04	32.89	32.74	32.51	32.28	32.03	31.78	31.51	31.23	30.92	30.92
Commercial	Curtailment - Firm	0.57	0.91	1.14	1.14	1.13	1.13	1.13	1.13	1.12	1.12	1.12	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Commercial	Curtailment - Non-Firm	0.84	1.34	1.67	1.67	1.67	1.66	1.66	1.65	1.65	1.65	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.63	1.63
Commercial	Grid-Interactive WH	0.02	0.06	0.15	0.21	0.25	0.26	0.28	0.28	0.29	0.26	0.24	0.22	0.20	0.18	0.16	0.14	0.13	0.12	0.11	0.10	0.10
Commercial	Smart Thermostats DLC	0.07	0.17	0.27	0.42	0.56	0.72	0.90	0.90	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.87	0.87	0.87	0.86	0.86
Commercial	TOU Opt-Out	5.37	15.56	33.91	41.92	45.50	45.19	44.87	44.65	44.39	44.17	43.94	43.71	43.49	43.13	42.77	42.39	42.00	41.58	41.14	40.67	40.67
Total Demand Response	**Total Demand Response**	**17.33**	**46.73**	**98.04**	**125.14**	**140.86**	**146.79**	**153.47**	**153.32**	**153.13**	**152.95**	**152.24**	**151.56**	**150.93**	**150.08**	**149.24**	**148.18**	**147.18**	**146.19**	**145.12**	**144.10**	**144.10**

Table 5-63 – Non-Incentive Utility Costs for DR and DR Options

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Battery Storage DLC	$19,910	$26,706	$33,406	$34,220	$41,608	$43,864	$54,523	$55,767	$56,113	$64,411	$16,424	$16,679	$15,965	$16,019	$16,202	$16,476	$17,801	$18,892	$20,391	$21,001	$20,038
Residential	CPP	$191,366	$380,099	$762,428	$383,358	$189,798	$12,044	$12,327	$17,946	$17,705	$17,181	$17,853	$17,640	$17,478	$16,149	$16,132	$17,672	$17,999	$17,636	$17,515	$17,703	$21,778
Residential	Grid-Interactive WH	$29,108	$45,437	$80,612	$63,515	$51,876	$35,145	$34,403	$33,768	$33,115	$24,124	$24,691	$25,271	$25,865	$26,473	$27,095	$27,732	$28,383	$29,050	$29,733	$30,432	$31,147
Residential	Smart Appliances DLC	$66,861	$107,313	$180,575	$98,100	$60,462	$29,464	$30,156	$32,377	$33,044	$33,645	$34,318	$35,038	$35,780	$36,557	$37,378	$38,617	$39,562	$40,345	$41,427	$42,283	$43,178
Residential	Smart Thermostats DLC	$38,053	$47,275	$57,078	$75,732	$78,497	$90,069	$102,298	$12,515	$12,448	$12,739	$13,028	$13,338	$13,651	$14,023	$14,413	$12,059	$12,905	$13,168	$13,962	$14,765	$15,545
Residential	TOU Opt-Out	$225,922	$429,428	$778,735	$346,334	$156,856	$13,503	$13,820	$18,904	$18,648	$18,090	$18,913	$18,713	$18,672	$17,148	$17,478	$18,873	$19,127	$18,943	$19,314	$19,724	$23,346
Commercial	Battery Storage DLC	$514	$696	$866	$894	$1,096	$1,232	$1,526	$1,596	$1,651	$1,916	$790	$797	$756	$725	$746	$750	$833	$906	$1,006	$1,048	$980
Commercial	CPP	$33,112	$66,418	$135,089	$72,331	$39,800	$4,837	$4,723	$5,616	$5,634	$5,575	$5,602	$5,609	$5,575	$4,496	$4,352	$4,196	$4,046	$3,914	$3,826	$3,422	$7,045
Commercial	Curtailment - Firm	$8,082	$8,272	$8,467	$8,665	$8,869	$9,078	$9,291	$9,509	$9,733	$9,961	$10,195	$10,435	$10,680	$10,931	$11,188	$11,451	$11,720	$11,996	$12,277	$12,566	$12,861
Commercial	Curtailment - Non-Firm	$7,935	$8,121	$8,312	$8,507	$8,707	$8,912	$9,121	$9,336	$9,555	$9,780	$10,009	$10,245	$10,485	$10,732	$10,984	$11,242	$11,506	$11,777	$12,053	$12,337	$12,627
Commercial	Grid-Interactive WH	$4,057	$6,248	$10,877	$8,348	$6,636	$4,356	$4,141	$4,009	$3,863	$3,348	$3,427	$3,507	$3,590	$3,674	$3,760	$3,849	$3,939	$4,032	$4,126	$4,223	$4,323
Commercial	Smart Thermostats DLC	$670	$863	$1,071	$1,472	$1,533	$1,785	$2,055	$113	$117	$118	$122	$125	$128	$129	$134	$104	$115	$108	$121	$128	$137
Commercial	TOU Opt-Out	$46,107	$89,095	$164,954	$79,457	$41,452	$5,334	$5,130	$6,372	$6,352	$6,236	$6,229	$6,194	$6,109	$4,518	$4,262	$3,992	$3,757	$3,632	$3,699	$3,774	$7,827
Total Demand Response	**Total Demand Response**	**$671,698**	**$1,215,971**	**$2,222,468**	**$1,180,934**	**$687,190**	**$259,623**	**$283,515**	**$207,828**	**$207,978**	**$207,125**	**$161,604**	**$163,591**	**$164,735**	**$161,575**	**$164,126**	**$167,013**	**$171,694**	**$174,398**	**$179,451**	**$183,405**	**$200,831**

Table 5-64 – Annual DR and DSR Option Benefits (NPV)

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Battery Storage DLC	$6,076	$16,196	$33,220	$54,357	$72,613	$97,583	$132,352	$169,385	$204,916	$277,744	$301,474	$321,251	$359,037	$408,331	$427,141	$441,012	$456,110	$473,354	$491,983	$512,077	$522,831
Residential	CPP	$66,500	$207,713	$533,823	$742,814	$765,692	$767,496	$774,270	$790,532	$795,795	$897,269	$951,871	$993,739	$1,088,647	$1,215,337	$1,250,765	$1,269,545	$1,288,960	$1,308,622	$1,326,379	$1,344,974	$1,373,218
Residential	Grid-Interactive WH	$2,035	$7,760	$23,466	$37,477	$43,283	$47,734	$52,585	$57,105	$60,556	$63,029	$61,384	$58,776	$59,013	$60,262	$56,826	$53,166	$50,003	$46,224	$43,203	$40,514	$41,365
Residential	Smart Appliances DLC	$30,947	$95,396	$231,025	$310,064	$329,571	$333,014	$340,068	$351,114	$359,849	$395,307	$418,136	$435,622	$470,042	$517,055	$535,510	$548,360	$561,513	$574,968	$588,600	$602,529	$615,182
Residential	Smart Thermostats DLC	$155,320	$367,520	$682,338	$1,149,340	$1,463,410	$1,929,048	$2,485,640	$2,548,361	$2,575,415	$2,910,705	$3,097,704	$3,245,684	$3,567,487	$3,999,738	$4,139,096	$4,193,997	$4,257,452	$4,323,838	$4,390,045	$4,466,525	$4,560,322
Residential	TOU Opt-Out	$151,333	$457,177	$1,076,985	$1,414,923	$1,466,742	$1,462,089	$1,472,244	$1,502,553	$1,521,301	$1,662,963	$1,745,302	$1,804,412	$1,937,428	$2,119,237	$2,175,270	$2,207,061	$2,239,809	$2,273,343	$2,302,486	$2,333,316	$2,382,315
Commercial	Battery Storage DLC	$0	$1,036	$2,313	$2,555	$4,841	$6,212	$9,003	$10,587	$13,417	$19,819	$21,174	$23,969	$26,430	$31,841	$32,995	$33,688	$36,689	$39,801	$40,636	$43,930	$44,853
Commercial	CPP	$174,623	$550,030	$1,426,531	$2,014,205	$2,109,144	$2,151,563	$2,213,175	$2,266,781	$2,286,562	$2,585,116	$2,748,537	$2,875,839	$3,156,166	$3,522,152	$3,624,284	$3,672,622	$3,719,265	$3,766,087	$3,810,225	$3,852,273	$3,933,171
Commercial	Curtailment - Firm	$29,060	$49,833	$68,100	$75,889	$71,136	$73,797	$75,465	$78,469	$78,593	$90,024	$94,994	$98,681	$109,886	$122,060	$127,929	$129,340	$133,556	$135,055	$139,356	$140,957	$143,918
Commercial	Curtailment - Non-Firm	$43,590	$72,484	$101,320	$112,027	$105,011	$108,121	$112,320	$114,137	$116,103	$132,035	$139,325	$146,925	$160,051	$180,436	$187,811	$189,882	$194,769	$199,769	$201,923	$207,121	$211,471
Commercial	Grid-Interactive WH	$800	$2,808	$8,771	$13,834	$15,411	$16,829	$18,120	$19,361	$19,998	$20,634	$19,834	$18,989	$18,882	$18,923	$17,826	$16,380	$15,485	$13,913	$12,914	$11,867	$12,116
Commercial	Smart Thermostats DLC	$3,669	$8,897	$16,434	$27,780	$35,295	$46,604	$60,216	$61,565	$62,406	$70,362	$75,152	$78,546	$86,102	$96,798	$99,872	$101,554	$103,267	$105,018	$106,751	$109,192	$111,485
Commercial	TOU Opt-Out	$392,351	$1,194,785	$2,845,905	$3,804,572	$4,017,437	$4,085,825	$4,206,610	$4,306,621	$4,368,871	$4,787,647	$5,034,470	$5,214,614	$5,607,130	$6,127,969	$6,283,172	$6,358,686	$6,431,281	$6,503,573	$6,568,500	$6,629,111	$6,768,323
Total Demand Response	**Total Demand Response**	**$1,056,303**	**$3,031,636**	**$7,050,231**	**$9,759,838**	**$10,499,585**	**$11,125,914**	**$11,952,067**	**$12,276,570**	**$12,463,782**	**$13,912,655**	**$14,709,357**	**$15,317,048**	**$16,646,301**	**$18,420,140**	**$18,958,499**	**$19,215,293**	**$19,488,157**	**$19,763,565**	**$20,023,001**	**$20,294,385**	**$20,720,567**

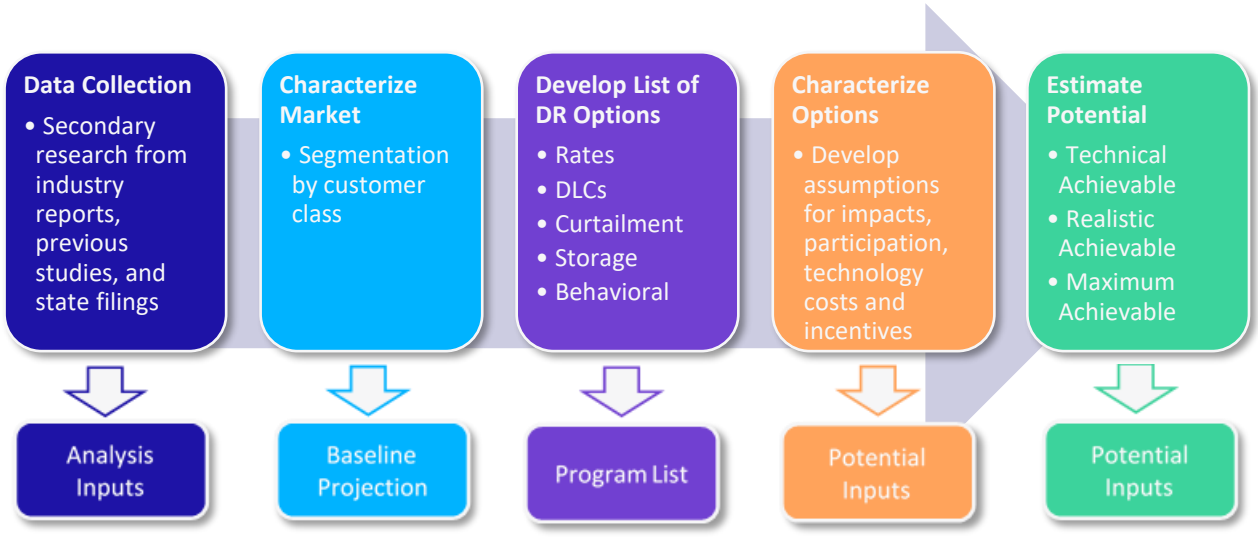
(F) Evaluate how each demand-side rate would be considered by the utility's Regional Transmission Organization (RTO) in resource adequacy determinations, eligibility to participate as a demand response resource in RTO markets for energy, capacity, and ancillary services; and

Liberty-Empire's analysis did not include consideration of RTO treatment at this time. Liberty-Empire's RTO does not currently have a market for demand-side resources. In the absence of a market and market rules, there is no firm basis for estimating the value of these resources at the RTO level. Liberty-Empire will consider this type of treatment in the future as a market is developed.

(G) The utility shall describe and document how it performed the assessments and developed the estimates pursuant to subsection (4)(D) and shall document its sources and quality of information.

The demand response and demand-side rates potential assessment followed a similar process to the energy efficiency potential assessment described in Section 3. Figure 5-23 illustrates this process; each box in the figure corresponds to a key step in the study. The steps and key elements in the process used to complete the study are described below.

Figure 5-23 – Overview of AEG's Approach to Estimating DR Potential



Data Collection

As the demand response and demand-side rate is built from the same baseline market characterization and baseline forecast as the energy efficiency analysis, many of the same data sources described in Section 2 are used directly in this assessment. Additionally, to inform estimates of potential, AEG reviewed similar program offerings from utilities within the region and across the nation to develop cost and impact parameters.

Market Characterization

Market characterization for demand response and demand-side rates focused on how Liberty-Empire's customers use energy during summer and winter peak periods. The analysis was conducted across the same three sectors as the energy efficiency analysis: residential, commercial, and industrial, accounting for variation in energy-consuming equipment and consumption patterns within major market segments. Similar to the energy efficiency portion of the analysis, opt-out customers are excluded from the DR and DSR potential analysis.

Demand Response and Demand-Side Rate Options

The structure of, and process for, the DR and DSR potential assessment is similar to the energy efficiency potential analysis. The key difference is that DR and DSR are "program" options (not measures), meaning that customers will not take these actions without a utility offering. DR requires an option to induce savings (i.e., there is no naturally occurring DR). Similarly, DSR requires a "rate structure" to supply a price signal to induce savings or shift demand.

While DR and DSR are quite different from the customers' perspective, they are similar with respect to modeling requirements, so we analyze them together. Some options will target the same customers, so we take steps to avoid double-counting and overstating of participation. In general, demand response options are controllable or dispatchable programmatic options where customers agree to reduce, shift, or modify their load during a specific number of hours throughout the year. Table 5-65 presents each of the final DR options that are included in this study and briefly describe each option. Note that Behavioral DR is voluntary and not dispatchable.

Table 5-65 – DR Options by Market Segment

Program Option	Eligibility	Mechanism	Lifetime
Behavioral DR (BDR)	Residential	Voluntary DR reductions in response to behavioral messaging. Requires AMI technology.	1
Grid-Interactive Water Heater	Residential	Internet-enabled control of water heater equipment.	10
Direct Load Control (DLC) of Smart Thermostats	Residential, Commercial	Internet-enabled control of thermostat set points, can be coupled with any dynamic pricing rate.	10
DLC of Smart Appliances	Residential	DLC switch installed on customer's equipment.	8
DLC of EV Charging	Residential	Automated, level 2 EV chargers that postpone or curtail charging during peak hours.	10
Curtailment Agreements – Firm	Large Commercial, Large Industrial[19]	Customers enact their customized, mandatory curtailment plan. May use stand-by generation. Penalties apply for non-performance.	3
Curtailment Agreements – Non-Firm	Large Commercial, Large Industrial	Customers enact their customized, mandatory curtailment plan. May use stand-by generation. No penalties apply for non-performance.	3
Battery Energy Storage	Residential, Commercial	Peak shifting of loads using stored electrochemical energy.	10
Thermal Energy Storage	Commercial, Industrial	Peak shifting of primarily space cooling loads using stored ice or cold water.	5

Demand-side rate options are not controllable or dispatchable by the utility but are considered a resource to be utilized for impactful demand reductions. Demand side rates do require significant utility resources to plan and implement a rate through the regulatory process, as well as certain infrastructure requirements for certain rates. Table 5-66 details the DSR options analyzed in this study.

