AEG

Liberty 2021 Market Research

The Missouri Service Territory of
The Empire District Electric Company

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EXECUTIVE SUMMARY

Applied Energy Group (AEG) is contracted to support The Empire District Electric Company's (Liberty-Empire or Company) Integrated Resource Planning (IRP) process and Missouri Energy Efficiency Investment Act (MEEIA) filings in Missouri. As part of that effort, AEG conducted primary data collection surveys with Liberty-Empire customers in Missouri to give planners insight into the equipment and appliances that customers use in their homes and businesses to determine the greatest opportunities for future energy savings.

Main Findings – Residential

The main findings and their implications for program planning are highlighted below.

Heating and Cooling

- Electricity is the predominant heating fuel (62% of customers have electric heat). The market is ripe for a heat pump program targeted towards Multi Family or low-income households.
- Customers who recently purchased a new heating system (11%) are almost evenly split between those that purchased standard efficiency (5%) and high efficiency (6%), and the majority of customers do not plan to buy a higher efficiency heating system when they are in the market, indicating an opportunity for more high efficiency sales (15% plan to buy a high efficiency heating system).
- Most homes (77%) have central air conditioning (AC). A quarter of all customers expressed a strong interest in an AC cycling program. This type of program is of particular interest to the Multi Family segment (35% of MF are very interested).
- There is a large opportunity for upgrading thermostats (57% of customers have manual thermostats). But education will be necessary since most customers with programmable thermostats don't use the program feature.

Lighting

- Opportunity remains to upgrade incandescent light bulbs to light emitting diodes (LEDs) with an average of more than 8 incandescent bulbs per household. Multi Family homes are an untapped market for lighting upgrades (less than half have upgraded to LEDs in the last 2 years).
- Smart lighting controls may be a good addition to a program portfolio. They are a relatively new technology and their saturation, although low (13%), is on par with other more mature technologies.

Appliances

- Single family homes are a good target for refrigerator or freezer recycling programs. Twenty-nine percent of SF homes have a second refrigerator and 56% have a freezer. Programs should target replacing second refrigerators and empty nesters who may no longer need their freezer.
- Non low income customers average one smart hub per household, but less than half (42%) use it to control household appliances and lighting. There is an opportunity for educating customers on how to use smart hub controls for energy efficiency.
- Saturation of electric vehicles (EVs) is very low (3%) as is interest in purchasing an EV in the next few years (4%).

Main Findings – Nonresidential

Highlights from the research and implications for programs that can best address the needs of businesses are outlined below.

Heating and Cooling

- Although high consumption businesses have the highest saturation of air source heat pumps (15%), they also have the highest saturation of electric furnaces (33%), indicating an opportunity for heat pump upgrades. High consumption businesses are also the most likely to purchase high efficiency equipment when it is time to replace their current system (19%).
- Saturation is low for smart thermostats (8%) and energy management systems (EMS 1%). A program that influences customers to upgrade their heating/cooling controls has potential, with a quarter of customers expressing interest in a smart thermostat rebate.
- Energy audits are of interest to more than a third of business customers which could provide a good opportunity to discuss the benefits heat pump upgrades and smart thermostats.

Cooking Equipment

- Almost half of high consumption customers have cooking equipment. Programs that target commercial kitchen equipment should focus their efforts on high consumption businesses.

Lighting

- There continues to be an opportunity to replace Incandescent lights and traditional fluorescent tubes with LEDs. On average buildings have 6.33 incandescent bulbs and 27.95 traditional fluorescent tubes.
- Education and marketing about the benefits of lighting controls could help customers save energy. Less than one in five businesses express interest in a lighting control rebate, indicating a lack of knowledge about their benefits.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

1

INTRODUCTION

Background

Applied Energy Group (AEG) is contracted to support the Liberty-Empire Integrated Resource Planning (IRP) process and Missouri Energy Efficiency Investment Act (MEEIA) filings in Missouri. As part of that effort, AEG conducted primary data collection surveys with Liberty-Empire customers in Missouri to give planners insight into the equipment and appliances that customers use in their homes and businesses to determine the most significant opportunities for future energy savings.

Goals of the Market Research

The use of primary data collection to inform market potential and energy efficiency opportunities can be one of the best ways to ensure that the study results represent customer characteristics, local geographic and economic conditions, and other unique market circumstances in the service territory. Primary market research provides more confidence that the particular customer attitudes, building characteristics, and equipment stock of a utility are represented as accurately as possible.

While the goal of the market research effort is to inform the IRP process, due to the timeline, the results were not completed in time to be directly used in the 2022 IRP potential study analysis. Following the Company's request for variance in its IRP case (File No. EO-2021-0331), the Company had discussions with interested stakeholders. The parties agreed that collecting primary data and incorporating the data into the 2022 IRP analysis would not likely be feasible since such data collection could jeopardize submission by the 2022 IRP filing deadline. Therefore, the parties agreed that the demand-side resource analysis variance requests regarding primary data collection should be approved for the 2022 IRP, but on the condition that Liberty-Empire agree to begin conducting residential and commercial surveys to collect the primary data needed for future market potential studies as soon as practical. As agreed, the Company did conduct the residential and commercial surveys as outlined in this report. As anticipated, the data was not fully analyzed and available in time to be incorporated into the 2022 IRP analysis, but the market research will inform the development of the next MEEIA cycle and future IRP processes. Additionally, as agreed the Company will file the primary residential and commercial data in the file opened in the Commission's EFIS for Empire's 2022 IRP file when it is available, regardless of whether Empire includes the data in its 2022 IRP study.

Report Structure

The remainder of the report is structured as follows:

- Chapter 2 – Research Methods: Description of the sample design and data collection process.
- Chapter 3 – Residential Results: Findings from the residential survey
- Chapter 4 – Nonresidential Results: Findings from the nonresidential survey.

2

RESEARCH METHODS

This chapter describes the research design and data collection process. An overview of the data collection activities is shown in the table below.

Table 2-1 Summary of Data Collection Activities

Sector	Population Size after Data Cleaning[1]	Survey Sample Size	Number of Completed Surveys	Incentive
Residential	100,063	7,500	300	$25
Nonresidential	13,730	7,500	302	$50

[1] This count represents the distinct number premise addresses that AEG included in the sample frame.

Sample Selection and Design

Liberty-Empire provided AEG with data that included customers' 2019 annual consumption for each premise address, mailing address, and customer name for their population of residential and non-residential customers in Missouri. 2019 was chosen as the base year because it was the latest year of energy consumption that was not impacted by the COVID pandemic. AEG cleaned and aggregated the data and developed a sample design. That process is outlined in detail below.

Residential Sector

Table 2-2 shows the data cleaning and screening steps AEG took to develop the residential sampling frame, i.e., the final group of customers eligible for the survey and the proportion of account numbers, premise addresses, and mailing addresses remaining after each data processing step.

First, we removed 10% of records with invalid addresses. Most often, these mailing addresses were PO Box numbers or addresses that Liberty-Empire had flagged as a bad or closed account or premise. Next, we removed ~16% of records with annual consumption of less than 2,000 kWh/year to avoid sampling an empty household or a meter serving a shed or other non-housing facility. Finally, we removed a small fraction of accounts with extremely high usage to avoid sampling master-metered properties.

Before we sampled records for the survey, we identified duplicate information. For example, a customer may own several properties and therefore have several records in the data. In another example, a distinct premise address may be associated with multiple accounts and also have several records in the data. Most premise and mailing addresses were only associated with one account number, but as shown in the starting population in Table 2-2, a distinct premise and mailing address was associated with two or more account numbers in several cases.

To avoid contacting a customer many times for the same or multiple premises, we defined the unit of analysis as the distinct combination of premise address, mailing address, and customer name, and then removed duplicates from the final sample. This way, we only surveyed customers about one of the premises associated with their name and mailing address.

We designed the sample to target survey results with ±10% precision at the 90% confidence level by income group (low-income, moderate-income, and regular income) and housing type (single-family vs. multifamily). Though we did not have income information for the population of customers, we used the premise address to identify possible multifamily units in the data and drew a stratified random sample. In order to meet confidence and precision targets around multifamily survey results, we oversampled the multifamily stratum.

Table 2-2 Residential Sample Frame Development

Step	Count of Distinct (% of Starting Population)		
	Remaining Account Numbers	Remaining Premise Addresses	Remaining Mailing Addresses
Starting population	168,027 (100%)	116,141 (100%)	129,013 (100%)
Removed bad addresses	151,292 (90%)	106,611 (90%)	119,252 (92%)
Removed low usage (<2 MWh/year)	125,031 (74%)	101,231 (74%)	110,659 (87%)
Removed high usage (99th percentile)	123,779 (74%)	100,063 (74%)	109,684 (86%)
Randomly sampled 7,500 (+1% for duplicates)	7,716 (4%)	6,531 (5%)	7,492 (6%)
Randomly sampled 7,500 mailers	7,680 (4%)	6,504 (5%)	7,492 (6%)

Nonresidential Sector

Table 2-3 presents AEG's data cleaning and screening steps to develop the nonresidential sampling frame, including the proportion of account numbers, premise addresses, and mailing addresses remaining after each data processing step.

Similar to how we developed the residential sample frame, we removed buildings that appeared empty (defined as having annual consumption less than 2,000 kWh/year in 2019) and accounts that were not eligible for this study, which included non-building accounts such as cell towers.

As with the residential data, AEG found that multiple account numbers could be associated with distinct premise addresses and mailing addresses in the nonresidential data. In addition, distinct premise addresses were at times associated with multiple mailing addresses. Given the nature of nonresidential buildings, this finding did not surprise AEG—large business or industrial complexes may appear like distinct premise addresses if they do not include suite or building information, while the account holder associated with the mailing address remains distinct. Therefore, we defined the unit of analysis as a unique combination of premise and mailing address.

We stratified the population of buildings by segment in order to observe all building segments of interest to the study. In a few cases, accounts within a premise/mailing address unit of analysis were associated with multiple segments. Since we planned to confirm the building segment with the customer during the survey, we opted to assign the premise to the predominant segment, i.e., the one that consumed the most energy annually. Then, we randomly sampled premise/mailing address units within each segment.

Table 2-3 Nonresidential Sample Frame Development

Step	Count of Distinct (% of Starting Population)		
	Remaining Account Numbers	Remaining Premise Addresses	Remaining Mailing Addresses
Starting population	24,014 (100%)	10,761 (100%)	17,769 (100%)
Removed low usage (<2 MWh/year)	18,110 (75%)	8,867 (80%)	14,193 (82%)
Removed non-building accounts	17,539 (73%)	8,824 (77%)	13,730 (82%)
Assigned single sector/segment per premise	17,539 (73%)	8,824 (77%)	13,730 (82%)
Randomly sampled 7,500	8,541 (36%)	5,324 (39%)	6,913 (49%)

Data Collection

AEG used a mail/online methodology for data collection. Each customer in the survey sample was mailed an invitation letter on Liberty-Empire letterhead the week of August 23, 2021. The letter included a link to take the survey and a unique ID for each customer. A reminder postcard was sent one week after the invitation. Data was collected from September 2 – September 14, 2021, when the goal of 300 completed surveys was met for each sector.

Overall survey results for the 300 respondents in each sector have a margin of error of approximately +/- 5% at the 90% confidence interval; the margin of error increases when segments of the total sample are analyzed.

Weighting

AEG reviewed how well the survey respondents represented the distribution of buildings in the population and weighted respondents accordingly.

To gauge the representativeness of residential survey respondents, AEG compared their self-reported income levels and housing types to the distribution of customers falling into each income level and housing type group provided by the American Community Survey[1] (ACS) for Missouri, which

[1] https://www.census.gov/programs-surveys/acs/

Table 2-4 shows (respondents shown in parentheses). As described earlier, the distributions aligned well in general, with slightly higher responses from multifamily customers because of oversampling. AEG weighted responses in each income-housing type group to better represent the population distribution.

Table 2-4 Distribution by Income Level and Housing Type – ACS (Respondents)

Income Level	Housing Type		
	Single Family	Multifamily	Total
Low Income[1]	19% (21%)	2% (7%)	**21% (29%)**
Moderate Income[2]	41% (26%)	5% (7%)	**46% (33%)**
Regular Income	31% (34%)	2% (4%)	**34% (38%)**
Total	**91% (81%)**	**9% (19%)**	**100% (100%)**

[1] Defined as households with income within 200% of the federal poverty level (FPL) by household size.

[2] Defined as households with income greater than 200% of the FPL and up to the state median income by household size.

The nonresidential data provided by Liberty-Empire included population building segment information, which AEG compared to the distribution of survey responses. AEG also looked at how the survey respondents were distributed across three consumption bins, as shown in Table 2-5. While the distribution of survey respondents deviated slightly from the population within some segments and consumption groups, in general, the distributions aligned. According to the population distribution, AEG weighted respondents to improve the sample's representation of Liberty-Empire's Missouri nonresidential population.

Table 2-5 Distribution by Building Segment and Consumption Bin – Population (Respondents)

Building Segment	Consumption Bin			
	Low (2,000 kWh-9,260 kWh)	Medium (>9,260 kWh-33,340 kWh)	High (>33,340 kWh)	Total
Education	0.47% (0.33%)	0.73% (0.99%)	1.57% (1.32%)	**2.77% (2.65%)**
Grocery	0.17% (0.33%)	0.00% (0.00%)	1.2% (0.66%)	**1.64% (0.99%)**
Healthcare	0.5% (1.66%)	1.04% (0.99%)	1.59% (2.98%)	**3.12% (5.63%)**
Lodging	0.62% (0.66%)	0.54% (0.66%)	1.41% (1.99%)	**2.56% (3.31%)**
Manufacturing	0.23% (0.33%)	0.48% (1.32%)	0.66% (1.99%)	**1.37% (3.64%)**
Miscellaneous	15.41% (8.94%)	14.6% (12.91%)	12.28% (9.93%)	**42.3% (31.79%)**
Office	9.32% (8.94%)	9.08% (10.26%)	8.72% (8.94%)	**27.12% (28.15%)**
Restaurant	0.00% (0.00%)	0.00% (0.00%)	2.55% (0.99%)	**3.26% (0.99%)**
Retail	3.38% (5.3%)	4.67% (6.95%)	4.55% (5.63%)	**12.6% (17.88%)**
Warehouse	0.97% (1.66%)	1.16% (1.99%)	1.13% (1.32%)	**3.26% (4.97%)**
Total	**31.27% (28.15%)**	**33.07% (36.09%)**	**35.66% (35.76%)**	**100% (100%)**

Segmentation

The residential survey results are analyzed by housing type (Single-family vs. Multifamily) and low income vs. non-low income. Low income is defined as 200% of the Federal Poverty level based on self-reported household size and income.

The nonresidential survey results are analyzed by electric consumption categories: low usage, medium usage, and high usage. Usage categories were defined at the population level to create three relatively equal bins of customers.

[2] Ibid.

Table 2-6 Electric Usage Categories

Usage Category	Annual Electricity Usage (kWh)	Number of Completed Surveys
Low Usage	2,000 – 9,260	85
Medium Usage	9,261 – 33,340	109
High Usage	33,341+	108

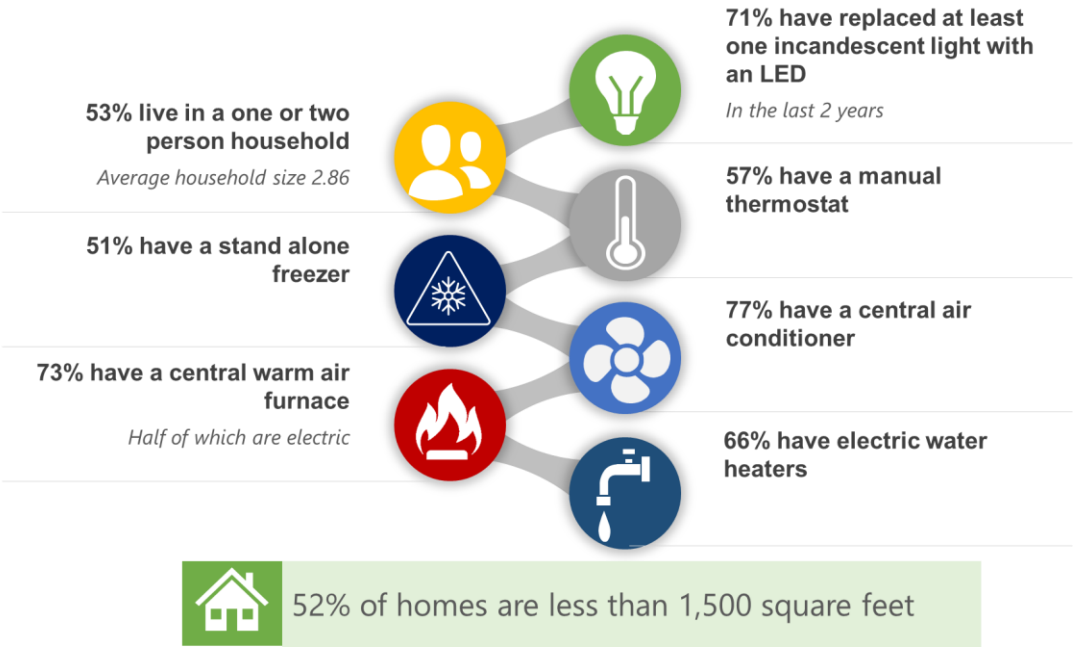
3

RESIDENTIAL SURVEY RESULTS

This chapter presents the results of the residential survey. The survey explored household equipment saturation, including heating, cooling, water heating, lighting, appliances, electronics, solar photovoltaic (PV), and electric vehicles (EVs). It also assessed customers' energy efficiency actions and their interest in utility energy efficiency programs. The results have been weighted to represent the population of Liberty-Empire residential customers in Missouri.

Figure 3-1 shows the characteristics of typical households in Liberty-Empire's Missouri service territory.