Table 5-66 – DSR Options by Market Segment

Program Option	Eligibility	Mechanism	Lifetime
Time of use (TOU) Rates	All segments	Higher rate for the peak block of hours that occurs every day. Requires either on/off peak meters or AMI technology.	10
Critical Peak Pricing (CPP)	All segments	Much higher rate for the peak block of hours that occurs only on event days. Requires AMI technology.	10
Real-time Pricing (RTP)	Commercial, Industrial	Dynamic rate that fluctuates throughout the day based on hourly energy market prices. Requires AMI technology.	10

[19] As discussed in the DR Market Characterization section of this report, the large commercial and industrial customers are not identified as individual segments. Instead, they are accounted for in the participation rates used for the curtailment options.

After the option list is developed, each option is characterized with respect to the achievable potential cases on a variety of different components, including participation rates, per customer impacts, and costs.

Participation Rates

Participation rate assumptions are defined as the percent of eligible customers who take part in a given option in a given year. Note that a customer is not considered eligible if they do not have the relevant equipment or are already participating in a mutually exclusive option. It is important to note that the percentage indicates the percentage of the eligible population that we assume will participate in each option. The eligible population reflects appliance saturation rates (e.g., the share of customers with electric water heating), large commercial and industrial segmentation for relevant programs, and the option hierarchy, described in the next section. The participation rates were sourced from recent evaluations and reports on currently implemented programs and rates, then adjusted to reflect implementation in the Liberty-Empire service territory.

In general, new DR and DSR options need time to ramp up and reach a steady state. During ramp up, customer education, marketing and recruitment take place, as well as the physical implementation and installation of any hardware, software, telemetry, or other equipment required. For Liberty-Empire, AEG assumed the different types of options ramp up over three to seven years, typical of industry experience.

DLC and rate-based options have participation ramp ups following an “S-shaped” diffusion curve over a five-year timeframe. Curtailment Agreements are typically third-party-delivered over shorter contract periods. For curtailment and behavioral options, participation ramps up linearly over a three-year timeframe.

Per-customer Impact Assumptions

The potential demand savings are calculated by multiplying the per-customer load reduction at system peak by the total number of participating customers. The per customer impacts are presented as percentages or deemed kW values which reflect the total load reduction during an event. The impacts are each benchmarked to programs operating in the industry today, specifically those within Missouri and similar regions.

Cost Assumptions

Option costs include fixed and variable cost elements: development costs, annual administration costs, marketing and recruitment costs, equipment purchase and installation costs, annual O&M costs, and participant incentives. These assumptions are based on actual AEG program implementation experience and experience in developing program costs for other similar studies.

(5) The utility shall describe and document its evaluation of the cost effectiveness of each potential demand-side program developed pursuant to section (3) and each potential demand-side rate developed pursuant to section (4). All costs and benefits shall be expressed in nominal dollars.

(A) In each year of the planning horizon, the benefits of each potential demand-side program and each potential demand-side rate shall be calculated as the cumulative demand reduction multiplied by the avoided demand cost plus the cumulative energy savings multiplied by the avoided energy cost. These calculations shall be performed both with and without the avoided probable environmental costs. The utility shall describe and document the methods, data, and assumptions it used to develop the avoided costs.

1. The utility avoided demand cost shall include the capacity cost of generation, transmission, and distribution facilities, adjusted to reflect reliability reserve margins and capacity losses on the transmission and distribution systems, or the corresponding market-based equivalents of those costs. The utility shall describe and document how it developed its avoided demand cost, and the capacity cost chosen shall be consistent throughout the triennial compliance filing.

Avoided Demand Cost

Liberty-Empire's avoided demand cost projections are based on a combination of sources that aim to develop a reasonable benchmark for capacity value. Because the SPP market does not have a formal capacity market and Liberty-Empire's supply-demand balance dynamics will evolve, it is necessary to consider a combination of fundamental SPP market drivers and utility-specific cost drivers in developing the estimate. The following section presents the rationale and drivers behind Liberty-Empire's avoided demand cost projections for three distinct periods.

Years 2024-2028: For the forecast period in which Liberty-Empire has an adequate reserve margin, the avoided cost of capacity is based on an average of a fundamentally

derived CRA SPP capacity price forecast and the net avoidable "going-forward" costs (fixed operations and maintenance costs and annual new capital expenditures, less projected energy margins) of the marginal plant in Liberty-Empire's existing generation portfolio.

The marginal plant in Liberty-Empire's existing generation portfolio was determined by analyzing each existing plant's most recent budgeted fixed O&M costs and new capex less the projected energy margins that each plant was projected to earn in the SPP power market under Liberty-Empire's Base Case market conditions, producing the "net going-forward cost" of each plant. Based on comparing the net going-forward costs at each plant, Liberty-Empire determined that Plum Point has the highest going-forward costs on average for the period and is thus the marginal retirement candidate in the portfolio. Therefore, the plant's going-forward costs represent the costs needed for Liberty-Empire to avoid a capacity deficit.

The rationale for this approach is that while Liberty-Empire has an extended capacity, this situation depends on maintaining all capacity resources in the existing fleet. While Liberty-Empire may have significant going-forward costs with Plum Point during this time period, Liberty-Empire could, in theory, retire Plum Point and find a bilateral capacity opportunity in the market. Therefore, the 2024-2028 avoided demand cost splits the difference between the CRA SPP capacity price and the Plum Point going-forward cost.

Years 2029+: In the years in which Liberty-Empire would undoubtedly require new additional generation capacity, the avoided demand cost projection is based on a transition to the projected cost of new entry ("CONE," which includes capital costs and ongoing fixed operations and maintenance costs) in SPP, net of expected energy margins in the SPP market. CRA's fundamentals-based SPP power market forecast projects a need for new capacity in the late 2020s and early 2030s as reserve margins decline due to growing SPP load, regional plant retirements, and declining ELCC. The cost of the new entrant in this time period is set by a blend of gas CC, gas CT, and battery storage, based on the rationale that the marginal capacity type is currently uncertain but is most likely to

be one of these technology types. The capacity value grows in the broader SPP market over this period due to larger "missing money" resulting from declining storage ELCC and lower energy margins as renewables push prices down.

The avoided demand cost projection used by Liberty-Empire in the 2025 IRP is shown in the table below in 2023 dollars per kW-year.

Figure 5-24 – Avoided Capacity Price (2023$/kW-year)

****Confidential in Its Entirety****

2. The utility avoided energy cost shall include the fuel, emission allowance, and other variable operation and maintenance costs of generation facilities, adjusted to reflect energy losses on the transmission and distribution systems or the corresponding market-based equivalents of those costs. The utility shall describe and document how it developed its avoided energy cost, and the energy costs shall be consistent throughout the triennial compliance filing.

Liberty-Empire engaged CRA to develop its avoided energy costs based on a fundamental market analysis of the Southwest Power Pool ("SPP") market. Since Liberty-Empire is a member of SPP and part of the SPP Integrated Marketplace ("SPP IM"), Liberty-Empire utilized market prices as the avoided energy cost. CRA developed a forward view of the SPP South electricity market for the 2025 IRP, incorporating an expectation for "Base Gas" and "Base Carbon" prices. The development of the gas and carbon price input assumptions is described further in Volume 4. The power price forecast

uses public and proprietary data to develop input assumptions for critical supply and demand drivers for power market outcomes. Supply includes a bottom-up analysis of generation resources, including parameters for fuel type, operations (capacity, heat rates, planned outages, and forced outages), emissions costs, and expectations for the number of additions (and retirements) over time. Demand includes the demand for electricity by zone at an annual, monthly, and hourly level. Figure 5-25 illustrates Liberty-Empire's assumptions for the Base Case's avoided energy costs ($/MWh). These prices represent the all-hours SPP South Hub power price forecast in 2023 dollars per MWh.

Figure 5-25 – Avoided Energy Costs (Base Carbon / Base Gas) (2023$/MWh)

****Confidential in Its Entirety****

3. The avoided probable environmental costs include the effects of the possible environmental costs calculated pursuant to 4 CSR 240-22.040(2)(B) on the utility avoided demand cost and the utility avoided energy cost. The utility shall describe and document how it developed and avoided probable environmental costs.

Projections of the price associated with CO_2 emissions (in real 2023 $/ton and nominal $/ton) for the Base case and the Low case (i.e., zero CO_2 price) are shown in the table below. Additional information on the development of these prices can be found in Technical Volume 4.

Figure 5-26 – Projections of Price for CO2 ($/short ton) for the Low and Base Avoided Probable Environmental Cost Scenarios

****Confidential in Its Entirety****

(B) The total resource cost test shall be used to evaluate the cost effectiveness of the potential demand-side programs and potential demand-side rates. In each year of the planning horizon—

1. The costs of each potential demand-side program shall be calculated as the sum of all incremental costs of end-use measures that are implemented due to the program (including both utility and participant contributions) plus utility costs to administer, deliver, and evaluate each potential demand-side program;

The demand-side program total resource cost test costs are shown in Table 5-67.

Note - CSR 240-2.135(2)(A)1 allows information to be marked as confidential when it is reports, work papers, or other documentation related to work produced by internal or external auditors or consultants.

Table 5-67 – Total Resource Cost Test Program Costs

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	$ 488,502	$ 497,518	$ 506,440	$ 513,768	$ 521,728	$ 528,263	$ 535,017	$ 536,193	$ 543,976	$ 530,136	$ 541,416	$ 546,936	$ 553,900	$ 560,405	$ 568,234	$ 575,483	$ 583,221	$ 589,958	$ 597,383	$ 600,015	$ 612,272
Residential	Income Eligible Lighting	$ 59,734	$ 63,008	$ 65,677	$ 71,925	$ 68,378	$ 59,359	$ 58,819	$ 57,401	$ 56,532	$ 56,123	$ 56,763	$ 1,985	$ 1,336	$ 1,842	$ 2,522	$ 12,093	$ 4,311	$ 9,220	$ 11,768	$ 13,748	$ 14,011
Total Residential	**Total Residential**	**$ 548,236**	**$ 560,526**	**$ 572,117**	**$ 585,693**	**$ 590,107**	**$ 587,622**	**$ 593,836**	**$ 593,593**	**$ 600,508**	**$ 586,259**	**$ 598,179**	**$ 548,921**	**$ 555,236**	**$ 562,247**	**$ 570,756**	**$ 587,576**	**$ 587,532**	**$ 599,179**	**$ 609,151**	**$ 613,763**	**$ 626,283**
Commercial	Commercial Prescriptive	$ 918,690	$ 933,609	$ 945,547	$ 951,735	$ 966,794	$ 971,888	$ 944,340	$ 926,359	$ 915,707	$ 911,940	$ 912,009	$ 938,747	$ 943,959	$ 947,837	$ 947,074	$ 942,188	$ 933,269	$ 922,597	$ 913,870	$ 906,281	$ 923,083
Commercial	Commercial Custom	$ 164,373	$ 184,796	$ 208,972	$ 228,794	$ 254,549	$ 275,350	$ 311,609	$ 344,526	$ 384,885	$ 417,263	$ 429,821	$ 473,137	$ 494,308	$ 519,931	$ 538,933	$ 437,231	$ 447,662	$ 458,800	$ 472,954	$ 487,450	$ 495,067
Commercial	SBDI	$ 214,603	$ 214,591	$ 229,460	$ 136,912	$ 146,012	$ 145,991	$ 148,200	$ 147,471	$ 145,328	$ 144,420	$ 144,322	$ 144,277	$ 144,229	$ 144,181	$ 144,129	$ 142,305	$ 142,252	$ 142,196	$ 142,113	$ 142,055	$ 145,423
Total Commercial	**Total Commercial**	**$1,297,666**	**$1,332,996**	**$1,383,979**	**$1,317,441**	**$1,367,355**	**$1,393,229**	**$1,404,149**	**$1,418,356**	**$1,445,920**	**$1,473,622**	**$1,486,152**	**$1,556,161**	**$1,582,496**	**$1,611,948**	**$1,630,136**	**$1,521,724**	**$1,523,183**	**$1,523,593**	**$1,528,938**	**$1,535,786**	**$1,563,573**
Portfolio	**EE Programs**	**$1,845,902**	**$1,893,522**	**$1,956,096**	**$1,903,133**	**$1,957,461**	**$1,980,851**	**$1,997,985**	**$2,011,949**	**$2,046,428**	**$2,059,882**	**$2,084,330**	**$2,105,082**	**$2,137,732**	**$2,174,195**	**$2,200,892**	**$2,109,300**	**$2,110,716**	**$2,122,772**	**$2,138,089**	**$2,149,549**	**$2,189,855**
Residential	Battery Storage DLC	$ 19,910	$ 26,706	$ 33,406	$ 34,220	$ 41,608	$ 43,864	$ 54,523	$ 55,767	$ 56,113	$ 64,411	$ 16,424	$ 16,679	$ 15,965	$ 16,019	$ 16,202	$ 16,476	$ 17,801	$ 18,892	$ 20,391	$ 21,001	$ 20,038
Residential	CPP	$ 191,366	$ 380,099	$ 762,428	$ 383,358	$ 189,798	$ 12,044	$ 12,327	$ 17,946	$ 17,705	$ 17,181	$ 17,853	$ 17,640	$ 17,478	$ 16,149	$ 16,132	$ 17,672	$ 17,999	$ 17,636	$ 17,515	$ 17,703	$ 21,778
Residential	Grid-Interactive WH	$ 29,108	$ 45,437	$ 80,612	$ 63,515	$ 51,876	$ 35,145	$ 34,403	$ 33,768	$ 33,115	$ 24,124	$ 24,691	$ 25,271	$ 25,865	$ 26,473	$ 27,095	$ 27,732	$ 28,383	$ 29,050	$ 29,733	$ 30,432	$ 31,147
Residential	Smart Appliances DLC	$ 66,861	$ 107,313	$ 180,575	$ 98,100	$ 60,462	$ 29,464	$ 30,156	$ 32,377	$ 33,044	$ 33,645	$ 34,318	$ 35,038	$ 35,780	$ 36,557	$ 37,378	$ 38,617	$ 39,562	$ 40,345	$ 41,427	$ 42,283	$ 43,178
Residential	Smart Thermostats DLC	$ 38,053	$ 47,275	$ 57,078	$ 75,732	$ 78,497	$ 90,069	$ 102,298	$ 12,515	$ 12,448	$ 12,739	$ 13,028	$ 13,338	$ 13,651	$ 14,023	$ 14,413	$ 12,059	$ 12,905	$ 13,168	$ 13,962	$ 14,765	$ 15,545
Residential	TOU Opt-Out	$ 225,922	$ 429,428	$ 778,735	$ 346,334	$ 156,856	$ 13,503	$ 13,820	$ 18,904	$ 18,648	$ 18,090	$ 18,913	$ 18,713	$ 18,672	$ 17,148	$ 17,478	$ 18,873	$ 19,127	$ 18,943	$ 19,314	$ 19,724	$ 23,346
Commercial	Battery Storage DLC	$ 514	$ 696	$ 866	$ 894	$ 1,096	$ 1,232	$ 1,526	$ 1,596	$ 1,651	$ 1,916	$ 790	$ 797	$ 756	$ 725	$ 746	$ 750	$ 833	$ 906	$ 1,006	$ 1,048	$ 980
Commercial	CPP	$ 33,112	$ 66,418	$ 135,089	$ 72,331	$ 39,800	$ 4,837	$ 4,723	$ 5,616	$ 5,634	$ 5,575	$ 5,602	$ 5,609	$ 5,575	$ 4,496	$ 4,352	$ 4,196	$ 4,046	$ 3,914	$ 3,826	$ 3,422	$ 7,045
Commercial	Curtailment - Firm	$ 8,082	$ 8,272	$ 8,467	$ 8,665	$ 8,869	$ 9,078	$ 9,291	$ 9,509	$ 9,733	$ 9,961	$ 10,195	$ 10,435	$ 10,680	$ 10,931	$ 11,188	$ 11,451	$ 11,720	$ 11,996	$ 12,277	$ 12,566	$ 12,861
Commercial	Curtailment - Non-Firm	$ 7,935	$ 8,121	$ 8,312	$ 8,507	$ 8,707	$ 8,912	$ 9,121	$ 9,336	$ 9,555	$ 9,780	$ 10,009	$ 10,245	$ 10,485	$ 10,732	$ 10,984	$ 11,242	$ 11,506	$ 11,777	$ 12,053	$ 12,337	$ 12,627
Commercial	Grid-Interactive WH	$ 4,057	$ 6,248	$ 10,877	$ 8,348	$ 6,636	$ 4,356	$ 4,141	$ 4,009	$ 3,863	$ 3,348	$ 3,427	$ 3,507	$ 3,590	$ 3,674	$ 3,760	$ 3,849	$ 3,939	$ 4,032	$ 4,126	$ 4,223	$ 4,323
Commercial	Smart Thermostats DLC	$ 670	$ 863	$ 1,071	$ 1,472	$ 1,533	$ 1,785	$ 2,055	$ 113	$ 117	$ 118	$ 122	$ 125	$ 128	$ 129	$ 134	$ 104	$ 115	$ 108	$ 121	$ 128	$ 137
Commercial	TOU Opt-Out	$ 46,107	$ 89,095	$ 164,954	$ 79,457	$ 41,452	$ 5,334	$ 5,130	$ 6,372	$ 6,352	$ 6,236	$ 6,229	$ 6,194	$ 6,109	$ 4,518	$ 4,262	$ 3,992	$ 3,757	$ 3,632	$ 3,699	$ 3,774	$ 7,827
Total Demand Response	**Total Demand Response**	**$ 671,698**	**$1,215,971**	**$2,222,468**	**$1,180,934**	**$ 687,190**	**$ 259,623**	**$ 283,515**	**$ 207,828**	**$ 207,978**	**$ 207,125**	**$ 161,604**	**$ 163,591**	**$ 164,735**	**$ 161,575**	**$ 164,126**	**$ 167,013**	**$ 171,694**	**$ 174,398**	**$ 179,451**	**$ 183,405**	**$ 200,831**
Total Portfolio Costs	**Total Portfolio Costs**	**$ 321,055**	**$ 425,077**	**$ 608,607**	**$ 466,374**	**$ 426,118**	**$ 393,664**	**$ 436,681**	**$ 452,341**	**$ 482,737**	**$ 515,305**	**$ 519,839**	**$ 528,463**	**$ 541,024**	**$ 553,698**	**$ 565,853**	**$ 565,659**	**$ 576,285**	**$ 589,383**	**$ 603,573**	**$ 618,447**	**$ 633,806**
Total Portfolio	**Total Portfolio**	**$2,838,655**	**$3,534,570**	**$4,787,171**	**$3,550,441**	**$3,070,770**	**$2,634,138**	**$2,718,181**	**$2,672,118**	**$2,737,142**	**$2,782,311**	**$2,765,773**	**$2,797,136**	**$2,843,491**	**$2,889,467**	**$2,930,871**	**$2,841,972**	**$2,858,694**	**$2,886,553**	**$2,921,114**	**$2,951,402**	**$3,024,493**