Figure 3-1 Typical Household Characteristics



AEG received completed surveys from 300 residential customers. The data was analyzed by housing type and low-income segments. The proportion of surveys by segment is shown in the table below.

Table 3-1 Residential Survey Segmentation[3]

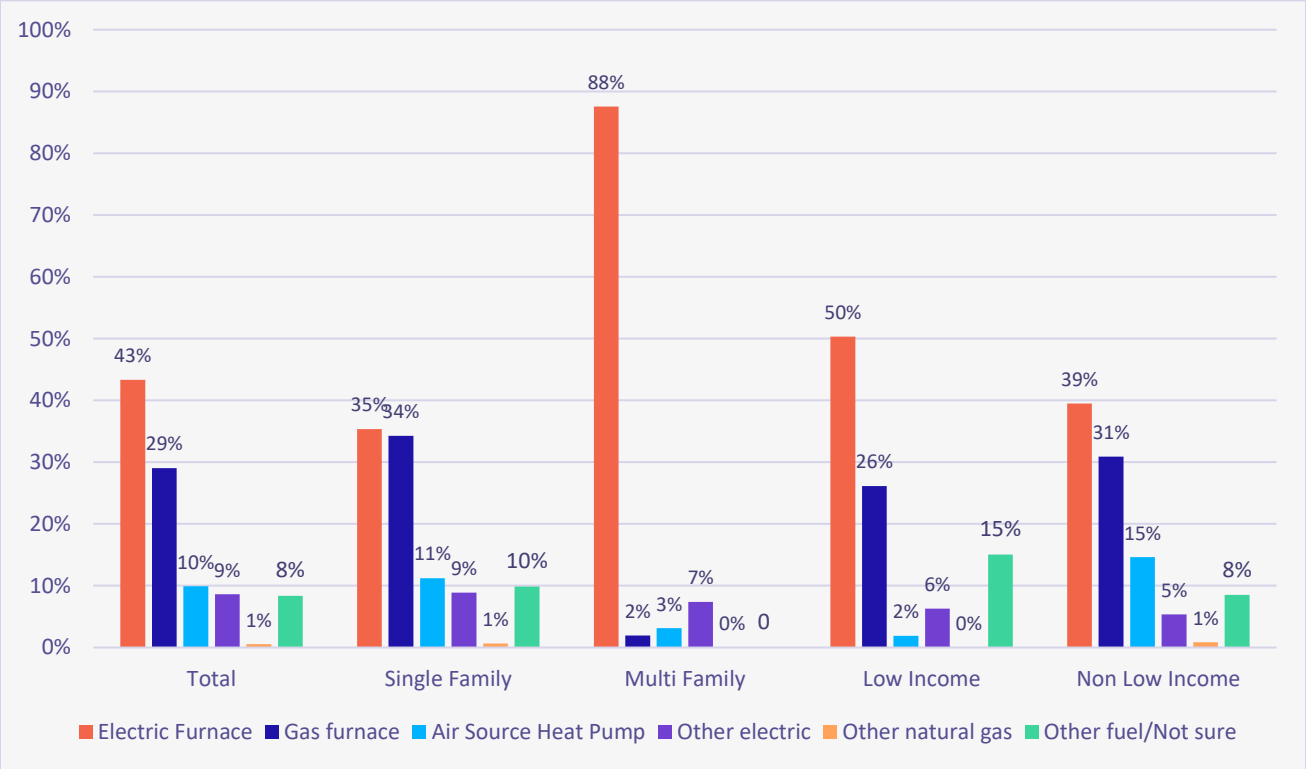
	Segment	Number of Completed Surveys[4]	% Population
Housing Type	Single Family	251	84%
	Multi Family	48	16%
Income Level	Low Income	109	36%
	Non Low Income	191	63%

The remaining results presented in this chapter are segmented by housing type and income level.

Heating and Cooling

The vast majority of customers have an electric or gas furnace. Multi-Family and Low-Income customers are much more likely to have an electric furnace. Ten percent of Missouri customers have air source heat pumps in their homes.

Figure 3-2 Primary Heating System

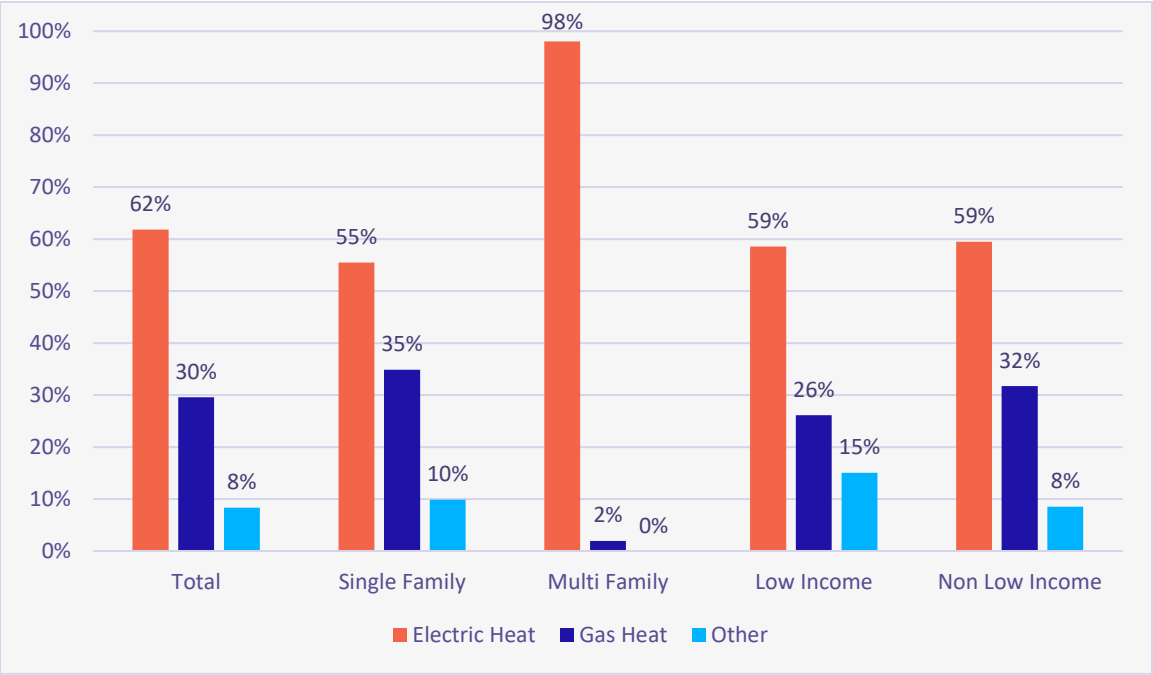


Electricity is the primary heating fuel for every segment. Natural gas is most prevalent in Single-Family and Non-Low-Income homes. Natural gas heating is virtually non-existent in the Multi-Family segment.

[3] The sample size does not support analysis by housing type by income level (e.g., SF low income, MF Low Income, etc.)

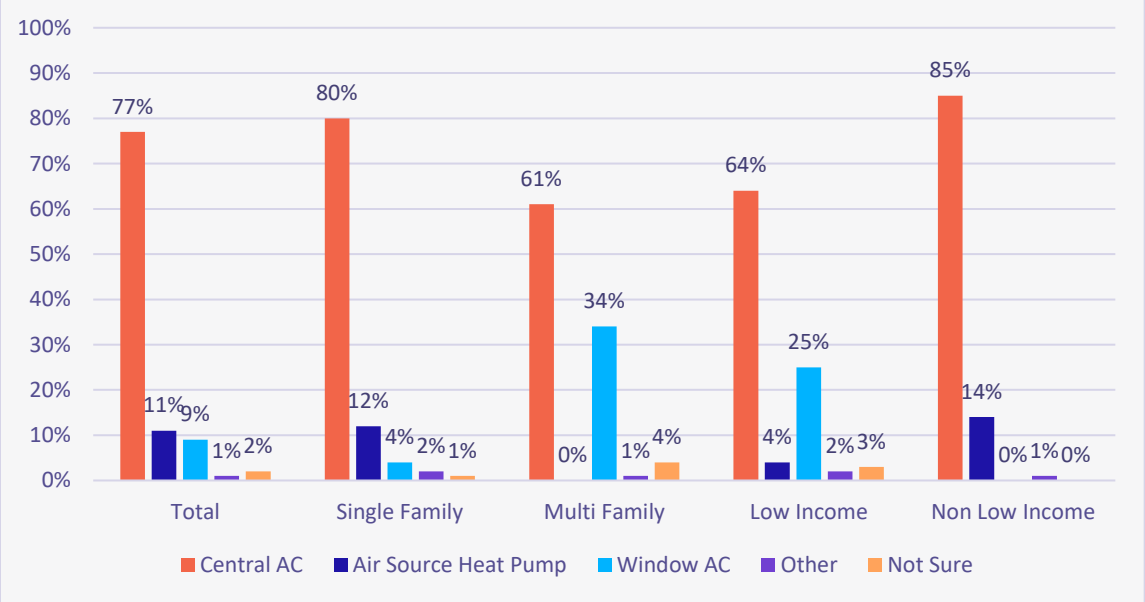
[4] Number of surveys in the segments do not add up to 300 because some respondents selected don't know/refused for the housing type or income question.

Figure 3-3 Primary Heating Fuel



More than three-quarters of residential customers have central air conditioning (AC). Single-Family and Non-Low-Income customers are more likely to have central air.

Figure 3-4 Primary Cooling System



The majority of households still have manual thermostats. Only four percent of households have WiFi thermostats, and 5% have smart thermostats. Most customers do not program their programmable thermostats.

Figure 3-5 Type of Thermostat

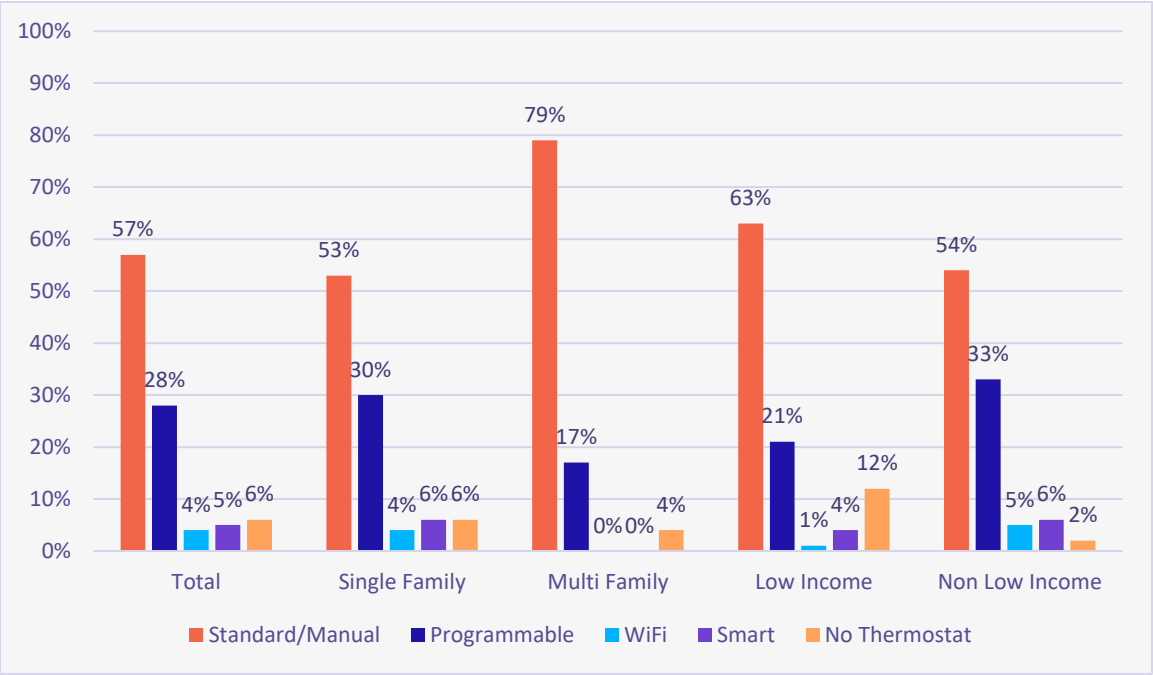
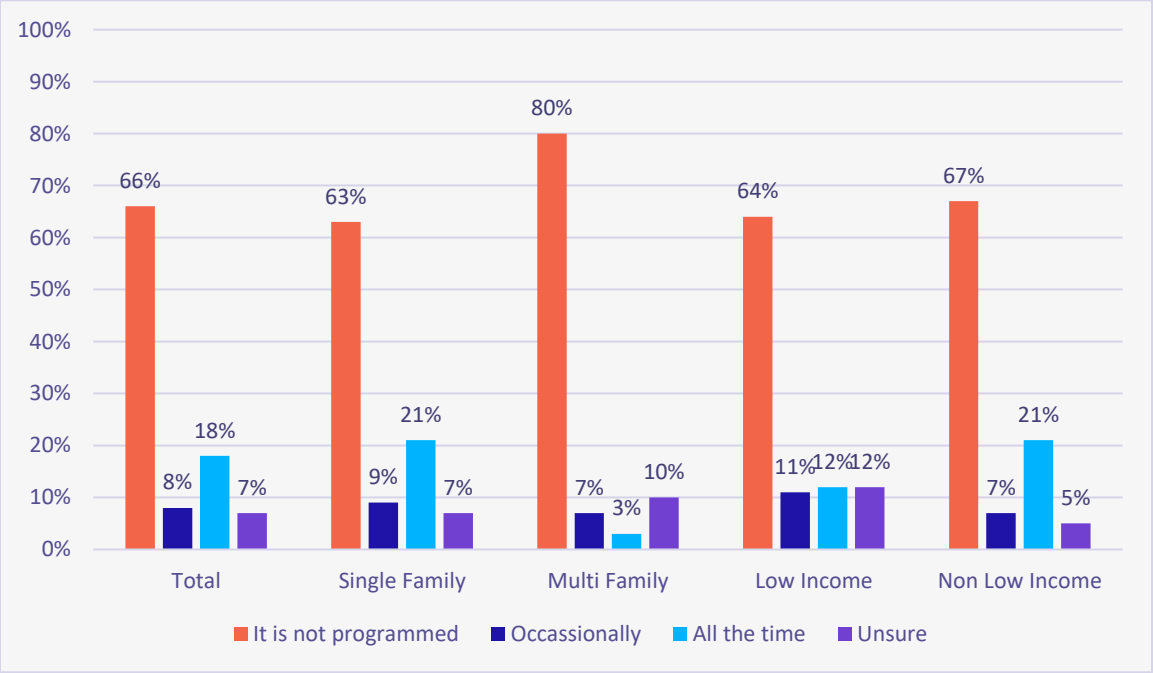


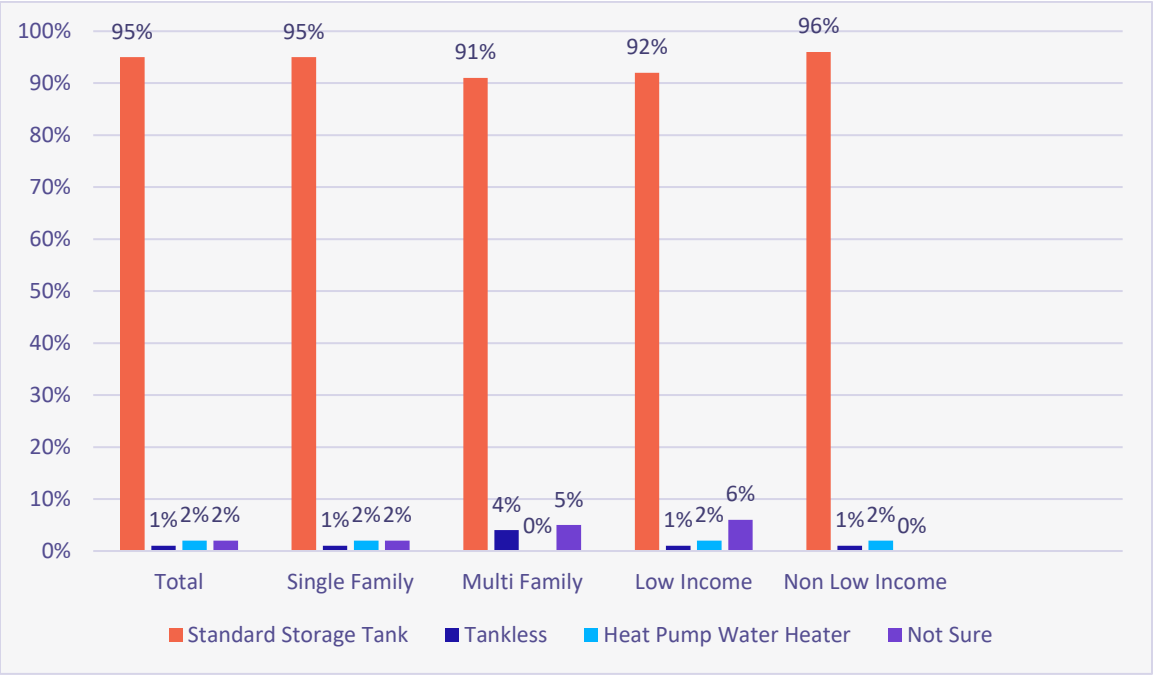
Figure 3-6 Operate Programmable Thermostat in Program Mode



Water Heating

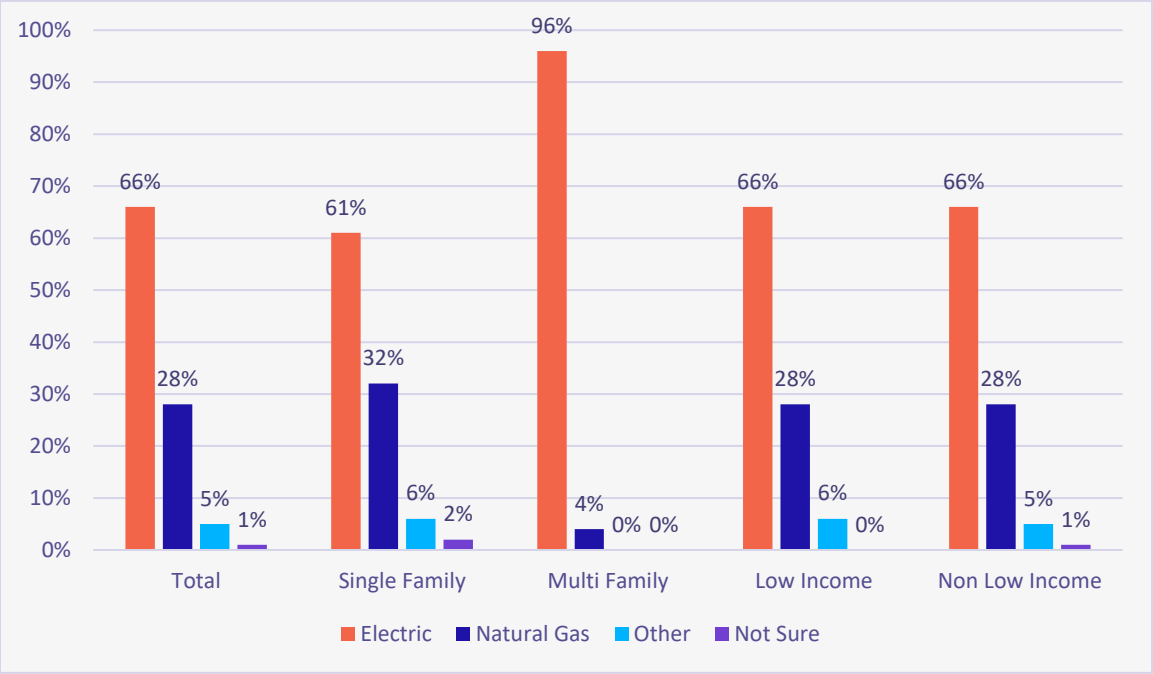
Almost all households have a standard storage tank water heater.

Figure 3-7 Type of Water Heater



The majority of water heaters are electric. About a third of Single-Family homes have natural gas water heaters. Multi-Family water heaters are almost exclusively electric.

Figure 3-8 Water Heater Fuel



Lighting

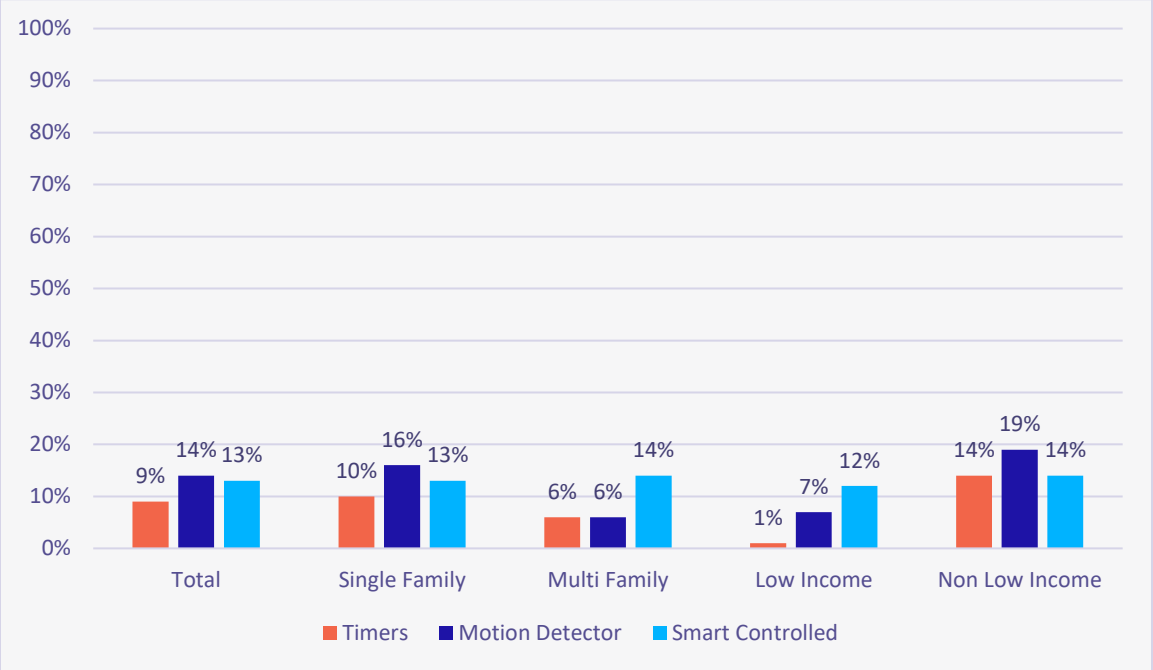
Although LEDs are very prominent in households, incandescent bulbs have the second highest average per household.

Table 3-2 Mean Number of Interior Lightbulbs by Type

	Segment	Incandescent	Wide-Faced Down Lights (non-LED)	CFL	Fluorescent Tubes	LED Lamps or Bulbs	Other LEDs	Other Type
Housing Type	Single Family	8.73	2.48	2.56	1.87	14.71	1.66	.9
	Multi Family	6.18	.49	1.07	.85	6.57	.22	.76
Income Level	Low Income	7.19	.93	1.21	1.54	8.97	.33	.50
	Non Low Income	8.94	2.86	2.95	1.79	15.99	2.06	1.08

Few customers install any type of lighting controls. Although smart controlled lighting is as popular as other technologies that have been available for a longer time.

Figure 3-9 Interior Lighting Controls



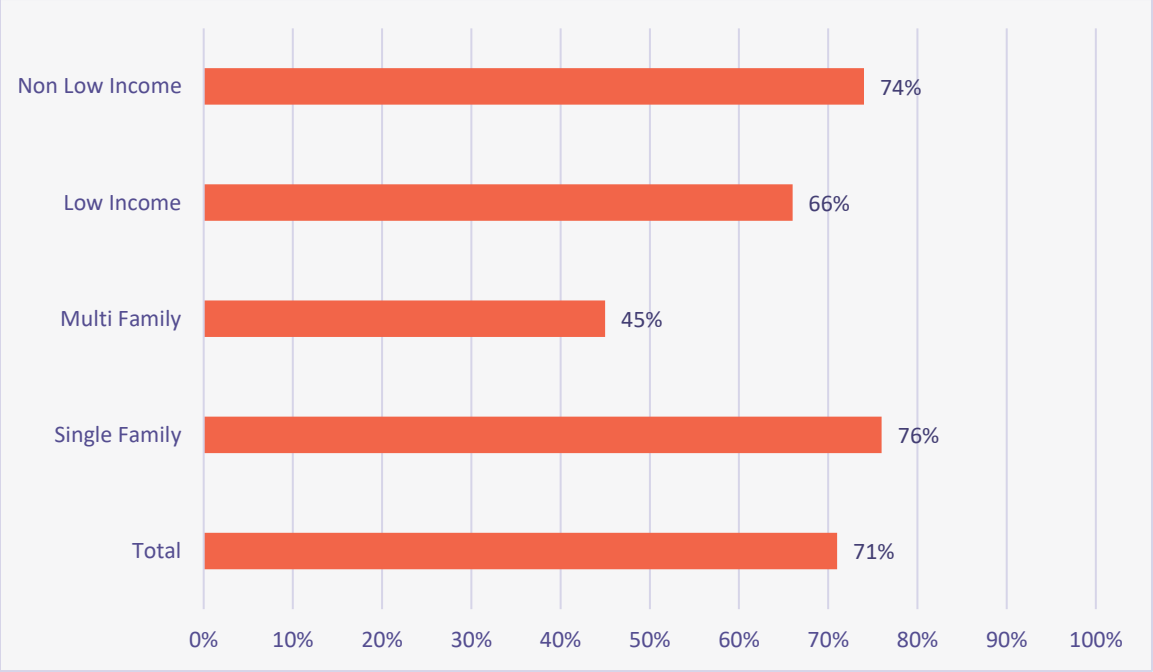
LEDs and incandescent bulbs are the main bulbs installed in the exterior of homes as well.

Table 3-3 Mean Number of Exterior Lightbulbs by Type

	Segment	Incandescent	Wide-Faced Down Lights (non-LED)	CFL	Fluorescent Tubes	LED Lamps or Bulbs	Other LEDs	Other Type
Housing Type	Single Family	1.86	.85	.38	.33	1.70	.64	.69
	Multi Family	.56	.59	.21	.09	.65	0	.17
Income Level	Low Income	1.62	.67	.43	.54	.85	.07	.32
	Non Low Income	1.85	.91	.33	.19	2.04	.87	.83

Almost three quarters of households have replaced incandescent bulbs with LEDs in the last two years. Less than half of Multi-Family customers have replaced their incandescent bulbs.

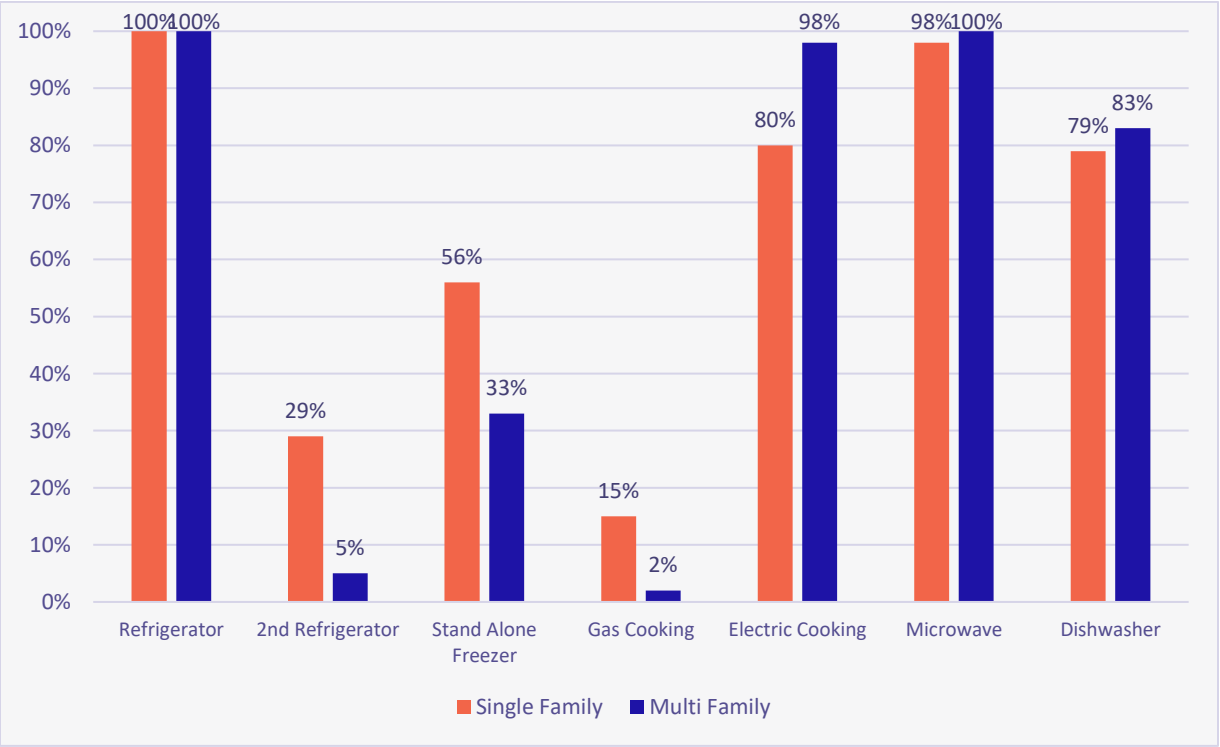
Figure 3-10 Customers Who Replaced Incandescent Bulbs with LEDs in Last 2 Years



Appliances

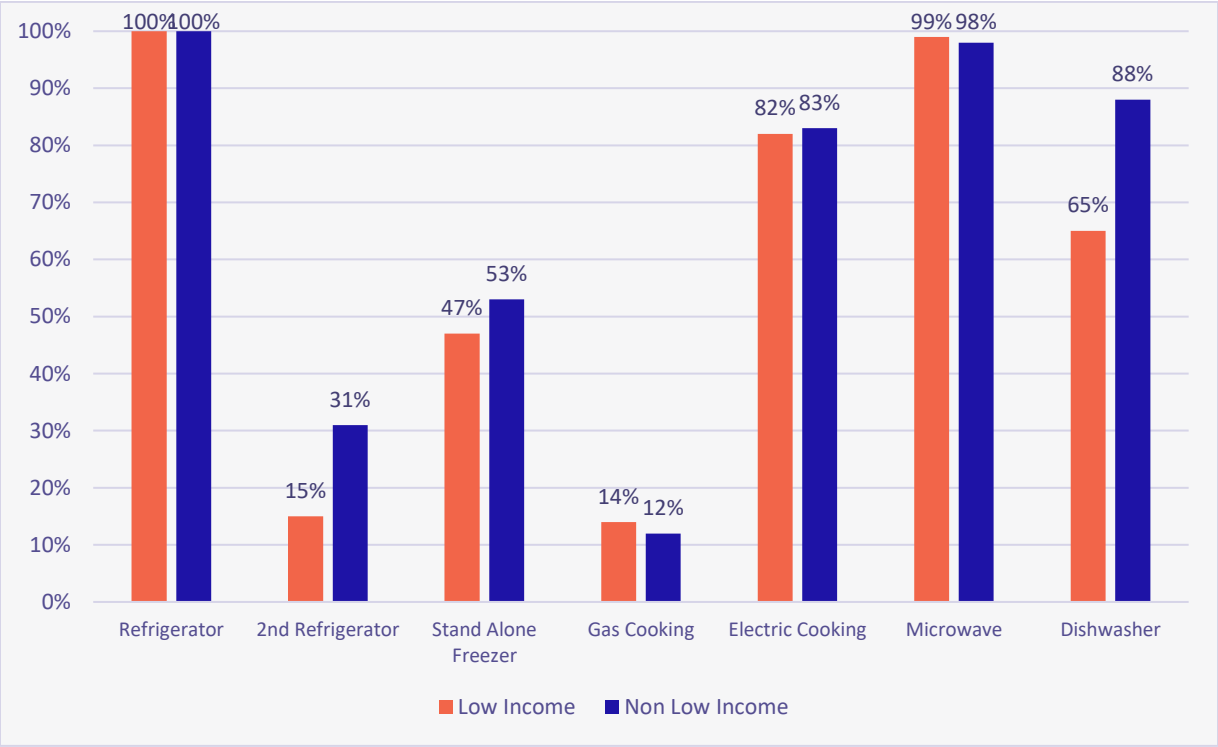
Twenty-nine percent of Single-Family households have a second refrigerator compared to only 5% of Multi-Family. Households predominately use electric for cooking, with only 15% of Single-Family households cooking with natural gas.

Figure 3-11 Kitchen Appliances by Housing Type



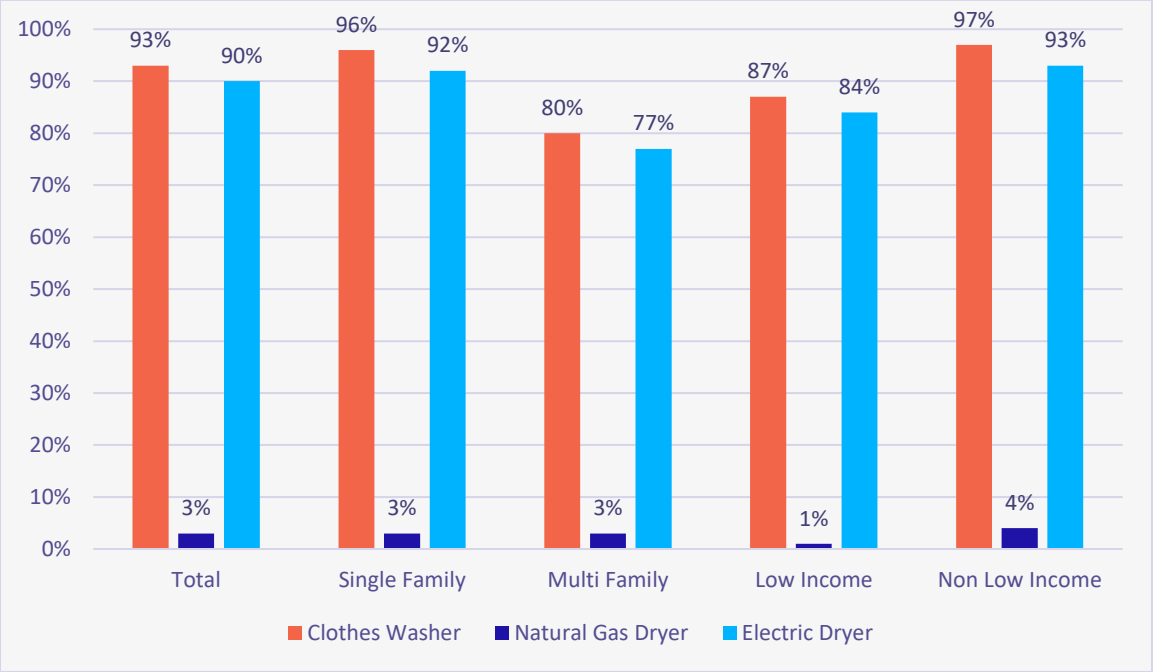
The main difference in appliance saturations by income is that fewer low income customers have second refrigerators or dishwashers.

Figure 3-12 Kitchen Appliances by Income



Most customers have clothes washers and dryers in their homes. Dryers are mainly fueled by electricity.

Figure 3-13 Laundry Equipment



Electronics

Although the number of TVs in a home range from 0 – 7, the average number of TVs per household is less than three.