2. The costs of each potential demand-side rate shall be calculated as the sum of all incremental costs that are due to the rate (including both utility and participant contributions) plus utility costs to administer, deliver, and evaluate each potential demand-side rate; and

Table 5-67 above details the Total Resource Cost Test Program Costs.

3. For purposes of this test, the costs of potential demand-side programs and potential demand-side rates shall not include lost revenues or utility incentive payments to customers.

The total resource cost test did not include lost revenues or utility payments to customers.

(C) The utility cost test shall also be performed for purposes of comparison. In each year of the planning horizon—

1. The costs of each potential demand-side program and potential demand-side rate shall be calculated as the sum of all utility incentive payments plus utility costs to administer, deliver, and evaluate each potential demand-side program or potential demand-side rate;

The demand-side bundle utility cost test costs are shown in the table below. This includes incentives and non-incentives.

Table 5-68 – Utility Cost Test Costs

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	$ 355,519	$ 362,024	$ 368,400	$ 371,183	$ 376,775	$ 381,226	$ 385,834	$ 386,325	$ 391,622	$ 380,697	$ 388,731	$ 392,424	$ 397,167	$ 401,614	$ 407,036	$ 412,018	$ 417,438	$ 422,021	$ 427,097	$ 428,560	$ 437,363
Residential	Income Eligible Lighting	$ 61,950	$ 65,371	$ 68,093	$ 76,382	$ 71,107	$ 61,429	$ 60,954	$ 59,539	$ 59,643	$ 59,107	$ 59,914	$ 2,079	$ 1,375	$ 1,907	$ 2,668	$ 12,621	$ 4,479	$ 9,679	$ 12,346	$ 14,582	$ 14,861
Total Residential	**Total Residential**	**$ 417,469**	**$ 427,395**	**$ 436,493**	**$ 447,565**	**$ 447,883**	**$ 442,655**	**$ 446,787**	**$ 445,864**	**$ 451,265**	**$ 439,804**	**$ 448,645**	**$ 394,502**	**$ 398,542**	**$ 403,521**	**$ 409,704**	**$ 424,639**	**$ 421,916**	**$ 431,699**	**$ 439,443**	**$ 443,143**	**$ 452,223**
Commercial	Commercial Prescriptive	$ 625,441	$ 635,761	$ 644,016	$ 648,337	$ 658,631	$ 662,158	$ 643,124	$ 630,731	$ 623,411	$ 620,827	$ 620,888	$ 639,407	$ 643,029	$ 645,723	$ 645,255	$ 641,897	$ 635,763	$ 628,431	$ 622,423	$ 617,201	$ 628,648
Commercial	Commercial Custom	$ 118,706	$ 133,355	$ 150,688	$ 164,904	$ 183,370	$ 198,286	$ 224,494	$ 248,242	$ 277,306	$ 300,627	$ 309,722	$ 341,145	$ 356,285	$ 374,677	$ 388,301	$ 314,558	$ 322,100	$ 330,169	$ 340,404	$ 350,887	$ 356,377
Commercial	SBDI	$ 232,605	$ 232,593	$ 246,476	$ 140,804	$ 149,301	$ 149,281	$ 151,343	$ 150,662	$ 148,661	$ 147,812	$ 147,720	$ 147,678	$ 147,632	$ 147,587	$ 147,538	$ 145,834	$ 145,785	$ 145,732	$ 145,654	$ 145,598	$ 148,745
Total Commercial	**Total Commercial**	**$ 976,751**	**$1,001,709**	**$1,041,179**	**$ 954,045**	**$ 991,302**	**$1,009,724**	**$1,018,961**	**$1,029,635**	**$1,049,377**	**$1,069,266**	**$1,078,330**	**$1,128,230**	**$1,146,946**	**$1,167,987**	**$1,181,094**	**$1,102,289**	**$1,103,648**	**$1,104,332**	**$1,108,481**	**$1,113,686**	**$1,133,771**
Portfolio	**EE Programs**	**$1,394,220**	**$1,429,104**	**$1,477,672**	**$1,401,610**	**$1,439,184**	**$1,452,379**	**$1,465,749**	**$1,475,499**	**$1,500,642**	**$1,509,070**	**$1,526,976**	**$1,522,732**	**$1,545,488**	**$1,571,507**	**$1,590,798**	**$1,526,929**	**$1,525,565**	**$1,536,032**	**$1,547,924**	**$1,556,829**	**$1,585,994**
Residential	Battery Storage DLC	$ 34,157	$ 63,589	$ 102,759	$ 139,347	$ 193,349	$ 247,174	$ 327,157	$ 402,842	$ 479,968	$ 581,894	$ 554,524	$ 574,996	$ 595,156	$ 615,620	$ 635,695	$ 657,650	$ 682,554	$ 710,456	$ 740,937	$ 772,815	$ 789,519
Residential	CPP	$ 191,366	$ 380,099	$ 762,428	$ 383,358	$ 189,798	$ 12,044	$ 12,327	$ 17,946	$ 17,705	$ 17,181	$ 17,853	$ 17,640	$ 17,478	$ 16,149	$ 16,132	$ 17,672	$ 17,999	$ 17,636	$ 17,515	$ 17,703	$ 21,778
Residential	Grid-Interactive WH	$ 29,658	$ 47,474	$ 86,262	$ 71,883	$ 62,308	$ 46,615	$ 46,898	$ 47,263	$ 47,560	$ 37,682	$ 37,345	$ 37,071	$ 36,871	$ 36,709	$ 36,629	$ 36,675	$ 36,815	$ 36,863	$ 37,053	$ 37,314	$ 38,189
Residential	Smart Appliances DLC	$ 77,430	$ 139,054	$ 252,882	$ 190,270	$ 163,010	$ 133,137	$ 134,542	$ 139,615	$ 143,203	$ 146,709	$ 150,386	$ 154,107	$ 157,982	$ 161,906	$ 165,916	$ 170,542	$ 175,028	$ 179,329	$ 184,126	$ 188,673	$ 193,026
Residential	Smart Thermostats DLC	$ 53,086	$ 82,196	$ 117,177	$ 170,838	$ 210,701	$ 265,912	$ 328,876	$ 245,931	$ 252,815	$ 260,198	$ 267,767	$ 275,535	$ 283,609	$ 291,893	$ 300,462	$ 304,598	$ 312,453	$ 319,930	$ 328,462	$ 337,634	$ 345,946
Residential	TOU Opt-Out	$ 225,922	$ 429,428	$ 778,735	$ 346,334	$ 156,856	$ 13,503	$ 13,820	$ 18,904	$ 18,648	$ 18,090	$ 18,913	$ 18,713	$ 18,672	$ 17,148	$ 17,478	$ 18,873	$ 19,127	$ 18,943	$ 19,314	$ 19,724	$ 23,346
Commercial	Battery Storage DLC	$ 514	$ 1,553	$ 2,622	$ 2,691	$ 4,774	$ 5,938	$ 8,270	$ 9,484	$ 11,743	$ 15,343	$ 14,534	$ 15,946	$ 16,260	$ 17,727	$ 18,147	$ 18,560	$ 20,277	$ 22,051	$ 22,648	$ 24,501	$ 24,985
Commercial	CPP	$ 33,112	$ 66,418	$ 135,089	$ 72,331	$ 39,800	$ 4,837	$ 4,723	$ 5,616	$ 5,634	$ 5,575	$ 5,602	$ 5,609	$ 5,575	$ 4,496	$ 4,352	$ 4,196	$ 4,046	$ 3,914	$ 3,826	$ 3,422	$ 7,045
Commercial	Curtailment - Firm	$ 9,456	$ 10,553	$ 11,321	$ 11,613	$ 11,842	$ 12,148	$ 12,389	$ 12,710	$ 12,965	$ 13,303	$ 13,574	$ 13,852	$ 14,216	$ 14,513	$ 14,895	$ 15,207	$ 15,607	$ 15,934	$ 16,352	$ 16,696	$ 17,049
Commercial	Curtailment - Non-Firm	$ 9,995	$ 11,438	$ 12,559	$ 12,859	$ 13,096	$ 13,410	$ 13,733	$ 13,991	$ 14,331	$ 14,681	$ 14,964	$ 15,333	$ 15,636	$ 16,026	$ 16,426	$ 16,756	$ 17,174	$ 17,603	$ 17,958	$ 18,405	$ 18,780
Commercial	Grid-Interactive WH	$ 4,136	$ 6,516	$ 11,645	$ 9,472	$ 7,987	$ 5,826	$ 5,706	$ 5,673	$ 5,598	$ 4,962	$ 4,913	$ 4,893	$ 4,870	$ 4,843	$ 4,848	$ 4,851	$ 4,889	$ 4,887	$ 4,922	$ 4,956	$ 5,073
Commercial	Smart Thermostats DLC	$ 984	$ 1,613	$ 2,360	$ 3,522	$ 4,378	$ 5,579	$ 6,963	$ 5,166	$ 5,352	$ 5,509	$ 5,706	$ 5,872	$ 6,046	$ 6,257	$ 6,442	$ 6,598	$ 6,799	$ 6,988	$ 7,202	$ 7,458	$ 7,637
Commercial	TOU Opt-Out	$ 46,107	$ 89,095	$ 164,954	$ 79,457	$ 41,452	$ 5,334	$ 5,130	$ 6,372	$ 6,352	$ 6,236	$ 6,229	$ 6,194	$ 6,109	$ 4,518	$ 4,262	$ 3,992	$ 3,757	$ 3,632	$ 3,699	$ 3,774	$ 7,827
Total Demand Response	**Total Demand Response**	**$ 715,923**	**$1,329,026**	**$2,440,793**	**$1,493,975**	**$1,099,353**	**$ 771,457**	**$ 920,535**	**$ 931,514**	**$1,021,874**	**$1,127,363**	**$1,112,310**	**$1,145,761**	**$1,178,482**	**$1,207,804**	**$1,241,686**	**$1,276,170**	**$1,316,524**	**$1,358,166**	**$1,404,014**	**$1,453,074**	**$1,500,200**
Total Portfolio Costs	**Total Portfolio Costs**	**$ 321,055**	**$ 425,077**	**$ 608,607**	**$ 466,374**	**$ 426,118**	**$ 393,664**	**$ 436,681**	**$ 452,341**	**$ 482,737**	**$ 515,305**	**$ 519,839**	**$ 528,463**	**$ 541,024**	**$ 553,698**	**$ 565,853**	**$ 565,659**	**$ 576,285**	**$ 589,383**	**$ 603,573**	**$ 618,447**	**$ 633,806**
Total Portfolio	**Total Portfolio**	**$2,431,199**	**$3,183,207**	**$4,527,072**	**$3,361,959**	**$2,964,655**	**$2,617,501**	**$2,822,965**	**$2,859,353**	**$3,005,253**	**$3,151,737**	**$3,159,125**	**$3,196,957**	**$3,264,994**	**$3,333,009**	**$3,398,337**	**$3,368,757**	**$3,418,374**	**$3,483,581**	**$3,555,511**	**$3,628,350**	**$3,720,001**

2. For purposes of this test, the costs of potential demand-side programs and potential demand-side rates shall not include lost revenues; and

The utility cost test does not include lost revenues.

3. The costs shall include, but separately identify, the costs of any rate of return or incentive included in the utility's recovery of demand-side program costs.

The demand-side program utility cost test was modified to include an estimated utility incentive of 10% of the total budget, presented in the tables below. The utility incentive was applied at the portfolio level, therefore, only affecting the portfolio level ratio.

Table 5-69 – Utility Cost Test Costs Modified with Utility Incentive

Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
All Programs	$ 2,185,056	$ 2,857,315	$ 4,060,473	$ 3,004,406	$ 2,637,965	$ 2,315,691	$ 2,488,176	$ 2,512,559	$ 2,635,155	$ 2,756,670	$ 2,760,582	$ 2,791,801	$ 2,850,209	$ 2,908,508	$ 2,964,516	$ 2,935,085	$ 2,976,555	$ 3,031,721	$ 3,092,772	$ 3,154,207	$ 3,234,082

Table 5-70 – Utility Cost Test Ratios Modified with Utility Incentive

Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
All Programs	2.33	2.56	2.86	4.85	5.90	7.10	7.04	7.19	7.02	7.30	7.69	7.92	8.33	8.88	8.98	9.11	9.12	9.10	9.06	9.02	9.04

(D) The present value of program benefits minus the present value of program costs over the planning horizon must be positive or the ratio of annualized benefits to annualized costs must be greater than one (1) for a potential demand-side program or potential demand-side rate to pass the utility cost test or the total resource cost test. The utility may relax this criterion for programs that are judged to have potential benefits that are not captured by the estimated load impacts or avoided costs, including programs required to comply with legal mandates.

The demand-side program total resource cost test and utility cost test benefit-cost ratios are shown in the tables below.

(E) The utility shall provide results of the total resource cost test and the utility cost test for each potential demand-side program evaluated pursuant to subsection (5)(B) and for each potential demand–side rate evaluated pursuant to subsection (5)(C) of this rule, including a tabulation of the benefits (avoided costs), demand-side resource costs, and net benefits or costs.