Table 3-4 Mean Number of Televison Equipment

	Segment	Flat Screen TV	Non-Flat Screen TV	Set Top Boxes	Gaming Boxes or Consoles
Housing Type	Single Family	2.67	.08	1.5	1.07
	Multi Family	1.90	.02	.84	.96
Income Level	Low Income	2.20	.09	1.00	.95
	Non Low Income	2.75	.07	1.61	1.13

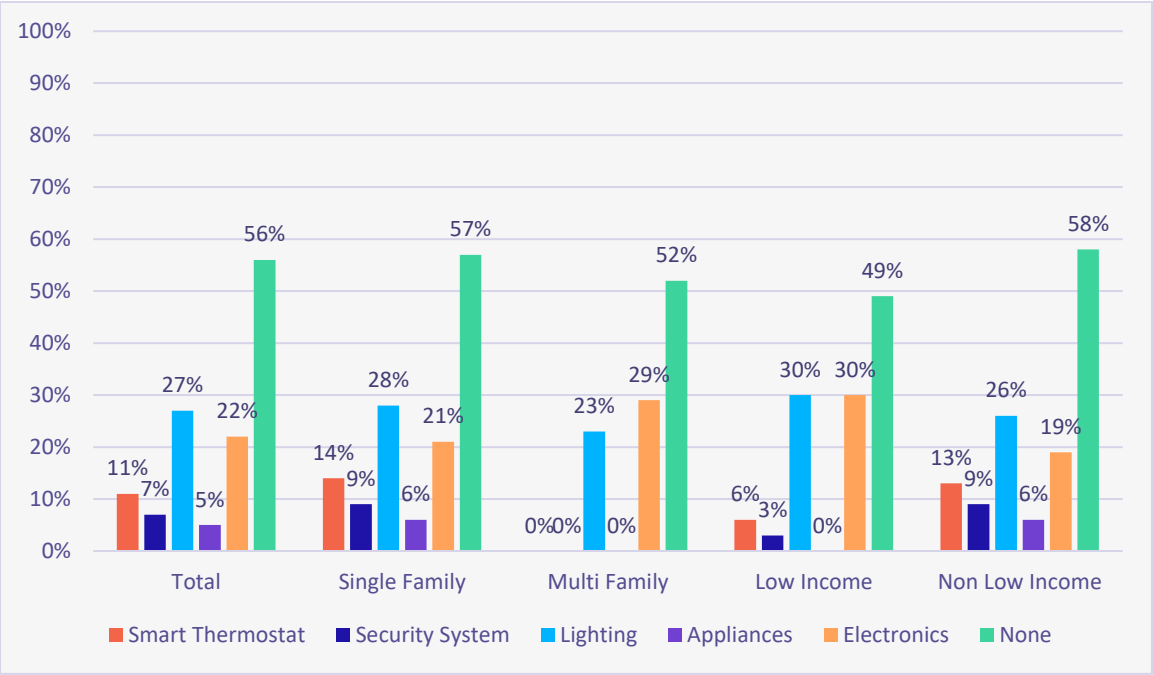
Laptop computers are the most likely type of computer to be in a home, followed by tablets and then desktop computers. The remaining electronics average less than one per household.

Table 3-5 Mean Number of Computer Equipment

	Segment	Stand Alone Audio	Laptop Computers	Tablet Computers	Desktop Computers	Printer/ Scanner/ Copers	Smart Hub (e.g., Alexa)
Housing Type	Single Family	.80	1.44	1.30	.66	.82	.84
	Multi Family	.53	1.20	.91	.41	.58	.71
Income Level	Low Income	.74	1.15	1.06	.48	.65	.49
	Non Low Income	.76	1.54	1.33	.72	.86	1.01

For those customers who have a smart hub (e.g., Alexa or Google home), they are most likely to control lighting and electronics. However, the majority of customers with a smart hub do not control any of the household items asked about in the survey.

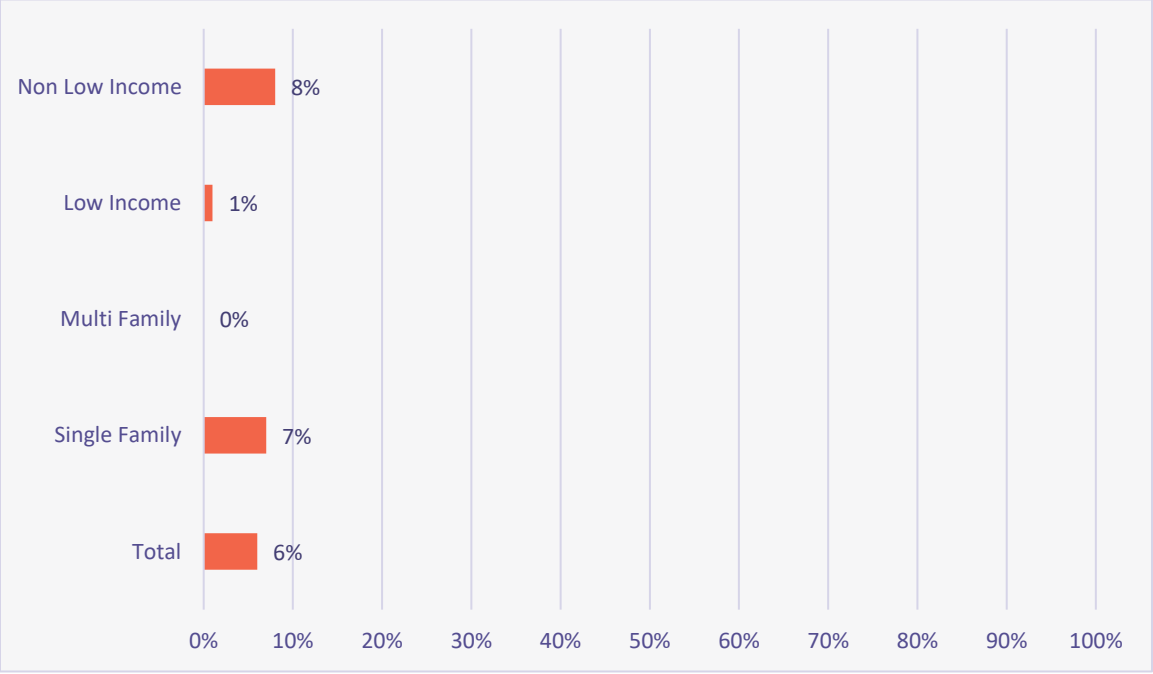
Figure 3-14 Devices Controlled by Smart Hub



Solar PV and Electric Vehicles

Few customers have Solar PV installed at their residence. Not surprisingly solar PV is more likely to be installed in Single-Family and Non-Low-Income households.

Figure 3-15 Solar PV Installed at Residence



Very few customers own electric vehicles and few plan to buy an EV or install solar PV in the next 2 – 3 years.

Figure 3-16 Electric Vehicle Ownership

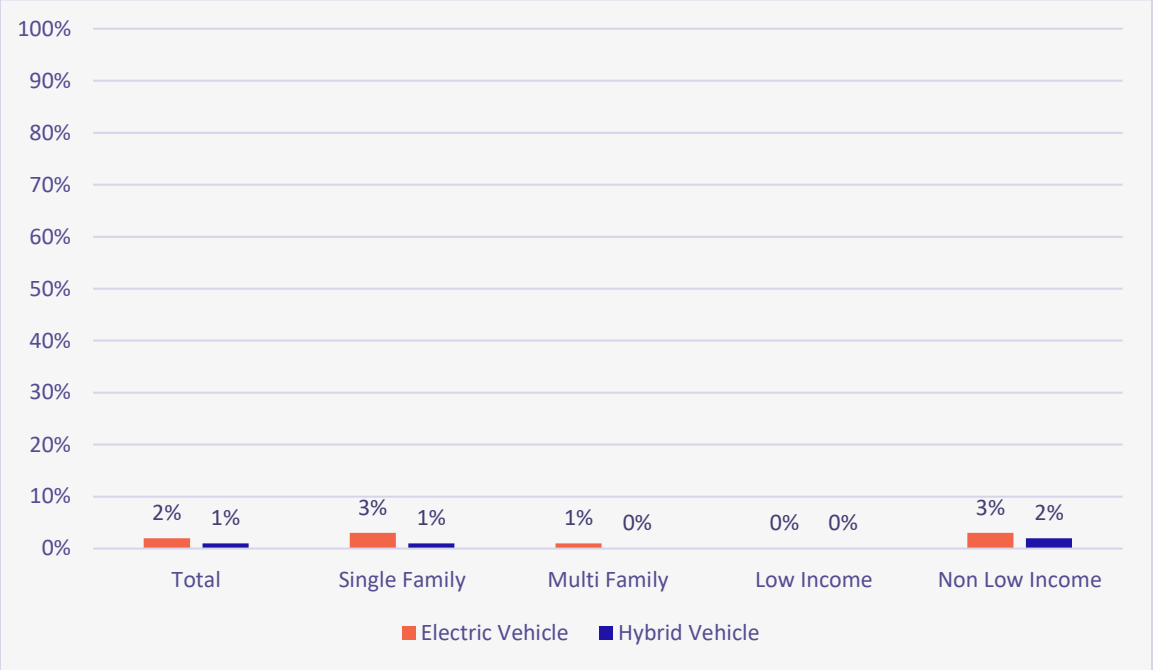
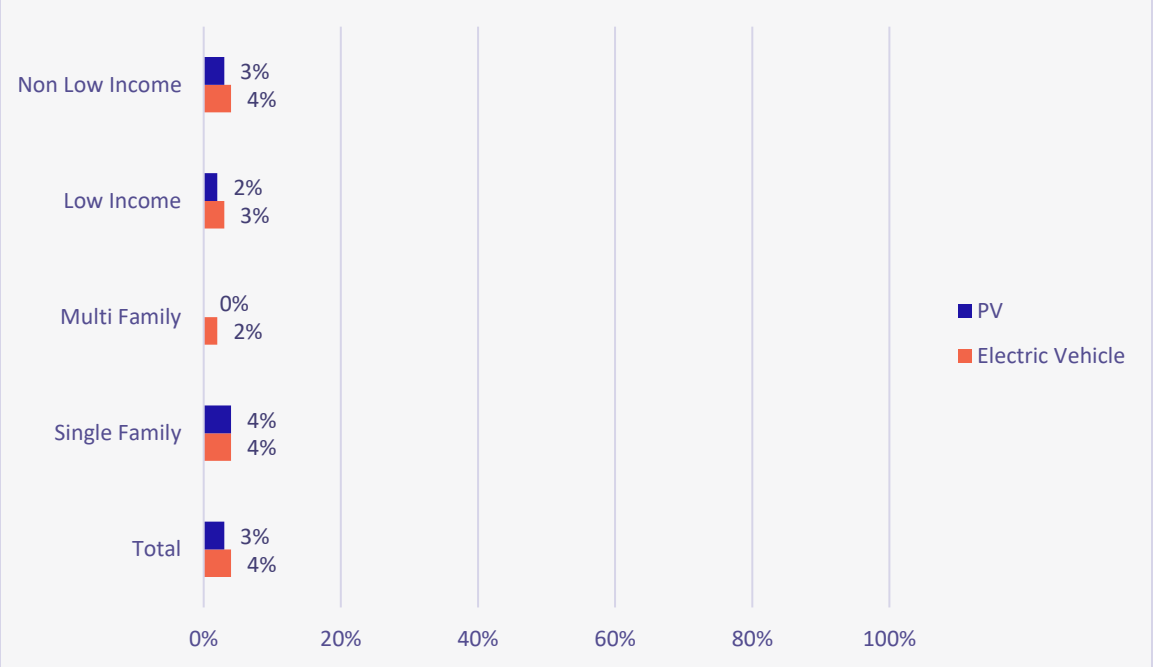


Figure 3-17 Likelihood of Buying an EV or Installing PV in the Next 2-3 Years (Top 3 Box)



Energy Efficiency Actions

Recent equipment purchases provide us with a snapshot of energy efficiency purchasing behavior. Less than 25% have recently purchased new major household equipment or appliances, and 2-8% of customers in each segment purchase standard efficiency while 3 – 17% purchased high-efficiency units.

Table 3-6 Recent Purchases (Last 2 Years)

	Heating System		AC Equipment		Water Heater		Refrigerator	
	Standard	High Efficiency	Standard	High Efficiency	Standard	High Efficiency	Standard	High Efficiency
Single Family	5%	7%	6%	16%	5%	12%	7%	16%
Multi Family	6%	4%	6%	8%	4%	3%	3%	4%
Low Income	2%	5%	3%	17%	3%	3%	4%	12%
Non Low Income	7%	7%	7%	13%	6%	15%	8%	16%

Five to eleven percent of customers in each segment have installed low E windows, and 0 – 12% have added insulation in the last three years. Smaller percentages plan to install either in the next two years. Few Multi-Family customers have installed or plan to install either improvement.

Table 3-7 Energy Efficiency Improvements

	Low E windows		Insulation	
	Completed last 3 years	Plan next two years	Completed last 3 years	Plan next two years
Single Family	10%	9%	12%	9%
Multi Family	5%	0%	0%	2%
Low Income	5%	6%	11%	8%
Non Low Income	11%	8%	10%	8%

In order to better understand naturally occurring energy efficiency, we asked if customers planned to replace their equipment with higher efficiency units. When they are in the market for new equipment, about 35-40% plan to replace their current heating, cooling, water heating, refrigerator, and dishwasher with a higher efficiency unit regardless of whether a rebate is offered. These results don't differ greatly by segment.

Fewer customers say they will replace their lighting with higher efficiency lighting. This is more likely due to the current saturation of LED lighting rather than a reduced desire to upgrade lighting compared to the other equipment asked about in the survey.

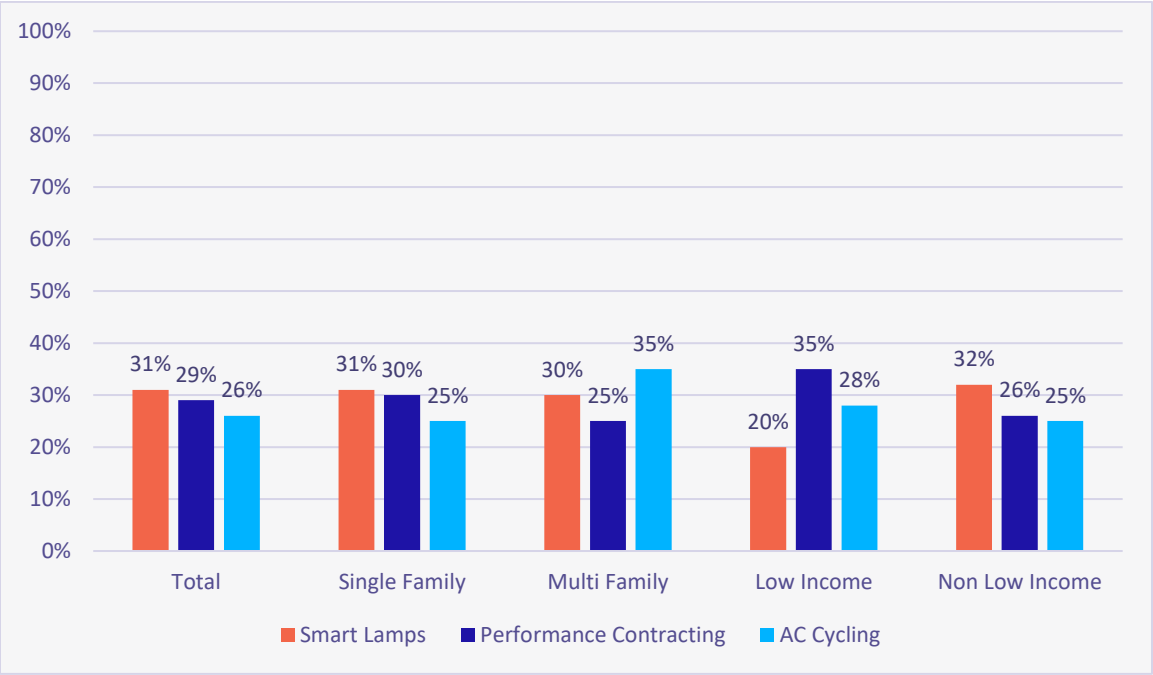
Figure 3-18 Likely to Replace Existing Equipment with Higher Efficiency (Top 3 Box)

Program Interest

A quarter to a little less than a third of customers say they are likely to participate in the three programs tested in the survey. The following descriptions were provided to respondents:

- **Smart Lamps:** New lighting technologies offer customers a way to control LED lighting remotely and adjust things like lighting colors, intensities, and fades, and to set automatic timers using a phone app or special controller. These bulbs, lamps, and associated technologies could also provide convenient ways to limit unnecessary consumption and reduce your overall electric bill. Liberty-Empire could work with product manufacturers to lower the price of qualified lights of this sort (sometimes called Smart Lamps) at local retail locations across the state. This means that all you would have to do is shop for Smart Lamps at a participating retailer and automatically receive reduced pricing on those bulbs.
- **Performance Contracting:** Some utilities have offered a program where you install energy efficiency improvements to your home and pay nothing at the time of installation. Instead, you are charged a monthly fee on your energy bill that is lower than the expected savings from the energy-efficient improvements until the total cost of the improvements is paid.
- **AC Cycling:** Some utilities offer programs designed to help the utility meet customer demand for electricity during summer weekday afternoons when electricity consumption is the highest. One way that Liberty-Empire could manage customer demand is to provide you with a Smart Thermostat (or use your existing Smart Thermostat) to cycle the compressor on your air conditioner on and off for 30 minutes out of every hour. These periods usually happen on hot summer weekday afternoons, for no more than 10 days each summer. There may also be other appliances (water heaters, dehumidifiers, etc.) which the customer could allow the utility to control. Customers participating in this program would receive a $25 bill credit each year.

Figure 3-19 Likelihood of Participating in Rebate Programs (Top 3 Box)



Demographics

The following tables show the demographic makeup of customers overall and by segment.

Table 3-8 Demographics

		Total	Single Family	Multi Family	Low Income	Non Low Income
Age	18 – 24 years old	3%	2%	7%	4%	2%
	25 – 34	18%	16%	27%	22%	16%
	35 – 44	20%	19%	22%	19%	20%
	45 – 54	17%	18%	13%	19%	17%
	55 – 64	25%	25%	24%	25%	24%
	65 and older	18%	20%	7%	12%	21%
Gender	Male	42%	40%	51%	26%	52%
	Female	56%	58%	49%	70%	48%
	Other	2%	2%	0%	4%	0%
Education	Less than High School	3%	2%	7%	7%	1%
	High School Degree	23%	22%	26%	32%	17%
	Technical/Trade School	10%	11%	10%	14%	8%
	Associates Degree or Some College	24%	24%	26%	31%	21%
	Bachelor's Degree	24%	24%	22%	13%	30%
	Graduate or Professional Degree	15%	17%	10%	3%	22%

		Total	Single Family	Multi Family	Low Income	Non Low Income
Employment	Employed Full Time	59%	57%	69%	48%	66%
	Employed Part Time	5%	5%	6%	3%	6%
	Retired	22%	24%	12%	20%	24%
	Full Tim Student	1%	1%	3%	4%	0%
	Unemployed	2%	3%	0%	5%	0%
	Something Else	10%	10%	10%	20%	4%
Income	**Less Than $15,000**	**7%**	**6%**	**17%**	**20%**	**0%**
	$15,000 – $19,999	5%	4%	5%	13%	0%
	$20,000 - $29,999	12%	11%	19%	33%	0%
	$30,000 - $39,999	11%	11%	14%	21%	5%
	$40,000 - $49,999	6%	6%	4%	4%	7%
	$50,000 - $59,999	9%	8%	10%	5%	11%
	$60,000 - $74,999	10%	11%	9%	4%	14%
	$75,000 - $89,999	10%	11%	5%	0%	16%
	$90,000 - $99,999	4%	5%	0%	0%	7%
	$100,000 - $114,999	3%	3%	4%	0%	4%
	$115,000 - $149,999	6%	8%	0%	0%	10%
	$150,000 or more	5%	6%	3%	0%	8%
	Don't know/Don't wish to say	11%	12%	8%	NA	NA

Household Characteristics

Table 3-9 Household Characteristics

		Total	Single Family	Multi Family	Low Income	Non Low Income
Household Size	Mean	2.86	2.96	2.33	2.93	2.82
Year Home Built	Before 1940	5%	6%	0%	4%	6%
	1940 – 1949	2%	2%	0%	1%	2%
	1950 – 1959	3%	4%	0%	6%	1%
	1960 – 1969	6%	8%	0%	8%	5%
	1970 – 1979	16%	19%	2%	21%	13%
	1980 – 1989	9%	9%	7%	9%	9%
	1990 – 1999	18%	19%	15%	10%	23%
	2000 – 2009	18%	19%	15%	10%	23%
	2019 – 2015	2%	2%	5%	2%	3%
	2016 – Present	4%	4%	8%	3%	5%
	Not Sure	16%	10%	46%	26%	10%
Square Footage	Less than 500 sq ft	1%	1%	3%	4%	0%
	500 – 999	14%	8%	42%	21%	9%
	1,000 – 1,499	37%	35%	49%	51%	29%
	1,500 – 1,999	22%	25%	4%	16%	25%
	2,000 – 2,499	9%	11%	2%	4%	12%
	2,500 – 2,999	7%	9%	0%	1%	11%
	3,000 – 3,999	5%	7%	0%	3%	8%
	4,000 or more	4%	5%	0%	0%	6%
Type of Home	Single Family Detached	70%	83%	0%	56%	77%
	Single Family Attached (Duplex or Townhome)	8%	9%	0%	10%	7%
	2 – 4 unit MF building (Apartment or Condo)	5%	0%	30%	9%	3%
	5 or more units	11%	0%	70%	14%	9%
	Mobile or Manufactured Home	6%	8%	0%	12%	4%

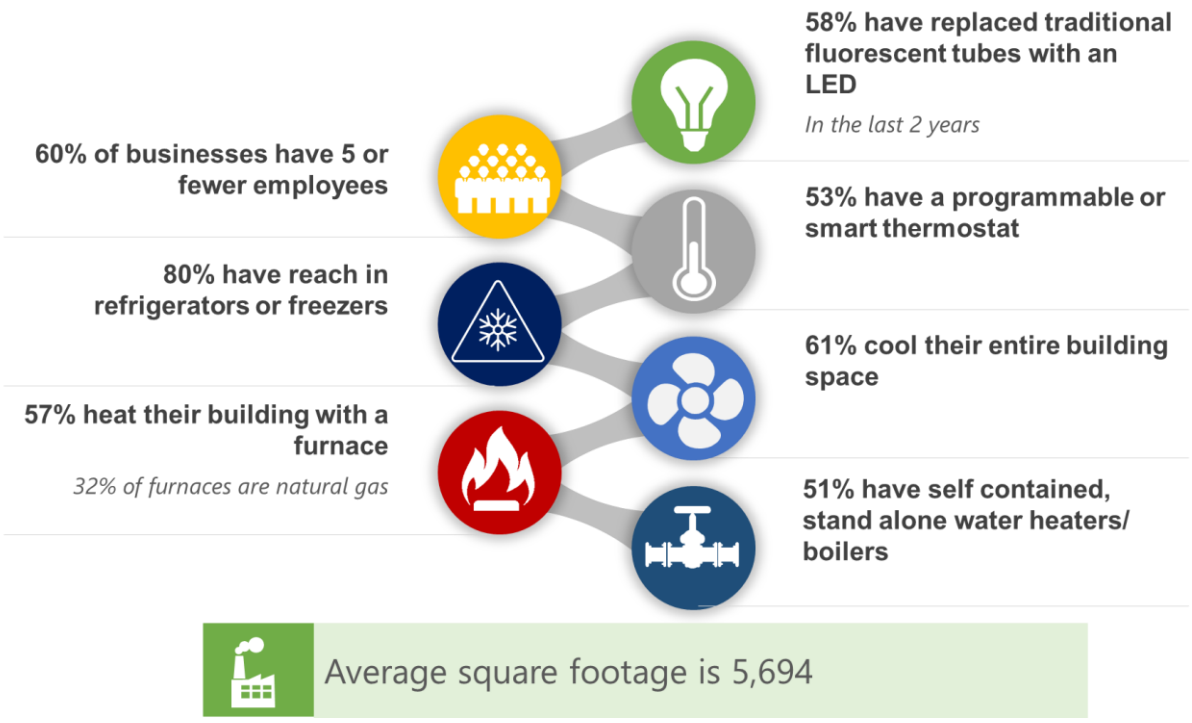
4

NONRESIDENITAL SURVEY RESULTS

This chapter presents the results from the nonresidential survey. The survey explored energy using equipment saturation in buildings, including heating, cooling, water heating, lighting, kitchen equipment, electronics, motors, generation, and electric vehicles. It also assessed customers' energy efficiency actions and their interest in utility energy efficiency programs. The results have been weighted to represent the population of Liberty - Empire nonresidential customers in Missouri.

Figure 4-1 shows the characteristics of a typical building in Liberty-Empire's Missouri service territory.

Figure 4-1 Typical Building Characteristics



The data was analyzed by electric consumption segments. The proportion of surveys by segment is shown in the table below.

Table 4-1 Nonresidential Survey Segmentation

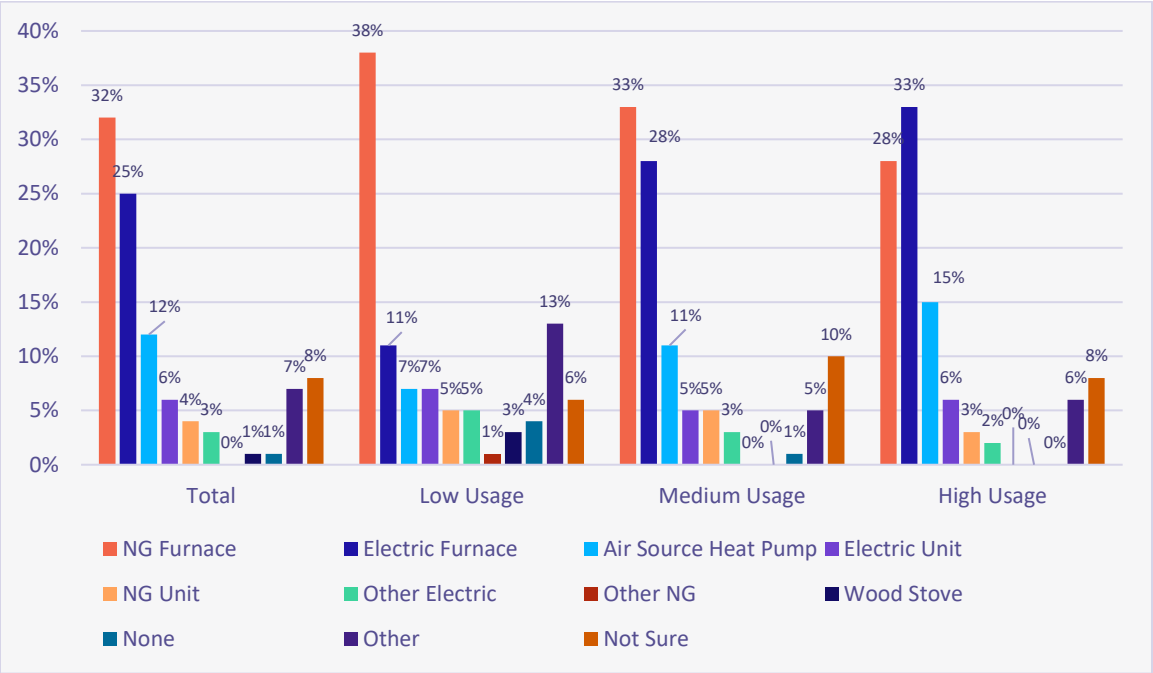
Segment	Number of Completed Surveys	% Population
Low Usage	85	28%
Medium Usage	109	36%
High Usage	108	36%

The remaining results presented in this chapter are shown by segment.

Heating and Cooling

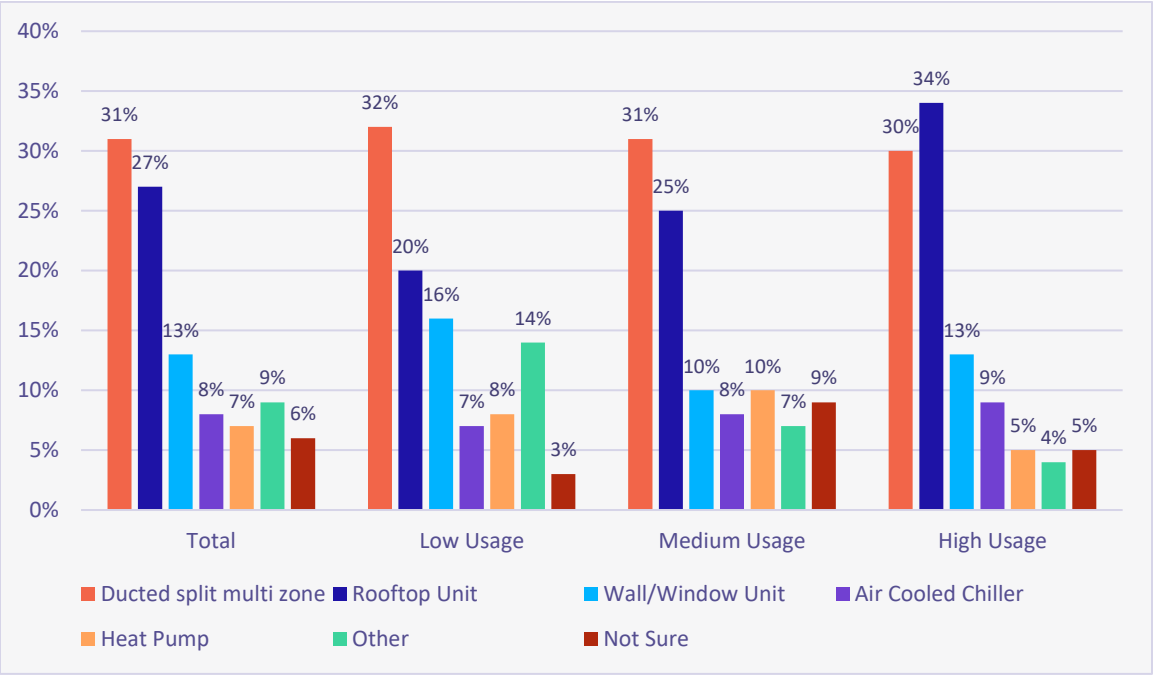
The majority of businesses have a furnace as their main heating system. A little over a third of heating systems are natural gas furnaces and a quarter of businesses have an electric furnace. High usage customers are more likely to have electric furnaces and air source heat pumps.

Figure 4-2 Primary Heating System



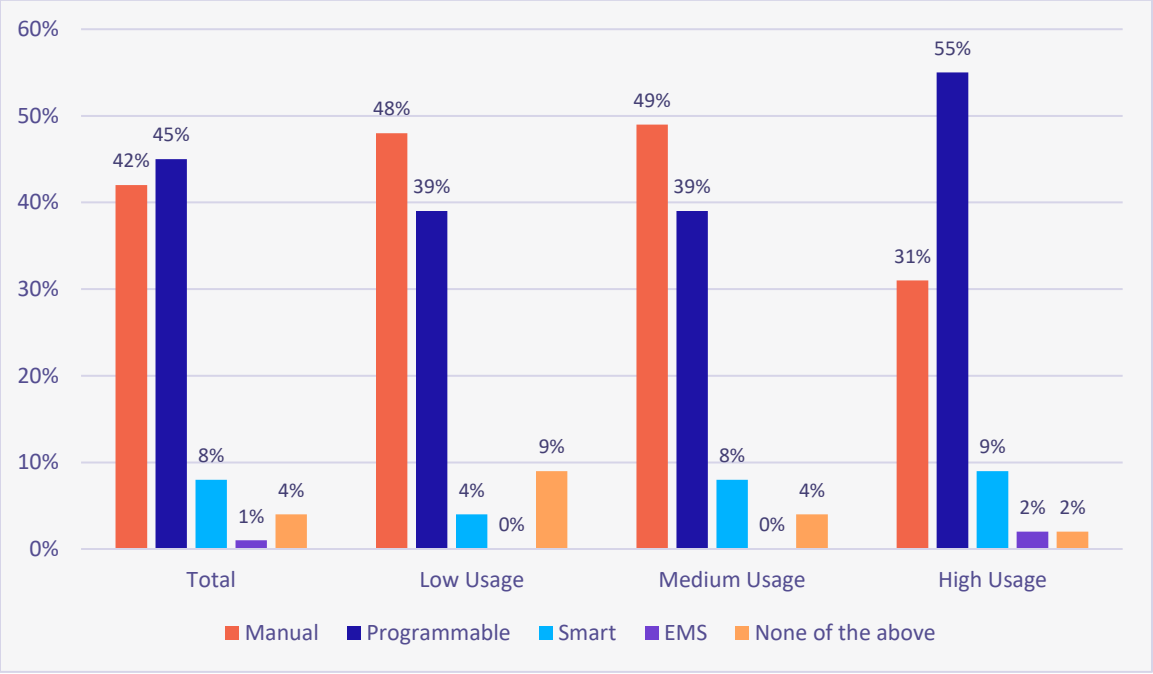
Ducted mini-splits and rooftop units are the most popular cooling systems. Higher usage customers are more likely to have rooftop units.

Figure 4-3 Primary Cooling System



A large proportion of customers have manual thermostats particularly among the lower usage segments.