The demand-side program total resource cost test and utility cost test benefit-cost ratios are shown in the tables below.

Table 5-71 – Total Resource Cost Test Program Costs

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	$ 488,502	$ 497,518	$ 506,440	$ 513,768	$ 521,728	$ 528,263	$ 535,017	$ 536,193	$ 543,976	$ 530,136	$ 541,416	$ 546,936	$ 553,900	$ 560,405	$ 568,234	$ 575,483	$ 583,221	$ 589,958	$ 597,383	$ 600,015	$ 612,272
Residential	Income Eligible Lighting	$ 59,734	$ 63,008	$ 65,677	$ 71,925	$ 68,378	$ 59,359	$ 58,819	$ 57,401	$ 56,532	$ 56,123	$ 56,763	$ 1,985	$ 1,336	$ 1,842	$ 2,522	$ 12,093	$ 4,311	$ 9,220	$ 11,768	$ 13,748	$ 14,011
Total Residential	**Total Residential**	**$ 548,236**	**$ 560,526**	**$ 572,117**	**$ 585,693**	**$ 590,107**	**$ 587,622**	**$ 593,836**	**$ 593,593**	**$ 600,508**	**$ 586,259**	**$ 598,179**	**$ 548,921**	**$ 555,236**	**$ 562,247**	**$ 570,756**	**$ 587,576**	**$ 587,532**	**$ 599,179**	**$ 609,151**	**$ 613,763**	**$ 626,283**
Commercial	Commercial Prescriptive	$ 918,690	$ 933,609	$ 945,547	$ 951,735	$ 966,794	$ 971,888	$ 944,340	$ 926,359	$ 915,707	$ 911,940	$ 912,009	$ 938,747	$ 943,959	$ 947,837	$ 947,074	$ 942,188	$ 933,269	$ 922,597	$ 913,870	$ 906,281	$ 923,083
Commercial	Commercial Custom	$ 164,373	$ 184,796	$ 208,972	$ 228,794	$ 254,549	$ 275,350	$ 311,609	$ 344,526	$ 384,885	$ 417,263	$ 429,821	$ 473,137	$ 494,308	$ 519,931	$ 538,933	$ 437,231	$ 447,662	$ 458,800	$ 472,954	$ 487,450	$ 495,067
Commercial	SBDI	$ 214,603	$ 214,591	$ 229,460	$ 136,912	$ 146,012	$ 145,991	$ 148,200	$ 147,471	$ 145,328	$ 144,420	$ 144,322	$ 144,277	$ 144,229	$ 144,181	$ 144,129	$ 142,305	$ 142,252	$ 142,196	$ 142,113	$ 142,055	$ 145,423
Total Commercial	**Total Commercial**	**$1,297,666**	**$1,332,996**	**$ 1,383,979**	**$ 1,317,441**	**$ 1,367,355**	**$ 1,393,229**	**$ 1,404,149**	**$ 1,418,356**	**$ 1,445,920**	**$ 1,473,622**	**$ 1,486,152**	**$ 1,556,161**	**$ 1,582,496**	**$ 1,611,948**	**$ 1,630,136**	**$ 1,521,724**	**$ 1,523,183**	**$ 1,523,593**	**$ 1,528,938**	**$ 1,535,786**	**$ 1,563,573**
Portfolio	**EE Programs**	**$1,845,902**	**$1,893,522**	**$ 1,956,096**	**$ 1,903,133**	**$ 1,957,461**	**$ 1,980,851**	**$ 1,997,985**	**$ 2,011,949**	**$ 2,046,428**	**$ 2,059,882**	**$ 2,084,330**	**$ 2,105,082**	**$ 2,137,732**	**$ 2,174,195**	**$ 2,200,892**	**$ 2,109,300**	**$ 2,110,716**	**$ 2,122,772**	**$ 2,138,089**	**$ 2,149,549**	**$ 2,189,855**
Residential	Battery Storage DLC	$ 19,910	$ 26,706	$ 33,406	$ 34,220	$ 41,608	$ 43,864	$ 54,523	$ 55,767	$ 56,113	$ 64,411	$ 16,424	$ 16,679	$ 15,965	$ 16,019	$ 16,202	$ 16,476	$ 17,801	$ 18,892	$ 20,391	$ 21,001	$ 20,038
Residential	CPP	$ 191,366	$ 380,099	$ 762,428	$ 383,358	$ 189,798	$ 12,044	$ 12,327	$ 17,946	$ 17,705	$ 17,181	$ 17,853	$ 17,640	$ 17,478	$ 16,149	$ 16,132	$ 17,672	$ 17,999	$ 17,636	$ 17,515	$ 17,703	$ 21,778
Residential	Grid-Interactive WH	$ 29,108	$ 45,437	$ 80,612	$ 63,515	$ 51,876	$ 35,145	$ 34,403	$ 33,768	$ 33,115	$ 24,124	$ 24,691	$ 25,271	$ 25,865	$ 26,473	$ 27,095	$ 27,732	$ 28,383	$ 29,050	$ 29,733	$ 30,432	$ 31,147
Residential	Smart Appliances DLC	$ 66,861	$ 107,313	$ 180,575	$ 98,100	$ 60,462	$ 29,464	$ 30,156	$ 32,377	$ 33,044	$ 33,645	$ 34,318	$ 35,038	$ 35,780	$ 36,557	$ 37,378	$ 38,617	$ 39,562	$ 40,345	$ 41,427	$ 42,283	$ 43,178
Residential	Smart Thermostats DLC	$ 38,053	$ 47,275	$ 57,078	$ 75,732	$ 78,497	$ 90,069	$ 102,298	$ 12,515	$ 12,448	$ 12,739	$ 13,028	$ 13,338	$ 13,651	$ 14,023	$ 14,413	$ 12,059	$ 12,905	$ 13,168	$ 13,962	$ 14,765	$ 15,545
Residential	TOU Opt-Out	$ 225,922	$ 429,428	$ 778,735	$ 346,334	$ 156,856	$ 13,503	$ 13,820	$ 18,904	$ 18,648	$ 18,090	$ 18,913	$ 18,713	$ 18,672	$ 17,148	$ 17,478	$ 18,873	$ 19,127	$ 18,943	$ 19,314	$ 19,724	$ 23,346
Commercial	Battery Storage DLC	$ 514	$ 696	$ 866	$ 894	$ 1,096	$ 1,232	$ 1,526	$ 1,596	$ 1,651	$ 1,916	$ 790	$ 797	$ 756	$ 725	$ 746	$ 750	$ 833	$ 906	$ 1,006	$ 1,048	$ 980
Commercial	CPP	$ 33,112	$ 66,418	$ 135,089	$ 72,331	$ 39,800	$ 4,837	$ 4,723	$ 5,616	$ 5,634	$ 5,575	$ 5,602	$ 5,609	$ 5,575	$ 4,496	$ 4,352	$ 4,196	$ 4,046	$ 3,914	$ 3,826	$ 3,422	$ 7,045
Commercial	Curtailment - Firm	$ 8,082	$ 8,272	$ 8,467	$ 8,665	$ 8,869	$ 9,078	$ 9,291	$ 9,509	$ 9,733	$ 9,961	$ 10,195	$ 10,435	$ 10,680	$ 10,931	$ 11,188	$ 11,451	$ 11,720	$ 11,996	$ 12,277	$ 12,566	$ 12,861
Commercial	Curtailment - Non-Firm	$ 7,935	$ 8,121	$ 8,312	$ 8,507	$ 8,707	$ 8,912	$ 9,121	$ 9,336	$ 9,555	$ 9,780	$ 10,009	$ 10,245	$ 10,485	$ 10,732	$ 10,984	$ 11,242	$ 11,506	$ 11,777	$ 12,053	$ 12,337	$ 12,627
Commercial	Grid-Interactive WH	$ 4,057	$ 6,248	$ 10,877	$ 8,348	$ 6,636	$ 4,356	$ 4,141	$ 4,009	$ 3,863	$ 3,348	$ 3,427	$ 3,507	$ 3,590	$ 3,674	$ 3,760	$ 3,849	$ 3,939	$ 4,032	$ 4,126	$ 4,223	$ 4,323
Commercial	Smart Thermostats DLC	$ 670	$ 863	$ 1,071	$ 1,472	$ 1,533	$ 1,785	$ 2,055	$ 113	$ 117	$ 118	$ 122	$ 125	$ 128	$ 129	$ 134	$ 104	$ 115	$ 108	$ 121	$ 128	$ 137
Commercial	TOU Opt-Out	$ 46,107	$ 89,095	$ 164,954	$ 79,457	$ 41,452	$ 5,334	$ 5,130	$ 6,372	$ 6,352	$ 6,236	$ 6,229	$ 6,194	$ 6,109	$ 4,518	$ 4,262	$ 3,992	$ 3,757	$ 3,632	$ 3,699	$ 3,774	$ 7,827
Total Demand Respons	**Total Demand Response**	**$ 671,698**	**$1,215,971**	**$ 2,222,468**	**$ 1,180,934**	**$ 687,190**	**$ 259,623**	**$ 283,515**	**$ 207,828**	**$ 207,978**	**$ 207,125**	**$ 161,604**	**$ 163,591**	**$ 164,735**	**$ 161,575**	**$ 164,126**	**$ 167,013**	**$ 171,694**	**$ 174,398**	**$ 179,451**	**$ 183,405**	**$ 200,831**
Total Portfolio Costs	**Total Portfolio Costs**	**$ 321,055**	**$ 425,077**	**$ 608,607**	**$ 466,374**	**$ 426,118**	**$ 393,664**	**$ 436,681**	**$ 452,341**	**$ 482,737**	**$ 515,305**	**$ 519,839**	**$ 528,463**	**$ 541,024**	**$ 553,698**	**$ 565,853**	**$ 565,659**	**$ 576,285**	**$ 589,383**	**$ 603,573**	**$ 618,447**	**$ 633,806**
Total Portfolio	**Total Portfolio**	**$2,838,655**	**$3,534,570**	**$ 4,787,171**	**$ 3,550,441**	**$ 3,070,770**	**$ 2,634,138**	**$ 2,718,181**	**$ 2,672,118**	**$ 2,737,142**	**$ 2,782,311**	**$ 2,765,773**	**$ 2,797,136**	**$ 2,843,491**	**$ 2,889,467**	**$ 2,930,871**	**$ 2,841,972**	**$ 2,858,694**	**$ 2,886,553**	**$ 2,921,114**	**$ 2,951,402**	**$ 3,024,493**

Table 5-72 – Total Resource Cost Test Program Benefits

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	$ 516,635	$ 547,071	$ 577,998	$ 638,306	$ 667,175	$ 694,139	$ 723,514	$ 710,819	$ 750,083	$ 665,885	$ 718,497	$ 738,118	$ 765,817	$ 790,493	$ 819,239	$ 842,045	$ 872,503	$ 897,535	$ 927,972	$ 923,090	$ 961,741
Residential	Income Eligible Lighting	$ 80,769	$ 90,314	$ 99,759	$ 91,731	$ 83,318	$ 73,353	$ 76,001	$ 78,828	$ 30,096	$ 33,308	$ 37,291	$ 5,653	$ 3,093	$ 3,577	$ 3,783	$ 26,514	$ 9,339	$ 13,390	$ 20,494	$ 34,950	$ 36,364
Total Residential	**Total Residential**	**$ 597,403**	**$ 637,384**	**$ 677,757**	**$ 730,037**	**$ 750,493**	**$ 767,492**	**$ 799,515**	**$ 789,648**	**$ 780,179**	**$ 699,193**	**$ 755,788**	**$ 743,771**	**$ 768,910**	**$ 794,070**	**$ 823,023**	**$ 868,559**	**$ 881,843**	**$ 910,926**	**$ 948,465**	**$ 958,040**	**$ 998,106**
Commercial	Commercial Prescriptive	$2,907,045	$3,028,590	$ 3,148,018	$ 3,253,251	$ 3,364,517	$ 3,479,049	$ 3,578,618	$ 3,674,669	$ 3,782,799	$ 3,902,527	$ 4,014,304	$ 4,134,715	$ 4,246,315	$ 4,346,918	$ 4,422,753	$ 4,492,860	$ 4,559,357	$ 4,620,807	$ 4,683,490	$ 4,753,449	$ 4,952,623
Commercial	Commercial Custom	$ 308,941	$ 382,764	$ 472,530	$ 563,337	$ 666,946	$ 772,009	$ 889,551	$ 1,010,969	$ 1,163,207	$ 1,301,663	$ 1,422,724	$ 1,576,246	$ 1,746,624	$ 1,905,485	$ 2,056,612	$ 1,802,668	$ 1,869,438	$ 1,934,873	$ 2,010,435	$ 2,087,169	$ 2,166,402
Commercial	SBDI	$ 223,316	$ 230,698	$ 258,852	$ 266,256	$ 280,061	$ 287,826	$ 298,930	$ 303,073	$ 308,194	$ 315,773	$ 323,617	$ 331,255	$ 339,093	$ 346,571	$ 352,986	$ 346,278	$ 352,356	$ 358,521	$ 364,684	$ 370,977	$ 394,705
Total Commercial	**Total Commercial**	**$3,439,302**	**$3,642,051**	**$ 3,879,400**	**$ 4,082,843**	**$ 4,311,524**	**$ 4,538,884**	**$ 4,767,099**	**$ 4,988,711**	**$ 5,254,200**	**$ 5,519,962**	**$ 5,760,645**	**$ 6,042,217**	**$ 6,332,032**	**$ 6,598,975**	**$ 6,832,351**	**$ 6,641,806**	**$ 6,781,151**	**$ 6,914,200**	**$ 7,058,610**	**$ 7,211,594**	**$ 7,513,730**
Portfolio	**EE Programs**	**$4,036,705**	**$4,279,436**	**$ 4,557,156**	**$ 4,812,880**	**$ 5,062,016**	**$ 5,306,376**	**$ 5,566,613**	**$ 5,778,359**	**$ 6,034,379**	**$ 6,219,156**	**$ 6,516,433**	**$ 6,785,988**	**$ 7,100,942**	**$ 7,393,045**	**$ 7,655,374**	**$ 7,510,365**	**$ 7,662,994**	**$ 7,825,126**	**$ 8,007,075**	**$ 8,169,634**	**$ 8,511,836**
Residential	Battery Storage DLC	$ 6,076	$ 16,196	$ 33,220	$ 54,357	$ 72,613	$ 97,583	$ 132,352	$ 169,385	$ 204,916	$ 277,744	$ 301,474	$ 321,251	$ 359,037	$ 408,331	$ 427,141	$ 441,012	$ 456,110	$ 473,354	$ 491,983	$ 512,077	$ 522,831
Residential	CPP	$ 66,500	$ 207,713	$ 533,823	$ 742,814	$ 765,692	$ 767,496	$ 774,270	$ 790,532	$ 795,795	$ 897,269	$ 951,871	$ 993,739	$ 1,088,647	$ 1,215,337	$ 1,250,765	$ 1,269,545	$ 1,288,960	$ 1,308,622	$ 1,326,379	$ 1,344,974	$ 1,373,218
Residential	Grid-Interactive WH	$ 2,035	$ 7,760	$ 23,466	$ 37,477	$ 43,283	$ 47,734	$ 52,585	$ 57,105	$ 60,556	$ 63,029	$ 61,384	$ 58,776	$ 59,013	$ 60,262	$ 56,826	$ 53,166	$ 50,003	$ 46,224	$ 43,203	$ 40,514	$ 41,365
Residential	Smart Appliances DLC	$ 30,947	$ 95,396	$ 231,025	$ 310,064	$ 329,571	$ 333,014	$ 340,068	$ 351,114	$ 359,849	$ 395,307	$ 418,136	$ 435,622	$ 470,042	$ 517,055	$ 535,510	$ 548,360	$ 561,513	$ 574,968	$ 588,600	$ 602,529	$ 615,182
Residential	Smart Thermostats DLC	$ 155,320	$ 367,520	$ 682,338	$ 1,149,340	$ 1,463,410	$ 1,929,048	$ 2,485,640	$ 2,548,361	$ 2,575,415	$ 2,910,705	$ 3,097,704	$ 3,245,684	$ 3,567,487	$ 3,999,738	$ 4,139,096	$ 4,193,997	$ 4,257,452	$ 4,323,838	$ 4,390,045	$ 4,466,525	$ 4,560,322
Residential	TOU Opt-Out	$ 151,333	$ 457,177	$ 1,076,985	$ 1,414,923	$ 1,466,742	$ 1,462,089	$ 1,472,244	$ 1,502,553	$ 1,521,301	$ 1,662,963	$ 1,745,302	$ 1,804,412	$ 1,937,428	$ 2,119,237	$ 2,175,270	$ 2,207,061	$ 2,239,809	$ 2,273,343	$ 2,302,486	$ 2,333,316	$ 2,382,315
Commercial	Battery Storage DLC	$ -	$ 1,036	$ 2,313	$ 2,555	$ 4,841	$ 6,212	$ 9,003	$ 10,587	$ 13,417	$ 19,819	$ 21,174	$ 23,969	$ 26,430	$ 31,841	$ 32,995	$ 33,688	$ 36,689	$ 39,801	$ 40,636	$ 43,930	$ 44,853
Commercial	CPP	$ 174,623	$ 550,030	$ 1,426,531	$ 2,014,205	$ 2,109,144	$ 2,151,563	$ 2,213,175	$ 2,266,781	$ 2,286,562	$ 2,585,116	$ 2,748,537	$ 2,875,839	$ 3,156,166	$ 3,522,152	$ 3,624,284	$ 3,672,622	$ 3,719,265	$ 3,766,087	$ 3,810,225	$ 3,852,273	$ 3,933,171
Commercial	Curtailment - Firm	$ 29,060	$ 49,833	$ 68,100	$ 75,889	$ 71,136	$ 73,797	$ 75,465	$ 78,469	$ 78,593	$ 90,024	$ 94,994	$ 98,681	$ 109,886	$ 122,060	$ 127,929	$ 129,340	$ 133,556	$ 135,055	$ 139,356	$ 140,957	$ 143,918
Commercial	Curtailment - Non-Firm	$ 43,590	$ 72,484	$ 101,320	$ 112,027	$ 105,011	$ 108,121	$ 112,320	$ 114,137	$ 116,103	$ 132,035	$ 139,325	$ 146,925	$ 160,051	$ 180,436	$ 187,811	$ 189,882	$ 194,769	$ 199,769	$ 201,923	$ 207,121	$ 211,471
Commercial	Grid-Interactive WH	$ 800	$ 2,808	$ 8,771	$ 13,834	$ 15,411	$ 16,829	$ 18,120	$ 19,361	$ 19,998	$ 20,634	$ 19,834	$ 18,989	$ 18,882	$ 18,923	$ 17,826	$ 16,380	$ 15,485	$ 13,913	$ 12,914	$ 11,867	$ 12,116
Commercial	Smart Thermostats DLC	$ 3,669	$ 8,897	$ 16,434	$ 27,780	$ 35,295	$ 46,604	$ 60,216	$ 61,565	$ 62,406	$ 70,362	$ 75,152	$ 78,546	$ 86,102	$ 96,798	$ 99,872	$ 101,554	$ 103,267	$ 105,018	$ 106,751	$ 109,192	$ 111,485
Commercial	TOU Opt-Out	$ 392,351	$1,194,785	$ 2,845,905	$ 3,804,572	$ 4,017,437	$ 4,085,825	$ 4,206,610	$ 4,306,621	$ 4,368,871	$ 4,787,647	$ 5,034,470	$ 5,214,614	$ 5,607,130	$ 6,127,969	$ 6,283,172	$ 6,358,686	$ 6,431,281	$ 6,503,573	$ 6,568,500	$ 6,629,111	$ 6,768,323
Total Demand Response	**Total Demand Response**	**$1,056,303**	**$3,031,636**	**$ 7,050,231**	**$ 9,758,838**	**$10,499,585**	**$11,125,914**	**$11,952,067**	**$12,276,570**	**$12,463,782**	**$13,912,655**	**$14,709,357**	**$15,317,048**	**$16,646,301**	**$18,420,140**	**$18,958,499**	**$19,215,293**	**$19,488,157**	**$19,763,565**	**$20,023,001**	**$20,294,385**	**$20,720,567**
Total Portfolio	**Total Portfolio**	**$5,093,009**	**$7,311,071**	**$11,607,387**	**$14,572,718**	**$15,561,602**	**$16,432,290**	**$17,518,681**	**$18,054,929**	**$18,498,161**	**$20,131,810**	**$21,225,790**	**$22,103,035**	**$23,747,243**	**$25,813,185**	**$26,613,872**	**$26,725,658**	**$27,151,151**	**$27,588,691**	**$28,030,076**	**$28,464,019**	**$29,232,403**