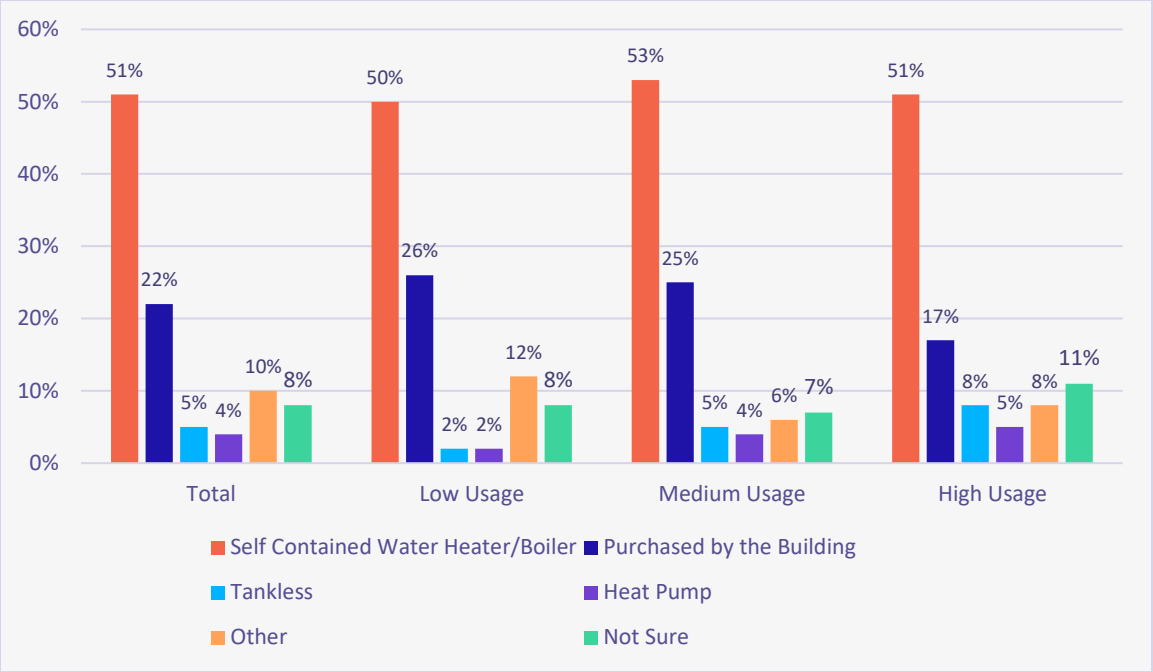
Figure 4-4 Type of Thermostat



Water Heating

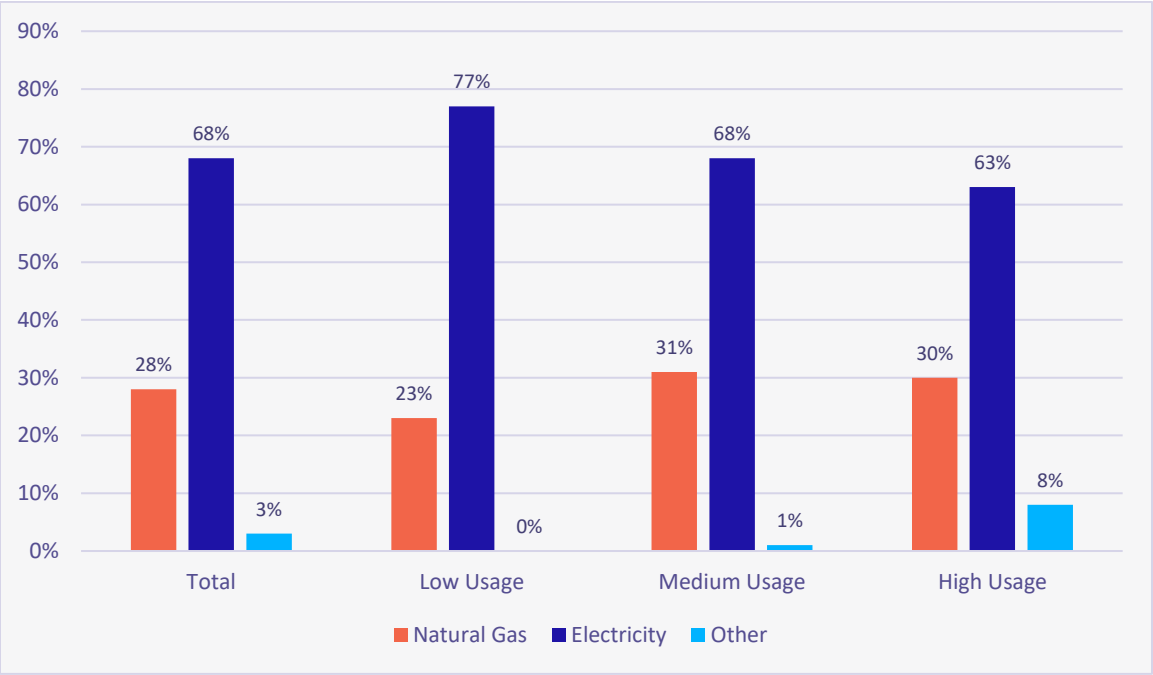
About half of businesses have self-contained water heaters or boilers. There is little difference in the type of water heat among the segments, although fewer high usage customers purchase hot water from the building.

Figure 4-5 Type of Water Heater



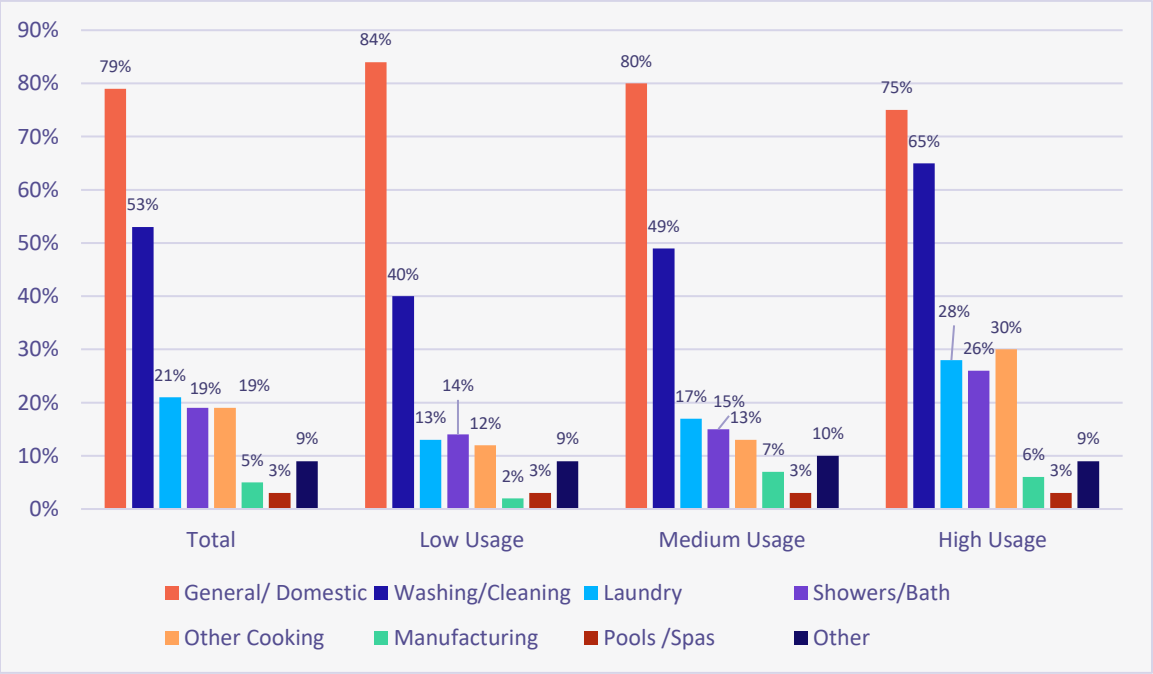
Most businesses use electricity to heat their water, less than a third use natural gas.

Figure 4-6 Water Heater Fuel[5]



The majority of businesses use hot water for general domestic reasons and for washing and cleaning. More higher usage customers use hot water for washing/cleaning, laundry, showers/baths and other cooking.

Figure 4-7 Hot Water Use



[5] Does not include respondents who said they purchase hot water from the building or who answered other or not sure.

Lighting

Although the average customer has several LEDs installed, incandescent bulbs and typical fluorescent tubes are prevalent.

Table 4-2 Mean Number of Lighting by Type

Segment	Incandescent	LED Bulb	CFL	Halogen	Typical Fluorescent	LED Tubes	Wide faced down lights	HID	Other LEDs	Neon	Exit	Other
Low Usage	6.18	10.55	4.11	.09	15.07	3.04	.85	.13	5.29	.20	2.56	.37
Medium Usage	3.42	12.34	2.40	.69	24.45	7.63	.33	.36	3.36	.13	1.37	.95
High Usage	9.41	39.60	9.39	.47	40.70	65.38	2.69	.22	13.17	1.68	3.88	1.0

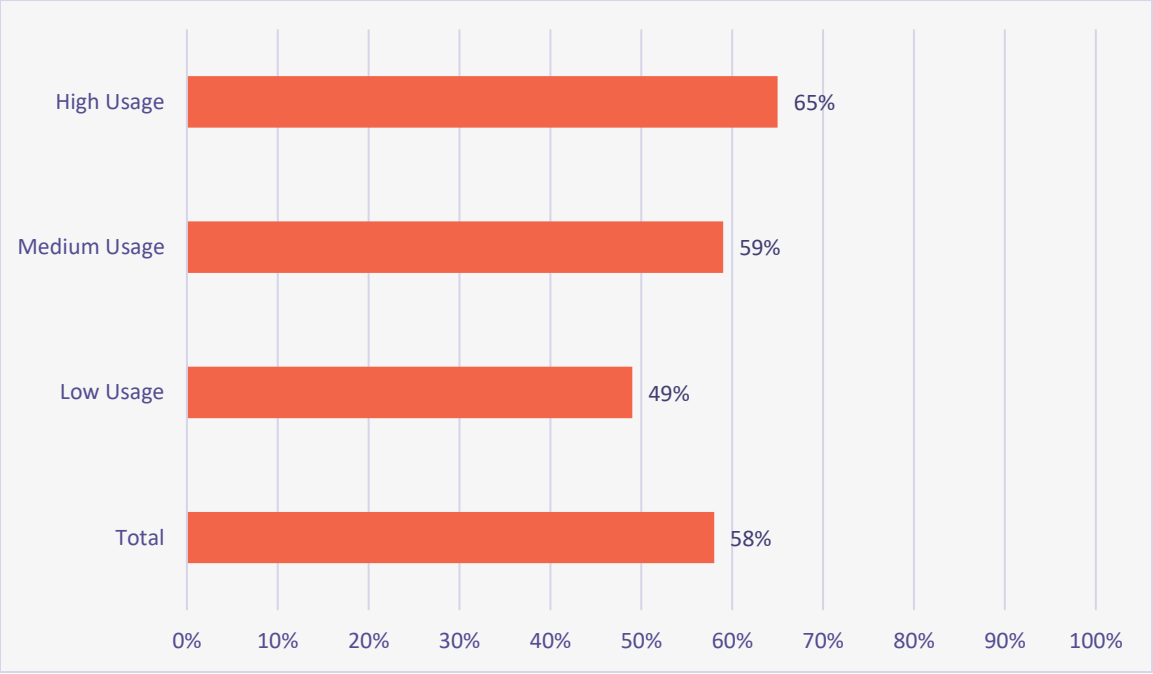
Most interior lighting using a manual single switch to control interior lighting.

Table 4-3 Interior Lighting Controls

Segment	Manual Single Switch	Manual Dual Switch	Manual Circuit Breaker	Occupancy Sensor	Timers	Photocell	Daylight Sensor	EMS	Other	Not Sure
Low Usage	86%	8%	1%	0%	1%	0%	1%	1%	0%	2%
Medium Usage	80%	15%	1%	0%	1%	0%	1%	0%	1%	0%
High Usage	67%	16%	9%	1%	2%	1%	1%	0%	0%	3%

The majority of businesses have replaced fluorescent tubes with LEDs in the last two years.

Figure 4-8 Businesses Who Replaced Fluorescent Tubes with LEDs in Last 2 Years



Kitchen Equipment

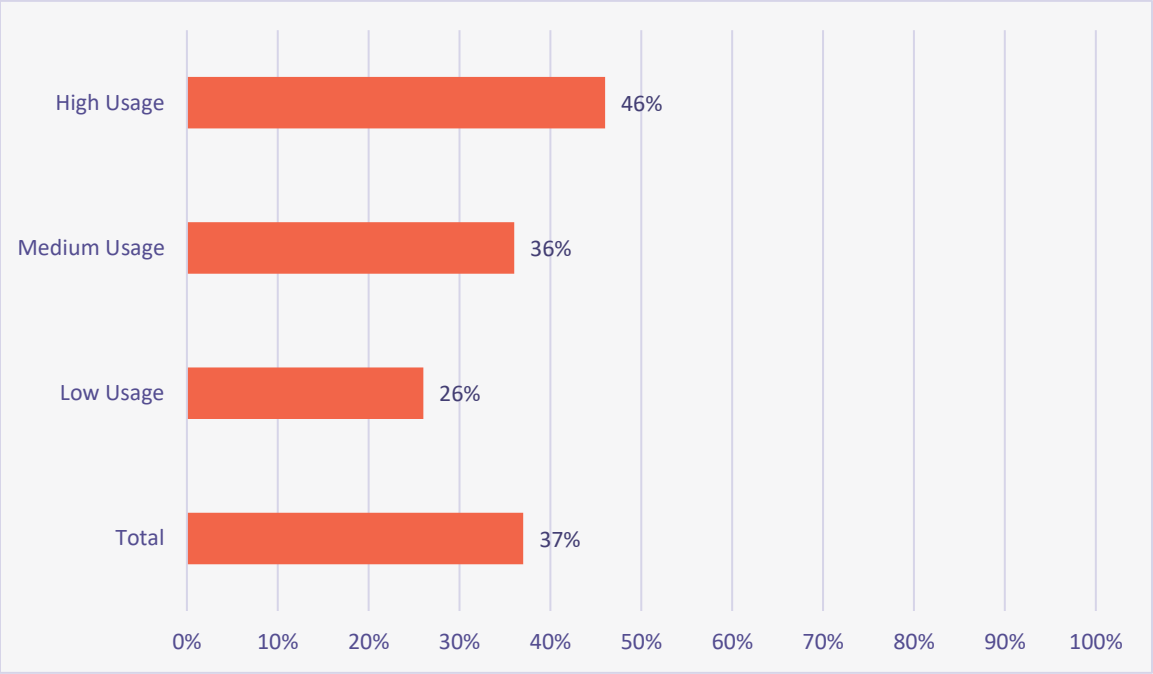
Businesses have an average of 1 -3 reach in refrigerators or freezers, but few other types of refrigeration.

Table 4-4 Mean Number of Refrigeraton and Food Display Equipment

Segment	Reach in Refrigerator or Freezer	Walk in Refrigerator or Freezer	Glass Door Refrigerator or Freezer Display	Open Refrigerated Display	Vending Machines	Ice Machines
Low Usage	3.23	.04	.03	0	.01	.05
Medium Usage	1.26	.02	.12	.01	.03	.11
High Usage	3.17	.57	.69	.06	.49	.63

A little over a third of businesses have cooking equipment at their facility. A higher proportion of higher usage customers have cooking equipment.

Figure 4-9 Businesses with Cooking Equipment in the Facility



More customers use electricity to fuel their cooking equipment, although high usage customers have a higher average number of natural gas stove top burners.

Table 4-5 Mean Number of Electric Cooking Equipment

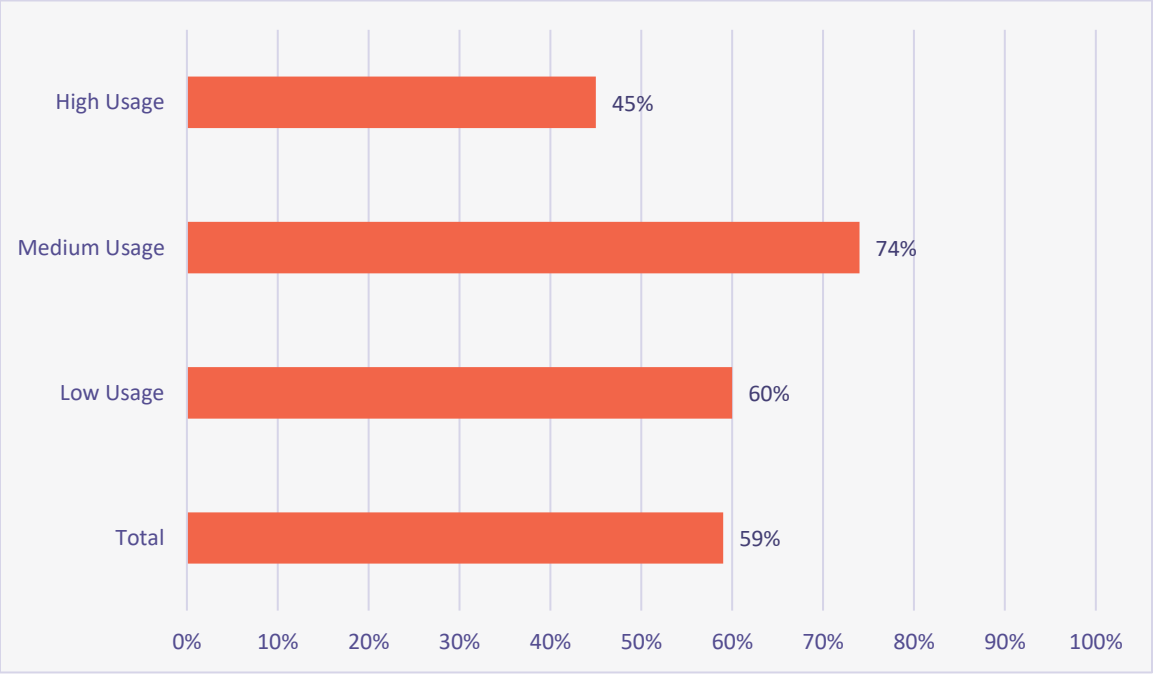
Segment	Fryers	Flattops	Ovens	Stove top Burners	Induction Range	Broilers	Steamers	Hot Food Cabinet
Low Usage	.10	.05	.71	.83	.05	0	0	.05
Medium Usage	.05	.14	1.18	1.62	0	.63	.04	.58
High Usage	.85	.38	.84	.53	.08	.15	.26	.58

Table 4-6 Mean Number of Natural Gas Cooking Equipment

Segment	Ovens	Stove top Burners	Wok	Broilers
Low Usage	.32	.28	.04	0
Medium Usage	.5	1.08	.06	0
High Usage	.65	1.19	.03	.08

More than half of businesses have a dishwasher.

Figure 4-10 Businesses with Dishwashers in the Facility



Electronics

The average number of desktop computers and monitors range from 2 to 10.5. High usage customers have a higher average number of every type of electronic equipment.