Table 5-73 – Total Resource Cost Test Benefit-Cost Ratio

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	1.06	1.10	1.14	1.24	1.28	1.31	1.35	1.33	1.38	1.26	1.33	1.35	1.38	1.41	1.44	1.46	1.50	1.52	1.55	1.54	1.57
Residential	Income Eligible Lighting	1.35	1.43	1.52	1.28	1.22	1.24	1.29	1.37	0.53	0.59	0.66	2.85	2.31	1.94	1.50	2.19	2.17	1.45	1.74	2.54	2.60
Total Residential	**Total Residential**	**1.09**	**1.14**	**1.18**	**1.25**	**1.27**	**1.31**	**1.35**	**1.33**	**1.30**	**1.19**	**1.26**	**1.35**	**1.38**	**1.41**	**1.44**	**1.48**	**1.50**	**1.52**	**1.56**	**1.56**	**1.59**
Commercial	Commercial Prescriptive	3.16	3.24	3.33	3.42	3.48	3.58	3.79	3.97	4.13	4.28	4.40	4.40	4.50	4.59	4.67	4.77	4.89	5.01	5.12	5.25	5.37
Commercial	Commercial Custom	1.88	2.07	2.26	2.46	2.62	2.80	2.85	2.93	3.02	3.12	3.31	3.33	3.53	3.66	3.82	4.12	4.18	4.22	4.25	4.28	4.38
Commercial	SBDI	1.04	1.08	1.13	1.94	1.92	1.97	2.02	2.06	2.12	2.19	2.24	2.30	2.35	2.40	2.45	2.43	2.48	2.52	2.57	2.61	2.71
Total Commercial	**Total Commercial**	**2.65**	**2.73**	**2.80**	**3.10**	**3.15**	**3.26**	**3.40**	**3.52**	**3.63**	**3.75**	**3.88**	**3.88**	**4.00**	**4.09**	**4.19**	**4.36**	**4.45**	**4.54**	**4.62**	**4.70**	**4.81**
Portfolio	**EE Programs**	**2.19**	**2.26**	**2.33**	**2.53**	**2.59**	**2.68**	**2.79**	**2.87**	**2.95**	**3.02**	**3.13**	**3.22**	**3.32**	**3.40**	**3.48**	**3.56**	**3.63**	**3.69**	**3.74**	**3.80**	**3.89**
Residential	Battery Storage DLC	0.30	0.63	1.04	1.62	1.81	2.30	2.52	3.14	3.78	4.49	18.74	19.75	23.05	26.29	27.15	27.56	26.45	25.92	24.89	25.22	27.01
Residential	CPP	1.07	1.70	2.18	6.05	12.52	172.92	175.21	129.75	132.07	153.03	157.77	166.44	184.13	229.47	237.99	226.00	227.19	235.48	240.69	246.03	184.10
Residential	Grid-Interactive WH	0.09	0.20	0.35	0.71	1.00	1.63	1.83	2.02	2.18	3.05	2.89	2.70	2.64	2.63	2.42	2.20	2.03	1.82	1.66	1.51	1.51
Residential	Smart Appliances DLC	0.46	0.89	1.28	3.16	5.45	11.30	11.28	10.84	10.89	11.75	12.18	12.43	13.14	14.14	14.33	14.20	14.19	14.25	14.21	14.25	14.25
Residential	Smart Thermostats DLC	4.11	7.82	12.02	15.25	18.73	21.51	24.40	206.68	209.93	231.85	241.28	246.91	265.16	289.45	291.39	353.15	334.93	333.61	319.32	307.23	297.92
Residential	TOU Opt-Out	2.00	3.19	4.16	12.26	27.65	294.52	299.67	229.83	235.60	265.18	269.65	281.81	304.44	380.66	389.06	374.62	378.91	388.78	385.47	381.42	293.54
Commercial	Battery Storage DLC	0.30	0.63	1.04	1.62	1.81	2.30	2.52	3.14	3.78	4.49	18.74	19.75	23.05	26.29	27.15	27.56	26.45	25.92	24.89	25.22	27.01
Commercial	CPP	1.07	1.70	2.18	6.05	12.52	172.92	175.21	129.75	132.07	153.03	157.77	166.44	184.13	229.47	237.99	226.00	227.19	235.48	240.69	246.03	184.10
Commercial	Curtailment - Firm	3.60	6.02	8.04	8.76	8.02	8.13	8.12	8.25	8.08	9.04	9.32	9.46	10.29	11.17	11.43	11.29	11.40	11.26	11.35	11.22	11.19
Commercial	Curtailment - Non-Firm	5.49	8.93	12.19	13.17	12.06	12.13	12.31	12.23	12.15	13.50	13.92	14.34	15.26	16.81	17.10	16.89	16.93	16.96	16.75	16.79	16.75
Commercial	Grid-Interactive WH	0.09	0.20	0.35	0.71	1.00	1.63	1.83	2.02	2.18	3.05	2.89	2.70	2.64	2.63	2.42	2.20	2.03	1.82	1.66	1.51	1.51
Commercial	Smart Thermostats DLC	4.11	7.82	12.02	15.25	18.73	21.51	24.40	206.68	209.93	231.85	241.28	246.91	265.16	289.45	291.39	353.15	334.93	333.61	319.32	307.23	297.92
Commercial	TOU Opt-Out	2.00	3.19	4.16	12.26	27.65	294.52	299.67	229.83	235.60	265.18	269.65	281.81	304.44	380.66	389.06	374.62	378.91	388.78	385.47	381.42	293.54
Total Demand Response	**Total Demand Response**	**1.57**	**2.49**	**3.17**	**8.26**	**15.28**	**42.85**	**42.16**	**59.07**	**59.93**	**67.17**	**91.02**	**93.63**	**101.05**	**114.00**	**115.51**	**115.05**	**113.51**	**113.32**	**111.58**	**110.65**	**103.17**
Total Portfolio	**Total Portfolio**	**1.79**	**2.07**	**2.42**	**4.10**	**5.07**	**6.24**	**6.45**	**6.76**	**6.76**	**7.24**	**7.67**	**7.90**	**8.35**	**8.93**	**9.08**	**9.40**	**9.50**	**9.56**	**9.60**	**9.64**	**9.67**

Table 5-74 – Utility Cost Test Program Costs

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	$ 355,519	$ 362,024	$ 368,400	$ 371,183	$ 376,775	$ 381,226	$ 385,834	$ 386,325	$ 391,622	$ 380,697	$ 388,731	$ 392,424	$ 397,167	$ 401,614	$ 407,036	$ 412,018	$ 417,438	$ 422,021	$ 427,097	$ 428,560	$ 437,363
Residential	Income Eligible Lighting	$ 61,950	$ 65,371	$ 68,093	$ 76,382	$ 71,107	$ 61,429	$ 60,954	$ 59,539	$ 59,643	$ 59,107	$ 59,914	$ 2,079	$ 1,375	$ 1,907	$ 2,668	$ 12,621	$ 4,479	$ 9,679	$ 12,346	$ 14,582	$ 14,861
Total Residential	**Total Residential**	**$ 417,469**	**$ 427,395**	**$ 436,493**	**$ 447,565**	**$ 447,883**	**$ 442,655**	**$ 446,787**	**$ 445,864**	**$ 451,265**	**$ 439,804**	**$ 448,645**	**$ 394,502**	**$ 398,542**	**$ 403,521**	**$ 409,704**	**$ 424,639**	**$ 421,916**	**$ 431,699**	**$ 439,443**	**$ 443,143**	**$ 452,223**
Commercial	Commercial Prescriptive	$ 625,441	$ 635,761	$ 644,016	$ 648,337	$ 658,631	$ 662,158	$ 643,124	$ 630,731	$ 623,411	$ 620,827	$ 620,888	$ 639,407	$ 643,029	$ 645,723	$ 645,255	$ 641,897	$ 635,763	$ 628,431	$ 622,423	$ 617,201	$ 628,648
Commercial	Commercial Custom	$ 118,706	$ 133,355	$ 150,688	$ 164,904	$ 183,370	$ 198,286	$ 224,494	$ 248,242	$ 277,306	$ 300,627	$ 309,722	$ 341,145	$ 356,285	$ 374,677	$ 388,301	$ 314,558	$ 322,100	$ 330,169	$ 340,404	$ 350,887	$ 356,377
Commercial	SBDI	$ 232,605	$ 232,593	$ 246,476	$ 140,804	$ 149,301	$ 149,281	$ 151,343	$ 150,662	$ 148,661	$ 147,812	$ 147,720	$ 147,678	$ 147,632	$ 147,587	$ 147,538	$ 145,834	$ 145,785	$ 145,732	$ 145,654	$ 145,598	$ 148,745
Total Commercial	**Total Commercial**	**$ 976,751**	**$1,001,709**	**$ 1,041,179**	**$ 954,045**	**$ 991,302**	**$ 1,009,724**	**$ 1,018,961**	**$ 1,029,635**	**$ 1,049,377**	**$ 1,069,266**	**$ 1,078,330**	**$ 1,128,230**	**$ 1,146,946**	**$ 1,167,987**	**$ 1,181,094**	**$ 1,102,289**	**$ 1,103,648**	**$ 1,104,332**	**$ 1,108,481**	**$ 1,113,686**	**$ 1,133,771**
Portfolio	**EE Programs**	**$1,394,220**	**$1,429,104**	**$ 1,477,672**	**$ 1,401,610**	**$ 1,439,184**	**$ 1,452,379**	**$ 1,465,749**	**$ 1,475,499**	**$ 1,500,642**	**$ 1,509,070**	**$ 1,526,976**	**$ 1,522,732**	**$ 1,545,488**	**$ 1,571,507**	**$ 1,590,798**	**$ 1,526,929**	**$ 1,525,565**	**$ 1,536,032**	**$ 1,547,924**	**$ 1,556,829**	**$ 1,585,994**
Residential	Battery Storage DLC	$ 34,157	$ 63,589	$ 102,759	$ 139,347	$ 193,349	$ 247,174	$ 327,157	$ 402,842	$ 479,968	$ 581,894	$ 554,524	$ 574,996	$ 595,156	$ 615,620	$ 635,695	$ 657,650	$ 682,554	$ 710,456	$ 740,937	$ 772,815	$ 789,519
Residential	CPP	$ 191,366	$ 380,099	$ 762,428	$ 383,358	$ 189,798	$ 12,044	$ 12,327	$ 17,946	$ 17,705	$ 17,181	$ 17,853	$ 17,640	$ 17,478	$ 16,149	$ 16,132	$ 17,672	$ 17,999	$ 17,636	$ 17,515	$ 17,703	$ 21,778
Residential	Grid-Interactive WH	$ 29,658	$ 47,474	$ 86,262	$ 71,883	$ 62,308	$ 46,615	$ 46,898	$ 47,263	$ 47,560	$ 37,682	$ 37,345	$ 37,071	$ 36,871	$ 36,709	$ 36,629	$ 36,675	$ 36,815	$ 36,863	$ 37,053	$ 37,314	$ 38,189
Residential	Smart Appliances DLC	$ 77,430	$ 139,054	$ 252,882	$ 190,270	$ 163,010	$ 133,137	$ 134,542	$ 139,615	$ 143,203	$ 146,709	$ 150,386	$ 154,107	$ 157,982	$ 161,906	$ 165,916	$ 170,542	$ 175,028	$ 179,329	$ 184,126	$ 188,673	$ 193,026
Residential	Smart Thermostats DLC	$ 53,086	$ 82,196	$ 117,177	$ 170,838	$ 210,701	$ 265,912	$ 328,876	$ 245,931	$ 252,815	$ 260,198	$ 267,767	$ 275,535	$ 283,609	$ 291,893	$ 300,462	$ 304,598	$ 312,453	$ 319,930	$ 328,462	$ 337,634	$ 345,946
Residential	TOU Opt-Out	$ 225,922	$ 429,428	$ 778,735	$ 346,334	$ 156,856	$ 13,503	$ 13,820	$ 18,904	$ 18,648	$ 18,090	$ 18,913	$ 18,713	$ 18,672	$ 17,148	$ 17,478	$ 18,873	$ 19,127	$ 18,943	$ 19,314	$ 19,724	$ 23,346
Commercial	Battery Storage DLC	$ 514	$ 1,553	$ 2,622	$ 2,691	$ 4,774	$ 5,938	$ 8,270	$ 9,484	$ 11,743	$ 15,343	$ 14,534	$ 15,946	$ 16,260	$ 17,727	$ 18,147	$ 18,560	$ 20,277	$ 22,051	$ 22,648	$ 24,501	$ 24,985
Commercial	CPP	$ 33,112	$ 66,418	$ 135,089	$ 72,331	$ 39,800	$ 4,837	$ 4,723	$ 5,616	$ 5,634	$ 5,575	$ 5,602	$ 5,609	$ 5,575	$ 4,496	$ 4,352	$ 4,196	$ 4,046	$ 3,914	$ 3,826	$ 3,422	$ 7,045
Commercial	Curtailment - Firm	$ 9,456	$ 10,553	$ 11,321	$ 11,613	$ 11,842	$ 12,148	$ 12,389	$ 12,710	$ 12,965	$ 13,303	$ 13,574	$ 13,852	$ 14,216	$ 14,513	$ 14,895	$ 15,207	$ 15,607	$ 15,934	$ 16,352	$ 16,696	$ 17,049
Commercial	Curtailment - Non-Firm	$ 9,995	$ 11,438	$ 12,559	$ 12,859	$ 13,096	$ 13,410	$ 13,733	$ 13,991	$ 14,331	$ 14,681	$ 14,964	$ 15,333	$ 15,636	$ 16,026	$ 16,426	$ 16,756	$ 17,174	$ 17,603	$ 17,958	$ 18,405	$ 18,780
Commercial	Grid-Interactive WH	$ 4,136	$ 6,516	$ 11,645	$ 9,472	$ 7,987	$ 5,826	$ 5,706	$ 5,673	$ 5,598	$ 4,962	$ 4,913	$ 4,893	$ 4,870	$ 4,843	$ 4,848	$ 4,851	$ 4,889	$ 4,887	$ 4,922	$ 4,956	$ 5,073
Commercial	Smart Thermostats DLC	$ 984	$ 1,613	$ 2,360	$ 3,522	$ 4,378	$ 5,579	$ 6,963	$ 5,166	$ 5,352	$ 5,509	$ 5,706	$ 5,872	$ 6,046	$ 6,257	$ 6,442	$ 6,598	$ 6,799	$ 6,988	$ 7,202	$ 7,458	$ 7,637
Commercial	TOU Opt-Out	$ 46,107	$ 89,095	$ 164,954	$ 79,457	$ 41,452	$ 5,334	$ 5,130	$ 6,372	$ 6,352	$ 6,236	$ 6,229	$ 6,194	$ 6,109	$ 4,518	$ 4,262	$ 3,992	$ 3,757	$ 3,632	$ 3,699	$ 3,774	$ 7,827
Total Demand Response	**Total Demand Response**	**$ 715,923**	**$1,329,026**	**$ 2,440,793**	**$ 1,493,975**	**$ 1,099,353**	**$ 771,457**	**$ 920,535**	**$ 931,514**	**$ 1,021,874**	**$ 1,127,363**	**$ 1,112,310**	**$ 1,145,761**	**$ 1,178,482**	**$ 1,207,804**	**$ 1,241,686**	**$ 1,276,170**	**$ 1,316,524**	**$ 1,358,166**	**$ 1,404,014**	**$ 1,453,074**	**$ 1,500,200**
Total Portfolio Costs	**Total Portfolio Costs**	**$ 321,055**	**$ 425,077**	**$ 608,607**	**$ 466,374**	**$ 426,118**	**$ 393,664**	**$ 436,681**	**$ 452,341**	**$ 482,737**	**$ 515,305**	**$ 519,839**	**$ 528,463**	**$ 541,024**	**$ 553,698**	**$ 565,853**	**$ 565,659**	**$ 576,285**	**$ 589,383**	**$ 603,573**	**$ 618,447**	**$ 633,806**
Total Portfolio	**Total Portfolio**	**$2,431,199**	**$3,183,207**	**$ 4,527,072**	**$ 3,361,959**	**$ 2,964,655**	**$ 2,617,501**	**$ 2,822,965**	**$ 2,859,353**	**$ 3,005,253**	**$ 3,151,737**	**$ 3,159,125**	**$ 3,196,957**	**$ 3,264,994**	**$ 3,333,009**	**$ 3,398,337**	**$ 3,368,757**	**$ 3,418,374**	**$ 3,483,581**	**$ 3,555,511**	**$ 3,628,350**	**$ 3,720,001**

Table 5-75 – Utility Cost Test Program Benefits

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	$ 516,635	$ 547,071	$ 577,998	$ 638,306	$ 667,175	$ 694,139	$ 723,514	$ 710,819	$ 750,083	$ 665,885	$ 718,497	$ 738,118	$ 765,817	$ 790,493	$ 819,239	$ 842,045	$ 872,503	$ 897,535	$ 927,972	$ 923,090	$ 961,741
Residential	Income Eligible Lighting	$ 80,769	$ 90,314	$ 99,759	$ 91,731	$ 83,318	$ 73,353	$ 76,001	$ 78,828	$ 30,096	$ 33,308	$ 37,291	$ 5,653	$ 3,093	$ 3,577	$ 3,783	$ 26,514	$ 9,339	$ 13,390	$ 20,494	$ 34,950	$ 36,364
Total Residential	**Total Residential**	**$ 597,403**	**$ 637,384**	**$ 677,757**	**$ 730,037**	**$ 750,493**	**$ 767,492**	**$ 799,515**	**$ 789,648**	**$ 780,179**	**$ 699,193**	**$ 755,788**	**$ 743,771**	**$ 768,910**	**$ 794,070**	**$ 823,023**	**$ 868,559**	**$ 881,843**	**$ 910,926**	**$ 948,465**	**$ 958,040**	**$ 998,106**
Commercial	Commercial Prescriptive	$2,907,045	$3,028,590	$ 3,148,018	$ 3,253,251	$ 3,364,517	$ 3,479,049	$ 3,578,618	$ 3,674,669	$ 3,782,799	$ 3,902,527	$ 4,014,304	$ 4,134,715	$ 4,246,315	$ 4,346,918	$ 4,422,753	$ 4,492,860	$ 4,559,357	$ 4,620,807	$ 4,683,490	$ 4,753,449	$ 4,952,623
Commercial	Commercial Custom	$ 308,941	$ 382,764	$ 472,530	$ 563,337	$ 666,946	$ 772,009	$ 889,551	$ 1,010,969	$ 1,163,207	$ 1,301,663	$ 1,422,724	$ 1,576,246	$ 1,746,624	$ 1,905,485	$ 2,056,612	$ 1,802,668	$ 1,869,438	$ 1,934,873	$ 2,010,435	$ 2,087,169	$ 2,166,402
Commercial	SBDI	$ 223,316	$ 230,698	$ 258,852	$ 266,256	$ 280,061	$ 287,826	$ 298,930	$ 303,073	$ 308,194	$ 315,773	$ 323,617	$ 331,255	$ 339,093	$ 346,571	$ 352,986	$ 346,278	$ 352,356	$ 358,521	$ 364,684	$ 370,977	$ 394,705
Total Commercial	**Total Commercial**	**$3,439,302**	**$3,642,051**	**$ 3,879,400**	**$ 4,082,843**	**$ 4,311,524**	**$ 4,538,884**	**$ 4,767,099**	**$ 4,988,711**	**$ 5,254,200**	**$ 5,519,962**	**$ 5,760,645**	**$ 6,042,217**	**$ 6,332,032**	**$ 6,598,975**	**$ 6,832,351**	**$ 6,641,806**	**$ 6,781,151**	**$ 6,914,200**	**$ 7,058,610**	**$ 7,211,594**	**$ 7,513,730**
Portfolio	**EE Programs**	**$4,036,705**	**$4,279,436**	**$ 4,557,156**	**$ 4,812,880**	**$ 5,062,016**	**$ 5,306,376**	**$ 5,566,613**	**$ 5,778,359**	**$ 6,034,379**	**$ 6,219,156**	**$ 6,516,433**	**$ 6,785,988**	**$ 7,100,942**	**$ 7,393,045**	**$ 7,655,374**	**$ 7,510,365**	**$ 7,662,994**	**$ 7,825,126**	**$ 8,007,075**	**$ 8,169,634**	**$ 8,511,836**
Residential	Battery Storage DLC	$ 6,076	$ 16,196	$ 33,220	$ 54,357	$ 72,613	$ 97,583	$ 132,352	$ 169,385	$ 204,916	$ 277,744	$ 301,474	$ 321,251	$ 359,037	$ 408,331	$ 427,141	$ 441,012	$ 456,110	$ 473,354	$ 491,983	$ 512,077	$ 522,831
Residential	CPP	$ 66,500	$ 207,713	$ 533,823	$ 742,814	$ 765,692	$ 767,496	$ 774,270	$ 790,532	$ 795,795	$ 897,269	$ 951,871	$ 993,739	$ 1,088,647	$ 1,215,337	$ 1,250,765	$ 1,269,545	$ 1,288,960	$ 1,308,622	$ 1,326,379	$ 1,344,974	$ 1,373,218
Residential	Grid-Interactive WH	$ 2,035	$ 7,760	$ 23,466	$ 37,477	$ 43,283	$ 47,734	$ 52,585	$ 57,105	$ 60,556	$ 63,029	$ 61,384	$ 58,776	$ 59,013	$ 60,262	$ 56,826	$ 53,166	$ 50,003	$ 46,224	$ 43,203	$ 40,514	$ 41,365
Residential	Smart Appliances DLC	$ 30,947	$ 95,396	$ 231,025	$ 310,064	$ 329,571	$ 333,014	$ 340,068	$ 351,114	$ 359,849	$ 395,307	$ 418,136	$ 435,622	$ 470,042	$ 517,055	$ 535,510	$ 548,360	$ 561,513	$ 574,968	$ 588,600	$ 602,529	$ 615,182
Residential	Smart Thermostats DLC	$ 155,320	$ 367,520	$ 682,338	$ 1,149,340	$ 1,463,410	$ 1,929,048	$ 2,485,640	$ 2,548,361	$ 2,575,415	$ 2,910,705	$ 3,097,704	$ 3,245,684	$ 3,567,487	$ 3,999,738	$ 4,139,096	$ 4,193,997	$ 4,257,452	$ 4,323,838	$ 4,390,045	$ 4,466,525	$ 4,560,322
Residential	TOU Opt-Out	$ 151,333	$ 457,177	$ 1,076,985	$ 1,414,923	$ 1,466,742	$ 1,462,089	$ 1,472,244	$ 1,502,553	$ 1,521,301	$ 1,662,963	$ 1,745,302	$ 1,804,412	$ 1,937,428	$ 2,119,237	$ 2,175,270	$ 2,207,061	$ 2,239,809	$ 2,273,343	$ 2,302,486	$ 2,333,316	$ 2,382,315
Commercial	Battery Storage DLC	$ -	$ 1,036	$ 2,313	$ 2,555	$ 4,841	$ 6,212	$ 9,003	$ 10,587	$ 13,417	$ 19,819	$ 21,174	$ 23,969	$ 26,430	$ 31,841	$ 32,995	$ 33,688	$ 36,689	$ 39,801	$ 40,636	$ 43,930	$ 44,853
Commercial	CPP	$ 174,623	$ 550,030	$ 1,426,531	$ 2,014,205	$ 2,109,144	$ 2,151,563	$ 2,213,175	$ 2,266,781	$ 2,286,562	$ 2,585,116	$ 2,748,537	$ 2,875,839	$ 3,156,166	$ 3,522,152	$ 3,624,284	$ 3,672,622	$ 3,719,265	$ 3,766,087	$ 3,810,225	$ 3,852,273	$ 3,933,171
Commercial	Curtailment - Firm	$ 29,060	$ 49,833	$ 68,100	$ 75,889	$ 71,136	$ 73,797	$ 75,465	$ 78,469	$ 78,593	$ 90,024	$ 94,994	$ 98,681	$ 109,886	$ 122,060	$ 127,929	$ 129,340	$ 133,556	$ 135,055	$ 139,356	$ 140,957	$ 143,918
Commercial	Curtailment - Non-Firm	$ 43,590	$ 72,484	$ 101,320	$ 112,027	$ 105,011	$ 108,121	$ 112,320	$ 114,137	$ 116,103	$ 132,035	$ 139,325	$ 146,925	$ 160,051	$ 180,436	$ 187,811	$ 189,882	$ 194,769	$ 199,769	$ 201,923	$ 207,121	$ 211,471
Commercial	Grid-Interactive WH	$ 800	$ 2,808	$ 8,771	$ 13,834	$ 15,411	$ 16,829	$ 18,120	$ 19,361	$ 19,998	$ 20,634	$ 19,834	$ 18,989	$ 18,882	$ 18,923	$ 17,826	$ 16,380	$ 15,485	$ 13,913	$ 12,914	$ 11,867	$ 12,116
Commercial	Smart Thermostats DLC	$ 3,669	$ 8,897	$ 16,434	$ 27,780	$ 35,295	$ 46,604	$ 60,216	$ 61,565	$ 62,406	$ 70,362	$ 75,152	$ 78,546	$ 86,102	$ 96,798	$ 99,872	$ 101,554	$ 103,267	$ 105,018	$ 106,751	$ 109,192	$ 111,485
Commercial	TOU Opt-Out	$ 392,351	$1,194,785	$ 2,845,905	$ 3,804,572	$ 4,017,437	$ 4,085,825	$ 4,206,610	$ 4,306,621	$ 4,368,871	$ 4,787,647	$ 5,034,470	$ 5,214,614	$ 5,607,130	$ 6,127,969	$ 6,283,172	$ 6,358,686	$ 6,431,281	$ 6,503,573	$ 6,568,500	$ 6,629,111	$ 6,768,323
Total Demand Response	**Total Demand Response**	**$1,056,303**	**$3,031,636**	**$ 7,050,231**	**$ 9,759,838**	**$10,499,585**	**$11,125,914**	**$11,952,067**	**$12,276,570**	**$12,463,782**	**$13,912,655**	**$14,709,357**	**$15,317,048**	**$16,646,301**	**$18,420,140**	**$18,958,499**	**$19,215,293**	**$19,488,157**	**$19,763,565**	**$20,023,001**	**$20,294,385**	**$20,720,567**
Total Portfolio	**Total Portfolio**	**$5,093,009**	**$7,311,071**	**$11,607,387**	**$14,572,718**	**$15,561,602**	**$16,432,290**	**$17,518,681**	**$18,054,929**	**$18,498,161**	**$20,131,810**	**$21,225,790**	**$22,103,035**	**$23,747,243**	**$25,813,185**	**$26,613,872**	**$26,725,658**	**$27,151,151**	**$27,588,691**	**$28,030,076**	**$28,464,019**	**$29,232,403**