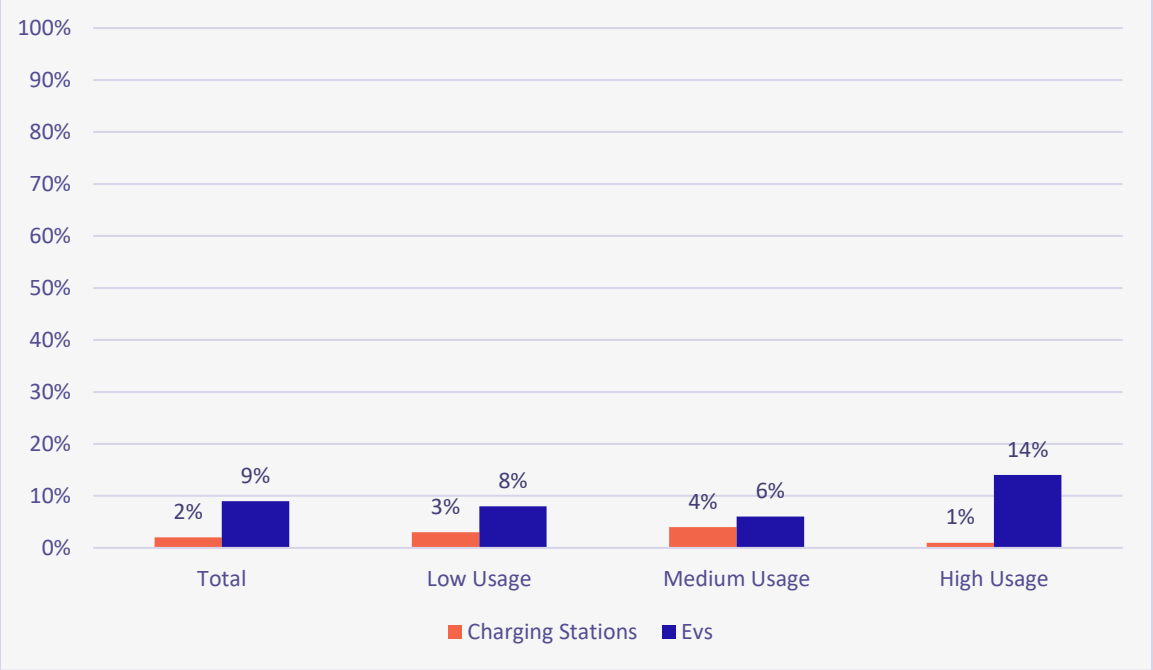
Table 4-7 Mean Number of Electronic Equipment

Segment	Desktop Computers	Computer Monitors	POS Terminals	Laptop	Scanners/ Printers/ Copers/ Fax	Computer Server	Networking Equipment
Low Usage	2.04	2.51	.37	.92	1.68	.53	1.52
Medium Usage	2.48	3.5	.36	1.16	1.97	.55	1.85
High Usage	7.06	10.52	1.32	7.87	3.34	1.01	3.55

Electric Vehicles

Nine percent of businesses have electric vehicles but only two percent have charging stations.

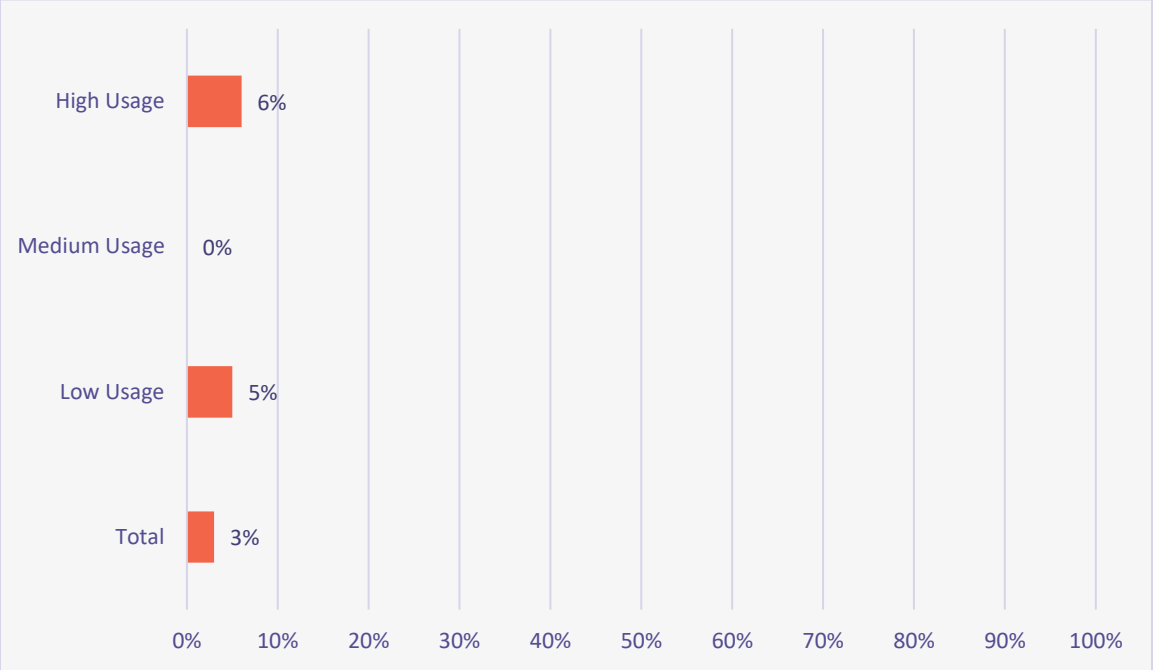
Figure 4-11 Businesses with Electric Vehicles and Charging Facilities



Generation and Back Up

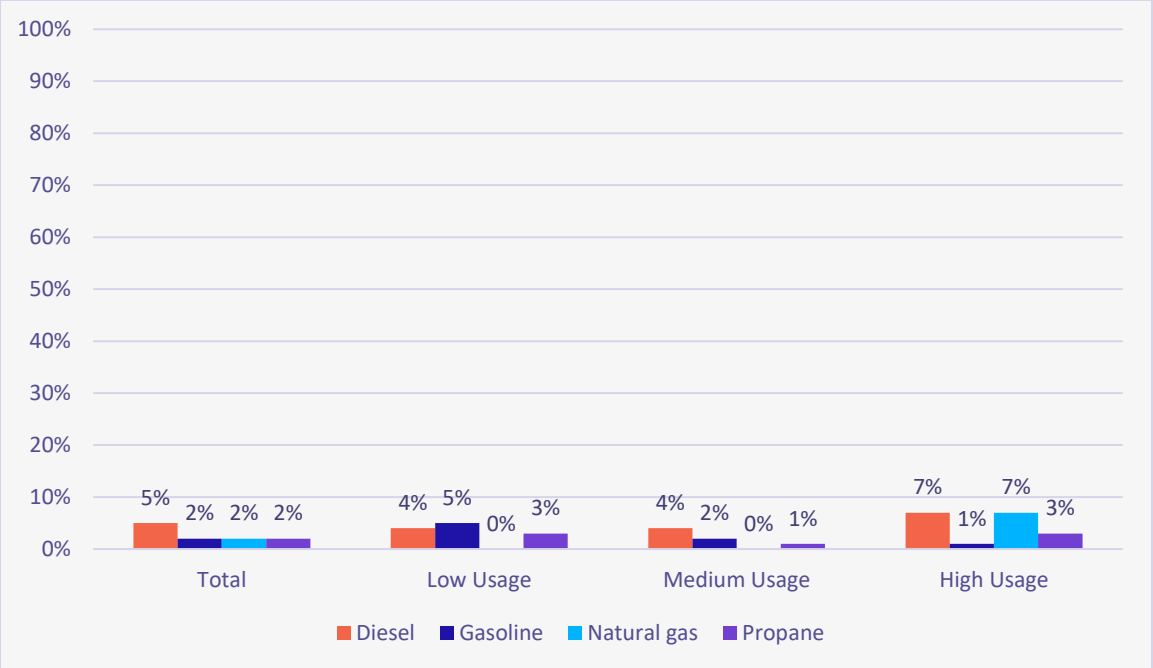
Few businesses have solar PV and none of the businesses surveyed have cogeneration at their facility.

Figure 4-12 Businesses with Solar PV



Few customers have stand by or backup generators.

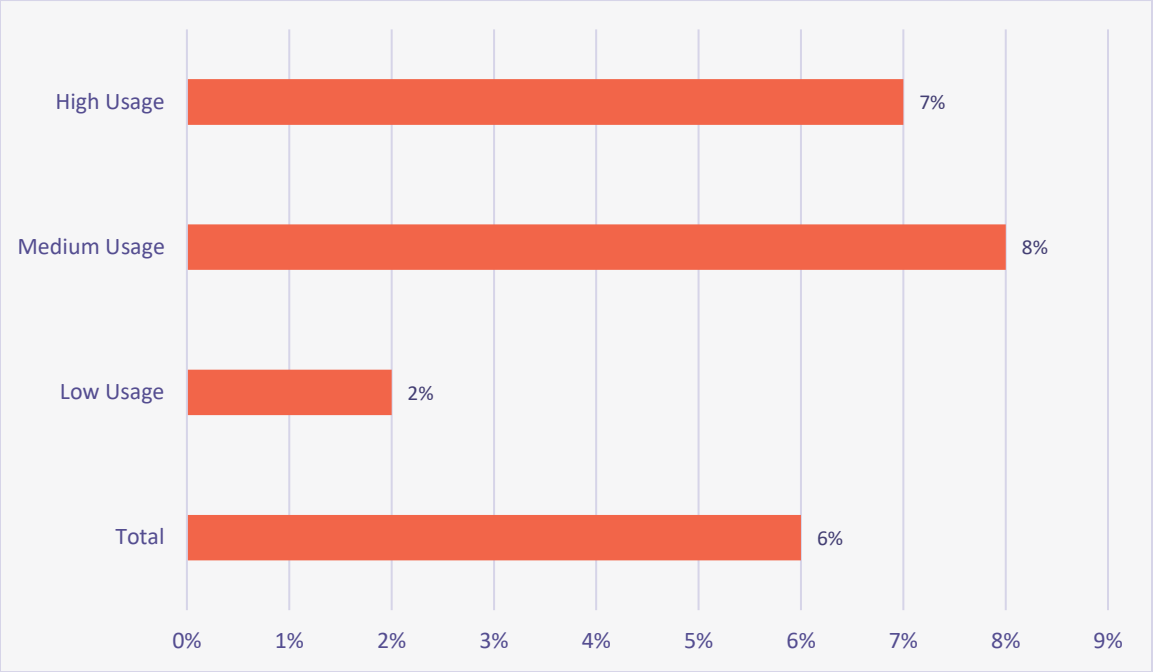
Figure 4-13 Businesses with Standby, Back Up or Generators



Motors

Six percent of businesses have manufacturing facilities. These facilities tend to fall into the medium and high usage groups.

Figure 4-14 Businesses with Manufacturing Facilities



Almost three-fourths of high usage customers say that 50% or more of their electricity use is due to motors.

Table 4-8 Proportion of Electricity Use from Motors

Segment	Less than 5%	5% to less than 25%	25% to less than 50%	More than 50%
Low Usage	0%	25%	75%	0%
Medium Usage	59%	37%	4%	0%
High Usage	11%	15%	0%	74%

Medium usage customers primarily use motors for fans and blowers while high usage customers use a variety of motor types. The vast majority of motors are less than 5 HP.

Table 4-9 Mean Percentage of Motors by Type

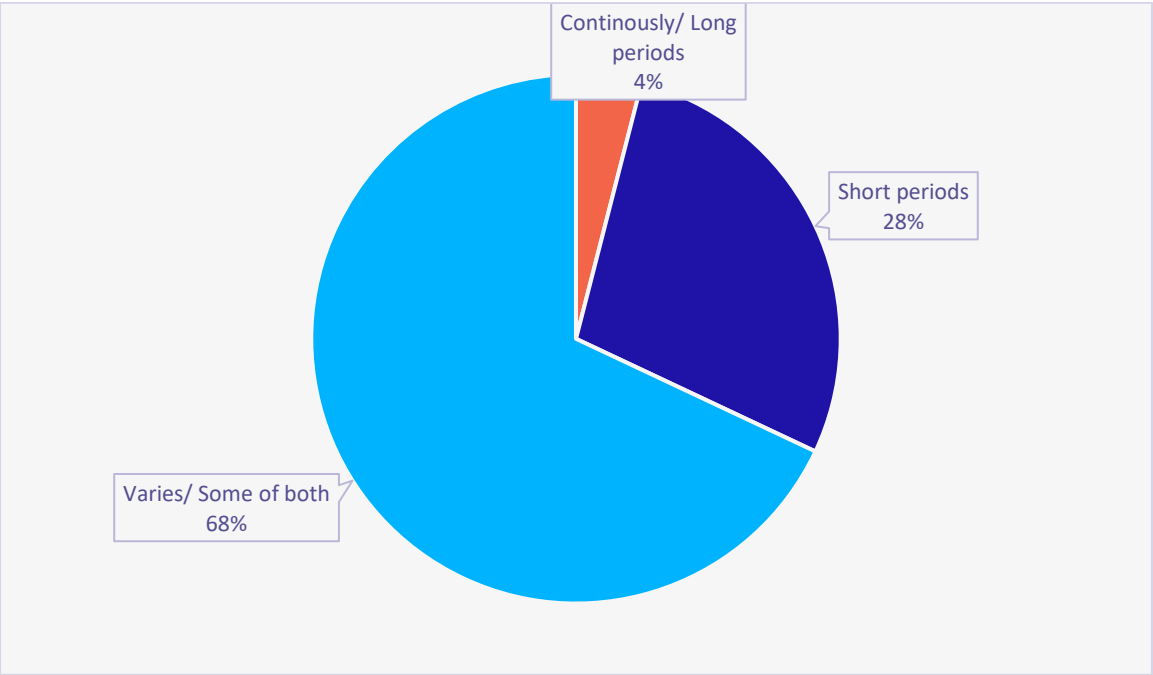
Segment	Fans and Blowers	Pumps	Compressed Air	Conveyors	Other
Low Usage	5%	4%	8%	8%	76%
Medium Usage	66%	11%	15%	0%	8%
High Usage	23%	10%	27%	5%	35%

Table 4-10 Mean Percentage of Motors by Size

Segment	Less than 5 HP	5 – 24 HP	25 -99 HP	100 – 249 HP	250 – 499 HP	500 or more HP
Low Usage	5.48	.25	0	0	0	0
Medium Usage	4.27	.74	.23	0	0	0
High Usage	21.32	3.55	.56	.63	.29	.17

Motor operation tends to vary for both long periods of time and short periods of time.

Figure 4-15 Motor Operation



Energy Efficiency Actions

Recent equipment purchases shed some light on customers' current energy efficiency behavior. More high usage customers have purchased equipment in the last two years and have higher proportions of high-efficiency equipment.

Table 4-11 Recent Purchases – Heating, Cooling, Water Heating & Refrigeration (Last 2 Years)

	Heating System		AC Equipment		Water Heater		Refrigeration Equipment	
	Standard	High Efficiency	Standard	High Efficiency	Standard	High Efficiency	Standard	High Efficiency
Low Usage	12%	7%	14%	14%	8%	9%	10%	8%
Medium Usage	7%	12%	9%	18%	5%	8%	9%	6%
High Usage	12%	19%	17%	31%	10%	16%	15%	18%

Table 4-12 Recent Purchases – Motors, Office Equipment, Venitalation (Last 2 Years)

	Motors		Office Equipment		Ventilation	
	Standard	High Efficiency	Standard	High Efficiency	Standard	High Efficiency
Low Usage	5%	0%	22%	14%	7%	1%
Medium Usage	6%	4%	28%	18%	4%	3%
High Usage	6%	6%	34%	17%	8%	3%

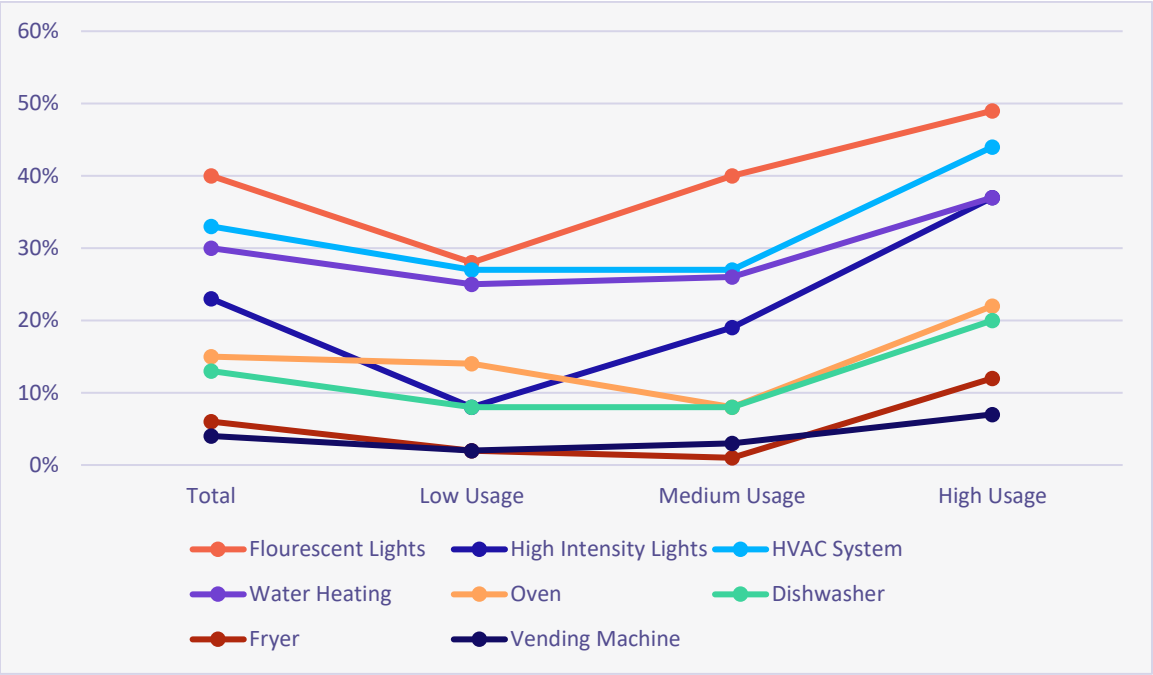
Twenty-two to forty-seven percent of customers in each segment have upgraded their lighting, and an additional fourteen to twenty-two percent plan to upgrade their lighting. Fewer customers have completed or plan to complete delamping, installing low E windows, or additional installation with ranges of 6 – 24%

Table 4-13 Energy Efficiency Improvements

	Upgrading Lighting		Delamping		Low E Windows		Insulation	
	Completed last 3 years	Plan next two years	Completed last 3 years	Plan next two years	Completed last 3 years	Plan next two years	Completed last 3 years	Plan next two year
Low Usage	22%	14%	12%	17%	8%	6%	9%	15%
Medium Usage	32%	22%	13%	8%	6%	7%	14%	8%
High Usage	47%	20%	22%	10%	11%	10%	24%	11%

Across the board, more higher usage customers plan to replace their current equipment with higher efficiency units regardless of whether a rebate is offered.