Table 5-76 – Utility Cost Test Benefit-Cost Ratio

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	1.45	1.51	1.57	1.72	1.77	1.82	1.88	1.84	1.92	1.75	1.85	1.88	1.93	1.97	2.01	2.04	2.09	2.13	2.17	2.15	2.20
Residential	Income Eligible Lighting	1.30	1.38	1.47	1.20	1.17	1.19	1.25	1.32	0.50	0.56	0.62	2.72	2.25	1.88	1.42	2.10	2.09	1.38	1.66	2.40	2.45
Total Residential	**Total Residential**	**1.43**	**1.49**	**1.55**	**1.63**	**1.68**	**1.73**	**1.79**	**1.77**	**1.73**	**1.59**	**1.68**	**1.89**	**1.93**	**1.97**	**2.01**	**2.05**	**2.09**	**2.11**	**2.16**	**2.16**	**2.21**
Commercial	Commercial Prescriptive	4.65	4.76	4.89	5.02	5.11	5.25	5.56	5.83	6.07	6.29	6.47	6.47	6.60	6.73	6.85	7.00	7.17	7.35	7.52	7.70	7.88
Commercial	Commercial Custom	2.60	2.87	3.14	3.42	3.64	3.89	3.96	4.07	4.19	4.33	4.59	4.62	4.90	5.09	5.30	5.73	5.80	5.86	5.91	5.95	6.08
Commercial	SBDI	0.96	0.99	1.05	1.89	1.88	1.93	1.98	2.01	2.07	2.14	2.19	2.24	2.30	2.35	2.39	2.37	2.42	2.46	2.50	2.55	2.65
Total Commercial	**Total Commercial**	**3.52**	**3.64**	**3.73**	**8.84**	**9.57**	**10.38**	**10.65**	**10.88**	**10.98**	**11.65**	**12.15**	**12.12**	**12.75**	**13.51**	**13.76**	**14.62**	**14.81**	**14.99**	**15.14**	**15.26**	**15.33**
Portfolio	**EE Programs**	**2.90**	**2.99**	**3.08**	**4.33**	**5.25**	**6.27**	**6.20**	**6.31**	**6.15**	**6.38**	**6.72**	**6.91**	**7.27**	**7.74**	**7.83**	**7.93**	**7.94**	**7.92**	**7.88**	**7.84**	**7.85**
Residential	Battery Storage DLC	0.18	0.26	0.34	0.40	0.39	0.41	0.42	0.44	0.44	0.50	0.57	0.58	0.63	0.69	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Residential	CPP	1.07	1.70	2.18	6.05	12.52	172.92	175.21	129.75	132.07	153.03	157.77	166.44	184.13	229.47	237.99	226.00	227.19	235.48	240.69	246.03	184.10
Residential	Grid-Interactive WH	0.08	0.20	0.33	0.63	0.83	1.23	1.34	1.44	1.52	1.96	1.92	1.85	1.87	1.91	1.80	1.67	1.57	1.44	1.34	1.24	1.24
Residential	Smart Appliances DLC	0.40	0.69	0.91	1.63	2.02	2.50	2.53	2.51	2.51	2.69	2.78	2.83	2.98	3.19	3.23	3.22	3.21	3.21	3.20	3.19	3.19
Residential	Smart Thermostats DLC	2.94	4.49	5.85	6.75	6.97	7.28	7.58	10.39	10.22	11.22	11.60	11.81	12.61	13.74	13.81	13.80	13.66	13.55	13.40	13.26	13.21
Residential	TOU Opt-Out	2.00	3.19	4.16	12.26	27.65	294.52	299.67	229.83	235.60	265.18	269.65	281.81	304.44	380.66	389.06	374.62	378.91	388.78	385.47	381.42	293.54
Commercial	Battery Storage DLC	0.18	0.26	0.34	0.40	0.39	0.41	0.42	0.44	0.44	0.50	0.57	0.58	0.63	0.69	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Commercial	CPP	1.07	1.70	2.18	6.05	12.52	172.92	175.21	129.75	132.07	153.03	157.77	166.44	184.13	229.47	237.99	226.00	227.19	235.48	240.69	246.03	184.10
Commercial	Curtailment - Firm	3.07	4.72	6.02	6.53	6.01	6.07	6.09	6.17	6.06	6.77	7.00	7.12	7.73	8.41	8.59	8.51	8.56	8.48	8.52	8.44	8.44
Commercial	Curtailment - Non-Firm	4.36	6.34	8.07	8.71	8.02	8.06	8.18	8.16	8.10	8.99	9.31	9.58	10.24	11.26	11.43	11.33	11.34	11.35	11.24	11.25	11.26
Commercial	Grid-Interactive WH	0.08	0.20	0.33	0.63	0.83	1.23	1.34	1.44	1.52	1.96	1.92	1.85	1.87	1.91	1.80	1.67	1.57	1.44	1.34	1.24	1.24
Commercial	Smart Thermostats DLC	2.94	4.49	5.85	6.75	6.97	7.28	7.58	10.39	10.22	11.22	11.60	11.81	12.61	13.74	13.81	13.80	13.66	13.55	13.40	13.26	13.21
Commercial	TOU Opt-Out	2.00	3.19	4.16	12.26	27.65	294.52	299.67	229.83	235.60	265.18	269.65	281.81	304.44	380.66	389.06	374.62	378.91	388.78	385.47	381.42	293.54
Total Demand Response	**Total Demand Response**	**1.48**	**2.28**	**2.89**	**6.53**	**9.55**	**14.42**	**12.98**	**13.18**	**12.20**	**12.34**	**13.22**	**13.37**	**14.13**	**15.25**	**15.27**	**15.06**	**14.80**	**14.55**	**14.26**	**13.97**	**13.81**
Total Portfolio	**Total Portfolio**	**2.09**	**2.30**	**2.56**	**4.33**	**5.25**	**6.28**	**6.21**	**6.31**	**6.16**	**6.39**	**6.72**	**6.91**	**7.27**	**7.74**	**7.83**	**7.93**	**7.94**	**7.92**	**7.88**	**7.84**	**7.86**

(F) If the utility calculates values for other tests to assist in the design of demand-side programs or demand-side rates, the utility shall describe and document the tests and provide the results of those tests.

Three other benefit-cost tests were utilized to analyze cost-effectiveness from different perspectives:

- **Participant Cost Test** quantifies the benefits and costs to the customer due to program participation.
- **Ratepayer Impact Measure ("RIM") Cost Test** measures what happens to a customer's rates due to changes in utility revenues and operating costs.
- **Societal Cost Test** measures the effects of a program on society as a whole.

Table 5-77 – Participant Cost Test Benefit-Cost Ratio

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	1.25	1.25	1.25	1.29	1.29	1.29	1.29	1.27	1.27	1.25	1.25	1.25	1.24	1.24	1.24	1.24	1.24	1.24	1.23	1.23	1.23
Residential	Income Eligible Lighting	1.16	1.16	1.15	1.27	1.16	1.14	1.14	1.15	1.23	1.22	1.23	1.19	1.11	1.14	1.24	1.18	1.16	1.20	1.20	1.26	1.26
Total Residential	**Total Residential**	**1.24**	**1.25**	**1.25**	**1.29**	**1.29**	**1.29**	**1.29**	**1.27**	**1.27**	**1.24**	**1.25**	**1.25**	**1.24**	**1.24**	**1.24**	**1.24**	**1.24**	**1.24**	**1.23**	**1.23**	**1.23**
Commercial	Commercial Prescriptive	2.05	2.04	2.03	2.02	2.01	2.01	2.04	2.05	2.06	2.06	2.06	2.02	2.01	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.01
Commercial	Commercial Custom	1.67	1.72	1.78	1.84	1.88	1.92	1.90	1.89	1.89	1.88	1.91	1.88	1.92	1.94	1.96	2.03	2.02	2.01	1.99	1.98	1.98
Commercial	SBDI	1.92	1.92	1.94	2.41	2.34	2.35	2.34	2.33	2.34	2.34	2.34	2.34	2.34	2.34	2.33	2.30	2.29	2.29	2.28	2.28	2.30
Total Commercial	**Total Commercial**	**1.99**	**1.98**	**1.98**	**2.82**	**2.86**	**2.84**	**2.87**	**2.87**	**2.87**	**2.85**	**2.85**	**2.77**	**2.76**	**2.75**	**2.74**	**2.80**	**2.80**	**2.79**	**2.78**	**2.76**	**2.76**
Portfolio	**EE Programs**	**1.77**	**1.77**	**1.77**	**1.81**	**1.81**	**1.81**	**1.82**	**1.82**	**1.82**	**1.82**	**1.82**	**1.80**	**1.80**	**1.80**	**1.80**	**1.80**	**1.80**	**1.80**	**1.79**	**1.79**	**1.79**
Total Demand Response	**Total Demand Response**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Total Portfolio	**Total Portfolio**	**1.90**	**2.14**	**2.55**	**2.83**	**2.95**	**2.99**	**3.09**	**3.14**	**3.18**	**3.24**	**3.24**	**3.20**	**3.20**	**3.20**	**3.20**	**3.27**	**3.28**	**3.29**	**3.29**	**3.30**	**3.29**

Table 5-78 – Ratepayer Impact Cost Test Benefit-Cost Ratio

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	0.52	0.54	0.56	0.60	0.62	0.64	0.65	0.65	0.67	0.62	0.65	0.67	0.68	0.70	0.71	0.72	0.74	0.75	0.77	0.76	0.78
Residential	Income Eligible Lighting	1.05	1.11	1.18	0.98	0.94	0.96	1.00	1.06	0.41	0.46	0.51	2.20	1.80	1.50	1.16	1.70	1.68	1.12	1.35	1.96	2.00
Total Residential	**Total Residential**	**0.56**	**0.59**	**0.61**	**0.63**	**0.64**	**0.66**	**0.68**	**0.67**	**0.66**	**0.61**	**0.64**	**0.67**	**0.68**	**0.70**	**0.71**	**0.74**	**0.74**	**0.76**	**0.78**	**0.78**	**0.80**
Commercial	Commercial Prescriptive	1.18	1.22	1.25	1.29	1.32	1.35	1.42	1.48	1.54	1.59	1.64	1.66	1.70	1.74	1.77	1.81	1.85	1.90	1.94	1.99	2.03
Commercial	Commercial Custom	0.85	0.93	0.99	1.06	1.12	1.18	1.21	1.24	1.28	1.33	1.40	1.42	1.48	1.53	1.59	1.68	1.70	1.73	1.75	1.77	1.81
Commercial	SBDI	0.45	0.46	0.48	0.72	0.72	0.74	0.76	0.78	0.80	0.83	0.85	0.87	0.89	0.91	0.93	0.93	0.95	0.97	0.99	1.00	1.04
Total Commercial	**Total Commercial**	**1.04**	**1.07**	**1.10**	**1.19**	**1.22**	**1.26**	**1.31**	**1.35**	**1.40**	**1.45**	**1.50**	**1.52**	**1.56**	**1.60**	**1.64**	**1.69**	**1.73**	**1.76**	**1.80**	**1.83**	**1.87**
Portfolio	**EE Programs**	**0.92**	**0.95**	**0.98**	**1.05**	**1.08**	**1.11**	**1.15**	**1.19**	**1.22**	**1.25**	**1.30**	**1.33**	**1.37**	**1.40**	**1.44**	**1.47**	**1.50**	**1.53**	**1.55**	**1.58**	**1.62**
Residential	Battery Storage DLC	0.17	0.26	0.34	0.40	0.39	0.41	0.42	0.43	0.44	0.50	0.56	0.58	0.63	0.69	0.70	0.70	0.70	0.70	0.70	0.70	0.69
Residential	CPP	1.06	1.66	2.13	5.68	10.94	58.90	59.74	54.03	54.46	62.27	65.26	68.91	76.02	88.22	91.11	90.43	91.75	94.25	96.27	98.34	87.64
Residential	Grid-Interactive WH	0.08	0.20	0.33	0.62	0.82	1.21	1.32	1.41	1.48	1.91	1.88	1.81	1.83	1.87	1.77	1.65	1.55	1.42	1.32	1.23	1.22
Residential	Smart Appliances DLC	0.36	0.58	0.74	1.17	1.34	1.55	1.57	1.58	1.58	1.71	1.77	1.82	1.93	2.08	2.11	2.12	2.13	2.15	2.16	2.17	2.18
Residential	Smart Thermostats DLC	2.73	4.03	5.15	5.91	6.02	6.27	6.51	8.51	8.40	9.27	9.62	9.86	10.58	11.55	11.66	11.69	11.62	11.58	11.50	11.43	11.43
Residential	TOU Opt-Out	1.35	1.82	2.17	3.50	4.01	4.74	4.82	4.90	4.93	5.42	5.68	5.95	6.42	6.99	7.18	7.32	7.48	7.64	7.79	7.95	8.06
Commercial	Battery Storage DLC	0.17	0.26	0.34	0.40	0.39	0.41	0.42	0.43	0.44	0.50	0.56	0.58	0.63	0.69	0.70	0.70	0.70	0.70	0.70	0.70	0.69
Commercial	CPP	1.06	1.66	2.13	5.68	10.94	58.90	59.74	54.03	54.46	62.27	65.26	68.91	76.02	88.22	91.11	90.43	91.75	94.25	96.27	98.34	87.64
Commercial	Curtailment - Firm	2.80	4.13	5.16	5.61	5.17	5.24	5.26	5.34	5.26	5.88	6.10	6.24	6.78	7.39	7.55	7.51	7.56	7.52	7.57	7.53	7.54
Commercial	Curtailment - Non-Firm	3.84	5.32	6.59	7.14	6.59	6.65	6.75	6.76	6.72	7.49	7.78	8.04	8.63	9.50	9.67	9.62	9.66	9.70	9.65	9.68	9.72
Commercial	Grid-Interactive WH	0.08	0.20	0.33	0.62	0.82	1.21	1.32	1.41	1.48	1.91	1.88	1.81	1.83	1.87	1.77	1.65	1.55	1.42	1.32	1.23	1.22
Commercial	Smart Thermostats DLC	2.73	4.03	5.15	5.91	6.02	6.27	6.51	8.51	8.40	9.27	9.62	9.86	10.58	11.55	11.66	11.69	11.62	11.58	11.50	11.43	11.43
Commercial	TOU Opt-Out	1.35	1.82	2.17	3.50	4.01	4.74	4.82	4.90	4.93	5.42	5.68	5.95	6.42	6.99	7.18	7.32	7.48	7.64	7.79	7.95	8.06
Total Demand Response	**Total Demand Response**	**1.22**	**1.72**	**2.07**	**3.62**	**4.33**	**5.33**	**5.30**	**5.40**	**5.25**	**5.62**	**5.97**	**6.17**	**6.63**	**7.22**	**7.34**	**7.37**	**7.39**	**7.40**	**7.41**	**7.40**	**7.43**
Total Portfolio	**Total Portfolio**	**0.91**	**1.09**	**1.34**	**1.88**	**2.06**	**2.26**	**2.33**	**2.38**	**2.37**	**2.53**	**2.65**	**2.73**	**2.89**	**3.09**	**3.14**	**3.23**	**3.26**	**3.29**	**3.31**	**3.34**	**3.36**

Table 5-79 – Societal Cost Test Benefit-Cost Ratio

Sector	Bundles	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Residential	Residential Prescriptive	1.06	1.10	1.14	1.24	1.28	1.31	1.35	1.33	1.38	1.26	1.33	1.35	1.38	1.41	1.44	1.46	1.50	1.52	1.55	1.54	1.57
Residential	Income Eligible Lighting	1.35	1.43	1.52	1.28	1.22	1.24	1.29	1.37	0.53	0.59	0.66	2.85	2.31	1.94	1.50	2.19	2.17	1.45	1.74	2.54	2.60
Total Residential	**Total Residential**	**1.09**	**1.14**	**1.18**	**1.25**	**1.27**	**1.31**	**1.35**	**1.33**	**1.30**	**1.19**	**1.26**	**1.35**	**1.38**	**1.41**	**1.44**	**1.48**	**1.50**	**1.52**	**1.56**	**1.56**	**1.59**
Commercial	Commercial Prescriptive	3.16	3.24	3.33	3.42	3.48	3.58	3.79	3.97	4.13	4.28	4.40	4.40	4.50	4.59	4.67	4.77	4.89	5.01	5.12	5.25	5.37
Commercial	Commercial Custom	1.88	2.07	2.26	2.46	2.62	2.80	2.85	2.93	3.02	3.12	3.31	3.33	3.53	3.66	3.82	4.12	4.18	4.22	4.25	4.28	4.38
Commercial	SBDI	1.04	1.08	1.13	1.94	1.92	1.97	2.02	2.06	2.12	2.19	2.24	2.30	2.35	2.40	2.45	2.43	2.48	2.52	2.57	2.61	2.71
Total Commercial	**Total Commercial**	**2.65**	**2.73**	**2.80**	**3.10**	**3.15**	**3.26**	**3.40**	**3.52**	**3.63**	**3.75**	**3.88**	**3.88**	**4.00**	**4.09**	**4.19**	**4.36**	**4.45**	**4.54**	**4.62**	**4.70**	**4.81**
Portfolio	**EE Programs**	**2.19**	**2.26**	**2.33**	**2.53**	**2.59**	**2.68**	**2.79**	**2.87**	**2.95**	**3.02**	**3.13**	**3.22**	**3.32**	**3.40**	**3.48**	**3.56**	**3.63**	**3.69**	**3.74**	**3.80**	**3.89**
Residential	Battery Storage DLC	0.30	0.63	1.04	1.62	1.81	2.30	2.52	3.14	3.78	4.49	18.74	19.75	23.05	26.29	27.15	27.56	26.45	25.92	24.89	25.22	27.01
Residential	CPP	1.07	1.70	2.18	6.05	12.52	172.92	175.21	129.75	132.07	153.03	157.77	166.44	184.13	229.47	237.99	226.00	227.19	235.48	240.69	246.03	184.10
Residential	Grid-Interactive WH	0.09	0.20	0.35	0.71	1.00	1.63	1.83	2.02	2.18	3.05	2.89	2.70	2.64	2.63	2.42	2.20	2.03	1.82	1.66	1.51	1.51
Residential	Smart Appliances DLC	0.46	0.89	1.28	3.16	5.45	11.30	11.28	10.84	10.89	11.75	12.18	12.43	13.14	14.14	14.33	14.20	14.19	14.25	14.21	14.25	14.25
Residential	Smart Thermostats DLC	4.11	7.82	12.02	15.25	18.73	21.51	24.40	206.68	209.93	231.85	241.28	246.91	265.16	289.45	291.39	353.15	334.93	333.61	319.32	307.23	297.92
Residential	TOU Opt-Out	2.00	3.19	4.16	12.26	27.65	294.52	299.67	229.83	235.60	265.18	269.65	281.81	304.44	380.66	389.06	374.62	378.91	388.78	385.47	381.42	293.54
Commercial	Battery Storage DLC	0.30	0.63	1.04	1.62	1.81	2.30	2.52	3.14	3.78	4.49	18.74	19.75	23.05	26.29	27.15	27.56	26.45	25.92	24.89	25.22	27.01
Commercial	CPP	1.07	1.70	2.18	6.05	12.52	172.92	175.21	129.75	132.07	153.03	157.77	166.44	184.13	229.47	237.99	226.00	227.19	235.48	240.69	246.03	184.10
Commercial	Curtailment - Firm	3.60	6.02	8.04	8.76	8.02	8.13	8.12	8.25	8.08	9.04	9.32	9.46	10.29	11.17	11.43	11.29	11.40	11.26	11.35	11.22	11.19
Commercial	Curtailment - Non-Firm	5.49	8.93	12.19	13.17	12.06	12.13	12.31	12.23	12.15	13.50	13.92	14.34	15.26	16.81	17.10	16.89	16.93	16.96	16.75	16.79	16.75
Commercial	Grid-Interactive WH	0.09	0.20	0.35	0.71	1.00	1.63	1.83	2.02	2.18	3.05	2.89	2.70	2.64	2.63	2.42	2.20	2.03	1.82	1.66	1.51	1.51
Commercial	Smart Thermostats DLC	4.11	7.82	12.02	15.25	18.73	21.51	24.40	206.68	209.93	231.85	241.28	246.91	265.16	289.45	291.39	353.15	334.93	333.61	319.32	307.23	297.92
Commercial	TOU Opt-Out	2.00	3.19	4.16	12.26	27.65	294.52	299.67	229.83	235.60	265.18	269.65	281.81	304.44	380.66	389.06	374.62	378.91	388.78	385.47	381.42	293.54
Total Demand Response	**Total Demand Response**	**1.57**	**2.49**	**3.17**	**8.26**	**15.28**	**42.85**	**42.16**	**59.07**	**59.93**	**67.17**	**91.02**	**93.63**	**101.05**	**114.00**	**115.51**	**115.05**	**113.51**	**113.32**	**111.58**	**110.65**	**103.17**
Total Portfolio	**Total Portfolio**	**1.79**	**2.07**	**2.42**	**4.10**	**5.07**	**6.24**	**6.45**	**6.76**	**6.76**	**7.24**	**7.67**	**7.90**	**8.35**	**8.93**	**9.08**	**9.40**	**9.50**	**9.56**	**9.60**	**9.64**	**9.67**

(G) The utility shall describe and document how it performed the cost effectiveness assessments pursuant to section (5) and shall describe and document its methods and its sources and quality of information.

Liberty-Empire engaged AEG to conduct a Demand-Side Management Potential Study and assist with demand-side program design in Liberty-Empire's Missouri service territory. As part of the potential study, a comprehensive list of EE/DR measures was developed and screened for cost-effectiveness (i.e. a TRC benefit-cost ratio of at least 1.0). Each measure was characterized with energy and demand savings, incremental cost, service life, and other performance factors, drawing upon data from well-vetted national and regional sources. Energy-efficient measure energy and demand impacts were calculated using generally accepted engineering algorithms based on a set of reasonable assumptions. Because of the diversity in equipment and energy consumption patterns across multiple building types and end-uses, there exists a variability in these savings estimates as they relate to program design and target markets, particularly at the planning stage of these programs.

The TRC test is the primary method of assessing the cost-effectiveness of energy efficient measures and programs. The TRC test is a widely accepted methodology that has been used across the United States for decades. The TRC test measures the net costs and benefits of an energy efficiency program as a resource option based on the total costs of the program, including both the participant's and the utility's costs. This test represents the combination of the effects of a program on both participating and non-participating customers.

Five additional benefit-cost tests were utilized to analyze cost-effectiveness from different perspectives:

- **Participant Cost Test** ("PCT") quantifies the benefits and costs to the customer due to program participation.
- **Ratepayer Impact Measure Cost Test** ("RIM") measures what happens to a customer's rates due to changes in utility revenues and operating costs.

- **Utility Cost Test** ("UCT") measures the net costs of a program as a resource option based on the costs incurred by the program administrator, excluding any net costs incurred by the participant.
    - Modified Utility Cost Test – similar to the above definition but includes the costs of a projected utility incentive.
- **Societal Cost Test** ("SCT") measures the effects of a program on society as a whole.

The cost-effectiveness analysis was performed using Liberty-Empire-specific data. The input data gathered for the model is listed in the table below.

Table 5-80 – Cost-Effectiveness Model Inputs

General Inputs	Specific-Project Inputs
Retail Rate ($/kWh)	Utility Project Costs (Administrative & Incentives)
Commodity Cost ($/kWh)	Direct Participant Project Costs ($/Participant)
Demand Cost ($/kW-Year)	Measure Life (Years)
Discount Rate (%)	kW/Participant Saved (Net and Gross)
Inflation Rate (%)	Number of Participants
Line Losses (%)	

Measures that were cost-effective within VisionLoadMAP are included in the economic and achievable potential. The DSM Potential Study MAP and RAP estimates were exported into the DSM bundle design. The measures were vetted for inclusion in a DSM program and measures were bundled into programs and re-screened for cost-effectiveness.

Liberty-Empire provided several different commodity cost scenarios, each described in Section 5. For the purposes of this Demand Side Management analysis, the base avoided energy cost scenario and the "base + carbon" scenario, which incorporated a cost for avoided CO2 emissions, were used to screen measures. The energy efficiency portfolios described above were screened using the base scenario. The RAP Portfolio was also screened utilizing the "base + carbon" scenario. All bundles were designed to be cost-effective. Measures were bundled based on the end-use, sector, and implementation.

SECTION 6 TOTAL RESOURCE COST TEST

(6) Potential demand-side programs and potential demand-side rates that pass the total resource cost test including probable environmental costs shall be considered as demand-side candidate resource options and must be included in at least one (1) alternative resource plan developed pursuant to 4 CSR 240-22.060(3).

Potential demand-side programs and demand-side rate pilot programs that passed the total resource cost test (i.e., achieved a TRC benefit-cost ratio of at least 1.0) were considered as a demand-side candidate resource options and were included in at least one of the five alternative resource plans.

(A) The utility may bundle demand-side candidate resource options into portfolios, as long as the requirements pursuant to section (1) are met and as long as multiple demand-side candidate resource options and portfolios advance for consideration in the integrated resource analysis in 4 CSR 240-22.060. The utility shall describe and document how its demand-side candidate resource options and portfolios satisfy these requirements.

Measures that were cost-effective within the DSM Potential Study were included in the economic and achievable potential. The DSM Potential Study MAP and RAP were exported into the DSM bundle design. The measures were vetted for inclusion in a DSM program and measures were bundled into programs and re-screened for cost-effectiveness.

AEG utilized its BenCost model[20] to perform the benefit-cost screening and develop the DSM Program Design. AEG considered several energy efficiency portfolios based on the cost-effective measures.

[20] Note: The model is consistent with the California Standard Practice Manual

- **RAP Scenario**. The RAP candidates from the DSM Potential Study that Liberty-Empire proposes to pass to the integration phase. This portfolio reflects expected program participation given barriers to customer acceptance and non-ideal implementation conditions. These measures are delivered under less-than-ideal market conditions.
- **MAP Scenario**. The MAP candidates from the DSM Potential Study that Liberty-Empire proposes passing into the integration phase. This portfolio reflects expected program participation given favorable market implementation and few barriers to customer adoption. Information channels are assumed to be established and efficient for marketing, educating consumers, and coordinating with dealers and delivery partners. Under this scenario, incentives represent a substantial portion of the incremental cost combined with high administrative and marketing costs.

Liberty-Empire provided several different commodity cost scenarios, each described in SECTION 5. For the purposes of this Demand Side Management analysis, the base avoided energy cost scenario and the "base + carbon" scenario, which incorporated a cost for avoided CO_2 emissions, were used to screen measures. The energy efficiency portfolios described above were screened using the base scenario. The RAP Portfolio was also screened utilizing the "base + carbon" scenario.

(B) For each demand-side candidate resource option or portfolio, the utility shall describe and document the time-differentiated load impact estimates over the planning horizon at the level of detail required by the supply system simulation model that is used in the integrated resource analysis, including a tabulation of the estimated annual change in energy usage and in diversified demand for each year in the planning horizon due to the implementation of the candidate demand-side resource option or portfolio.

Impacts for energy and demand are included in Table 5-24 through Table 5-27 by bundle option and Table 5-81 through Table 5-85 for aggregated results by bundle scenario.

(C) The utility shall describe and document its assessment of the potential uncertainty associated with the load impact estimates of the demand-side candidate resource options or portfolios. The utility shall estimate—

The demand-side program cost-effectiveness evaluation included an analysis of two scenarios to account for potential uncertainty.

1. The impact of the uncertainty concerning the customer participation levels by estimating and comparing the maximum achievable potential and realistic achievable potential of each demand-side candidate resource option or portfolio; and

The demand-side program cost-effectiveness evaluation included an analysis of two scenarios with varying participation levels and incentives to account for potential uncertainty.

2. The impact of uncertainty concerning the cost effectiveness by identifying uncertain factors affecting which end-use resources are cost effective. The utility shall identify how the menu of cost effective end-use measures changes with these uncertain factors and shall estimate how these changes affect the load impact estimates associated with the demand-side candidate resource options.

The demand-side program cost-effectiveness evaluation included an analysis of two scenarios with varying participation levels and incentives to account for potential uncertainty. As previously described, Liberty-Empire provided several different commodity cost scenarios, SECTION 5.

Table 5-81 – Comparison of Incremental Participation by Scenario

Scenario	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
RAP	1,105,447	1,225,349	1,387,334	1,475,598	1,528,089	1,549,002	1,520,961	1,505,755	1,514,783	1,533,580	1,560,763	1,739,542	1,755,839	1,780,362	1,795,183	1,590,671	1,584,519	1,579,805	1,577,302	1,578,983	1,604,511
MAP	1,586,313	1,713,949	1,876,671	1,952,425	1,987,534	1,989,820	1,927,932	1,885,996	1,875,617	1,878,145	1,890,401	2,089,842	2,085,929	2,092,043	2,086,502	1,767,259	1,741,457	1,718,091	1,697,597	1,682,363	1,709,709

Table 5-82 – Comparison of Net MWh Savings by Scenario

Scenario	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
RAP	8,596	16,353	30,203	36,370	39,200	39,115	39,024	38,842	38,736	38,562	38,441	38,347	38,269	38,100	37,925	37,467	37,233	36,976	36,704	36,410	36,517
MAP	13,165	25,078	44,746	52,464	55,514	55,078	54,571	54,207	53,908	53,541	53,263	53,009	52,741	52,342	51,971	51,183	50,691	50,183	49,656	49,095	49,194

Table 5-83 – Comparison of Net Coincidence MW Savings by Scenario

Scenario	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
RAP	18.73	45.96	93.43	118.47	132.99	138.47	144.67	144.51	144.21	144.03	143.39	142.72	142.17	141.43	140.70	139.63	138.71	137.80	136.82	135.89	135.95
MAP	29.75	74.06	149.22	187.00	208.39	216.35	225.49	225.88	226.05	226.36	225.32	224.27	223.31	222.03	220.72	218.97	217.43	215.92	214.34	212.77	212.83

Table 5-84 – Comparison of Incentives by Scenario

Scenario	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
RAP	$1,055,890	$1,192,553	$1,393,050	$1,503,654	$1,719,014	$1,929,326	$2,185,657	$2,360,853	$2,553,135	$2,765,978	$2,835,629	$2,914,641	$2,989,701	$3,067,973	$3,139,392	$3,157,074	$3,226,469	$3,305,032	$3,389,043	$3,479,590	$3,556,078
MAP	$1,543,004	$1,787,970	$2,144,418	$2,430,470	$2,871,443	$3,330,116	$3,908,357	$4,381,180	$4,886,758	$5,473,784	$5,620,492	$5,785,106	$5,933,864	$6,086,660	$6,244,724	$6,317,627	$6,476,040	$6,650,913	$6,850,989	$7,060,315	$7,220,700

Table 5-85 – Comparison of Total Utility Administrative Costs by Scenario

Scenario	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
RAP	$1,405,531	$2,066,371	$3,272,938	$2,071,877	$1,547,893	$1,088,768	$1,162,232	$1,107,092	$1,147,848	$1,184,690	$1,149,802	$1,136,911	$1,158,151	$1,177,041	$1,198,817	$1,179,646	$1,191,715	$1,213,568	$1,238,353	$1,261,841	$1,303,103
MAP	$1,655,862	$2,329,716	$3,554,249	$2,376,456	$1,882,679	$1,459,275	$1,575,408	$1,557,867	$1,637,938	$1,726,275	$1,698,991	$1,696,294	$1,721,565	$1,743,677	$1,775,798	$1,740,791	$1,757,117	$1,785,751	$1,819,809	$1,853,847	$1,908,752

SECTION 7 DEVELOPMENT OF EVALUATION PLANS

(7) For each demand-side candidate resource option identified in section (6), the utility shall describe and document the general principles it will use to develop evaluation plans pursuant to 4 CSR 240-22.070(8). The utility shall verify that the evaluation costs in subsections (5)(B) and (5)(C) are appropriate and commensurate with these evaluation plans and principles.

In conversations with Liberty-Empire it was determined that the traditional 5% of budget allocated for EM&V is would be insufficient to support meaningful Evaluation, Measurement and Verification ("EM&V") activities. As an alternative the Company has agreed to participate in a statewide EM&V effort in which Liberty-Empire will provide in kind support to the process. Liberty-Empire is prepared to support the process by providing staff for interviews, supporting program data and access to the program tracking system. This may also include providing data from the Liberty-Empire programs. Additionally, Liberty-Empire relies on the Arkansas TRM for savings associated with their MEEIA program. The Arkansas TRM is overseen by an independent evaluator that Liberty-Empire supports on a cost share basis through their program offerings in Arkansas. Therefore, Liberty -Empire is not moving forward with a formal independent EM&V process for their MEEIA portfolio.

SECTION 8 DEMAND-SIDE RESOURCES AND LOAD-BUILDING PROGRAMS

(8) Demand-side resources and load-building programs shall be separately designed and administered, and all costs shall be separately classified to permit a clear distinction between demand-side resource costs and the costs of load-building programs. The costs of demand-side resource development that also serve other functions shall be allocated between the functions served.

Liberty-Empire did not include any load-building programs in the IRP.