Figure 4-16 Likely to Replace Existing Equipment with Higher Efficiency (Top 3 Box)



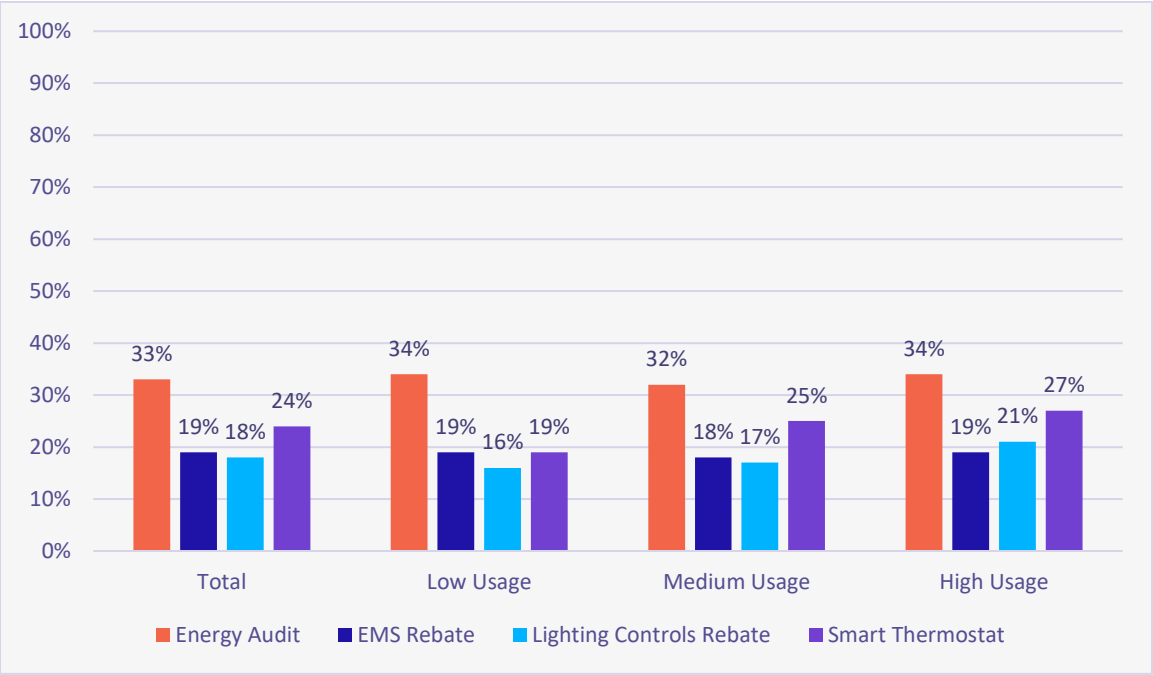
Program Interest

The following descriptions were provided to respondents:

- **Energy Audit:** Some utilities are offering energy audits to their business customers where a contractor would come to your business and conduct a free energy assessment. This representative would recommend energy efficiency measures that you could have installed to lower your energy bills. The utility would also offer a rebate covering up to 70% of the cost of the measures.
- **Energy Control Systems:** Liberty-Empire could also offer rebates on energy control systems that can help your business better manage and save energy. Now, for each of the energy control system improvements below, let's assume that the rebate from Liberty-Empire will save your business enough on electricity in 3 years to pay for the additional cost associated with installing each control system improvement. If this were true, how likely would your organization be to make each improvement?

Energy audits are the most popular program among business customers.

Figure 4-17 Likelihood of Participating in Rebate Programs (Top 3 Box)



Demographics

Business and building characteristics are included in the tables below.

Table 4-14 Business Characteristics

		Total	Low Usage	Medium Usage	High Usage
Business Type	Office	23%	31%	34%	7%
	Retail	17%	17%	19%	15%
	Grocery	1%	0%	0%	2%
	Restaurant	7%	1%	3%	15%
	Warehouse	6%	8%	7%	3%
	School	2%	1%	1%	4%
	Healthcare	7%	1%	9%	9%
	Lodging	3%	0%	1%	6%
	Entertainment	2%	1%	0%	5%
	Worship	7%	9%	8%	3%
	Mixed Use	1%	3%	1%	1%
	Manufacturing	6%	3%	6%	9%
Hours of Operation	8 hours; 5 days	65%	80%	73%	45%
	12 hours; 5 days	6%	1%	8%	8%
	8 hours; 7 days	8%	9%	9%	7%
	12 hours; 7 days	7%	2%	3%	15%
	24/7	14%	8%	7%	25%
Number of Employees	Fewer than 5	60%	82%	70%	34%
	5 – 9	21%	8%	25%	26%
	10 – 19	12%	6%	5%	24%
	20 – 49	4%	1%	1%	10%
	50 – 99	3%	3%	0%	6%
	100 – 199	0%	0%	0%	1%
	200 or more	0%	0%	0%	0%

Table 4-15 Building Characteristics

		Total	Low Usage	Medium Usage	High Usage
Building Size	Mean	5694	3868	3656	9701
Year Built	Before 1900	4%	3%	5%	4%
	1900 – 1949	13%	16%	16%	8%
	1950 – 1969	12%	11%	13%	12%
	1970 – 1979	9%	6%	8%	12%
	1980 – 1989	9%	13%	8%	9%
	1990 – 1999	15%	18%	12%	15%
	2000 – 2009	15%	17%	12%	15%
	2010 – Present	9%	6%	6%	15%
	Not Sure	15%	10%	22%	12%

A

SURVEY INSTRUMENTS

Presented below are the surveys as administered. Programmer notes are included as a reference to the reader.

Residential Survey

Welcome. This survey is sponsored by Liberty.

Please enter the 5-digit "Survey ID#" that appears on the survey invitation you received. This ID# should be located just above the mailing address on the invitation.

Survey ID# : _____

****PROGRAMMER: VERIFY VALID CODE AND READ IN ALL VARIABLES FROM SAMPLE FILE. ****

The information you provide will be kept anonymous. Your completed survey will go directly to an independent research company, which will collect and analyze the results. If you have any concerns about the legitimacy of this survey, please call Liberty at **1-800-206-2300.**

INTRODUCTION

Thank you for taking the time to see if you and your household qualify to participate in a new research study about energy. Information from the survey will assist Liberty in its efforts to develop energy efficiency programs that are best suited to helping our customers save money.
Your household is one of a small number being asked to respond to the survey. To show our appreciation for your time and effort, we will send a **$25 Amazon gift card as a Thank You** to **the first 300 people** who qualify for, and then complete the survey, which should take about 20 minutes.
You will first be asked a few questions to make sure that your household qualifies to complete the full survey.
If you need to pause the survey at any time, you can come back later to where you left off. Simply save the URL and the Survey ID# from your survey invitation to access your survey again. The survey will automatically take you to the point where you left off.

Please also note that any word or phrase that appears in blue, underlined font will provide a pop-up box with a definition of the word or phrase when you mouse-over it.

Please click "Next" to see if you qualify for the survey.

RESPONDENT SCREENING

S1. What is your role in making energy-related decisions about things such as adjusting your home's thermostat, selecting light bulbs, or selecting new appliances for your household? Would you say . . .

1. You are primarily responsible for some or all of these decisions
2. Someone else in your household is primarily responsible for these types of decisions **[GO TO R1]**
3. You share responsibility for these decisions with others in your household, or with a landlord or property manager
4. Don't know **[GO TO R1]**

[IF S1=2 OR 4, SKIP TO R1 AND THEN TERMINATE. IF S1=1 OR 3, CONTINUE]

S2. All of our questions will relate to the survey address shown on your invitation letter and below.

*Any reference to "your home," here and throughout the rest of this survey, will refer specifically to the residence at **[READ IN ADDRESS FROM SAMPLE]**.*

Is this either your address or an address about which you might be knowledgeable?

1. Yes
2. No

[PROGRAMMER NOTE: IF S2=1, CONTINUE, IF S2=2, TERMINATE VIA STANDARD TERMINATE LANGUAGE]

S3. Which of the following best describes this residence? Is it a . . .?

1. A single-family home, detached from any other houses
2. A single-family attached home, such as a duplex or townhome, with no other units above or below this residence
3. An apartment or condominium in a multi-family building that has 2-4 units in total
4. An apartment or condominium in a multi-family building that has 5 or more units in total
5. A mobile or manufactured home
6. Something else [Specify]

[SEE MF / SF BUILDING TYPE QUOTA]

S4. Which of the following categories represents your current age?

1. Less than 18 years old **[TERMINATE VIA STANDARD TERMINATE LANGUAGE]**
2. 18-24
3. 25-34
4. 35-44
5. 45-54
6. 55-64
7. 65 or more years old

S5. Who is billed by the gas or electric company for each of the following things used in your home?

	1. Your household	2. Someone else (e.g., landlord, property manager)	3. Not sure	4. Not used in your home
A. Heating all or some of the space in your house / unit	○	○	○	○
B. Air conditioning or cooling all or some of the space in your house / unit (including any fans, dehumidifiers, etc.)	○	○	○	○
C. Water heating	○	○	○	○
D. Lights on the outside of your home or building	○	○	○	○
E. Clothes washer	○	○	○	○
F. Clothes dryer	○	○	○	○
G. Cooking appliances	○	○	○	○
H. Pump for a swimming pool or hot tub	○	○	○	○
I. Heater for a swimming pool or hot tub	○	○	○	○

[IF ALL S5 A-I NE 1, THEN TERMINATE (RESPONDENT MUST ANSWER (1) FOR AT LEAST ONE A-I END USES); OTHERWISE, CONTINUE]

[IF S1=2 or 4, CONTINUE, OTHERWISE PROCEED TO EITHER "TERMINATE" OR "INVITATION" LANGUAGE AS APPROPRIATE]

R1. Thank you for taking the time to see if you are eligible to participate in this survey. At this time, we need responses from someone in your household who has specific knowledge about the way your household makes decisions about energy-related issues are made for your home.
We would appreciate it if you would provide that person with the invitation postcard you received or refer them to the following link so that they may complete this survey:
[INSERT URL THAT INCLUDES SURVEY ID#]
[THEN DISPLAY "Thank you for your time." AND TERMINATE]

TERMINATE LANGUAGE FOR NON-QUALIFYING OR OVER-QUOTA RESPONDENTS

We truly appreciate your time and effort in responding to our survey invitation and answering these initial questions, which were designed to see if you are eligible to participate.

In order to achieve a representative sample, quotas with specific criteria have been designated. At this time, we have reached the number of respondents we can accept from individuals with your type of experience or background. Again, we would like to thank you for your time and effort.

Thank you. Have a nice day!

INVITATION LANGUAGE FOR QUALIFYING RESPONDENTS

Thank you for your responses so far! You qualify for the survey. We appreciate your time in filling out the survey as completely as possible.

The survey should take about 20 minutes to complete. Once you complete the survey you will be eligible to receive our **$25 Amazon gift card as a thank you**. Information about how to receive this payment will be provided at the end of the survey.

Your responses are important to us, so please press "Next" to begin answering the survey questions. All information provided in this survey will be kept strictly confidential, and at no time will you be asked to purchase anything.

As you complete the survey, you will **not** be able to use your browser's "back" button. If you mistakenly press your browser's "back" button, you will need to press the "refresh" button to continue the survey.

HOUSEHOLD INFORMATION

[PROGRAMMER NOTE: THROUGHOUT THIS SURVEY, WORDS OR PHRASES WITH BLUE, UNDERLINED FONT WILL SHOW POP-UP BOX WHEN THE RESPONDENT MOUSES OVER THE WORD OR PHRASE. HYPERLINKED DEFINITIONS ARE PROVIDED AT THE END OF THIS DOCUMENT.]

Q1. **Including yourself**, how many individuals normally live in your home?
Do not include anyone who is just visiting, those away in the military, or children who are away at college.

[RECORD NUMBER 1-20] individuals

Q2. About when was your home built?
1. Before 1940
2. 1940-1949
3. 1950-1959
4. 1960-1969
5. 1970-1979
6. 1980-1989
7. 1990-1999
8. 2000-2009
9. 2010-2015
10. 2016 to the present
11. Not sure

Q2a. Has your home undergone any significant renovations either by you or previous occupants since it was built?
1 Yes
2 No

Q3. What is the total inside floor area of your home [including all floors], not counting garages or screened porches? *If you are not certain, please give your best estimate.*
1. Less than 500 sq. ft.
2. 500 – 999
3. 1,000 – 1,499
4. 1,500 – 1,999
5. 2,000 – 2,499
6. 2,500 – 2,999
7. 3,000 – 3,499
8. 3,500 – 3,999
9. 4,000 sq. ft. or more

Q4. How many stories or levels are there in your home? Please do NOT count any basements or attics in your response.
1. 1 story / level
2. 2 stories / levels
3. 3 stories / levels
4. 4 or more stories / levels

[IF S5_B=1, CONTINUE, OTHERWISE, SKIP TO QH1]

QC1. Which one of these cooling systems or equipment do you use to cool **the largest portion** of your home?

01. Central air conditioner
02. Ductless split air conditioning system (Sometimes called "mini split" systems, or ductless heat pump (DHP) systems)
03. Ducted split air conditioning system (Sometimes called "multi split" or "multi zone" systems)
04. One or more window or wall room air conditioners
05. Air-source heat pump
06. Geothermal heat pump
07. Whole-house fan or attic fan
08. One or more portable dehumidifiers
09. One or more ceiling fans
10. One or more window or room fans
97. Other (specify:_____)
98. Not sure **[EXCLUSIVE]**

[IF S5_A=1, CONTINUE, OTHERWISE SKIP TO QCT1]

QH1. Which one of the following systems/equipment do you use to **heat** your home, all or most of the time?

01. Central warm air furnace with ducts/vents to individual rooms
02. Central boiler with hot water/steam radiators or baseboards in individual rooms
03. Electric forced air furnace
04. Electric resistance or baseboard heat
05. Under floor, or radiant heating
06. Air-source heat pump
07. Ground-source or geothermal heat pump
08. Ductless split air conditioning system used in heating mode
09. Ducted split air conditioning system used in heating mode
10. One or more wood (or pellet) stoves
11. One or more portable electric space heaters
12. One or more portable gas-fueled, or other-fueled, space heaters
97. Other **[SPECIFY]**
98. Not sure **[EXCLUSIVE]**

[IF QH1=5, CONTINUE, OTHERWISE SKIP TO QH3]

QH2. Is the water used in your under-floor, or radiant, heating system heated with electricity or does this come from a central boiler heated by natural gas?

1. Electricity
2. Natural gas
3. [**NOT SURE**]

[IF QH1=1, CONTINUE, OTHERWISE SKIP TO QH4]

QH3. Is your central warm air furnace fueled by electricity, natural gas, or something else?

1. Electricity
2. Natural gas
3. Something else such as propane or oil
4. [**NOT SURE**]

[IF QH1=2, CONTINUE, OTHERWISE SKIP TO QCT1]

QH4. Is your central boiler fueled by electricity, natural gas, or something else?

1. Electricity
2. Natural gas
3. Something else such as propane or oil
4. Not sure

QCT1. Which of the following comes closest to describing the thermostat that you use to control your primary heating and / or cooling system? *Please select one option below.*

1. A standard / manual thermostat that has only one setting for the temperature you want.
2. A programmable thermostat that lets you set different temperature for different times of the day and/or for different days of the week.
3. A thermostat that is connected to the internet and gives you the ability to adjust the temperature through your cell phone or other computer interface but DOES NOT learn your schedule.
4. A "learning" smart thermostat that is connected to the internet and also learns your schedule, so it can automatically adjust the temperature at different times of the day in order to maximize energy savings. An example of this is the "Nest" learning thermostat.
5. No wall mounted thermostat.

[IF QCT1=2-4, CONTINUE, OTHERWISE SKIP TO QWH1]

QCT2. Does your programmable thermostat actually operate in a programmed mode for most of the year?

1. It is not programmed; we use it like a traditional thermostat
2. We occasionally run programmed settings
3. We always run programmed settings
4. Not sure

[IF S5_C = 1, CONTINUE, OTHERWISE SKIP TO QWH2]

QWH1. What type of water heating system do you use in your home? *If you use more than one water heating system, please answer for the system that is used most often*.

1. Standard water heater with a water storage tank
2. Instantaneous, or "tankless" water heater
3. Heat pump water heater
4. Solar thermal water heating system (Does not use electricity generated from a Photovoltaic (PV) system)
5. Something else
6. Not sure

[IF QWH1 = 1 OR 2, CONTINUE, OTHERWISE SKIP TO QK1]

QWH2. What type of fuel is used for your water heater?

1. Natural gas
2. Electricity
3. Something else (Please specify)
4. Not sure

QK1. Let's turn to traditional kitchen appliances, wherever these happen to be in your home. How many of

	Refrigerators / Freezers	Number of Units
1.	Combination refrigerator / freezer units	**[RECORD NUM 0-5]**
2.	Refrigerator-only units (excluding mini/wine fridges)	**[RECORD NUM 0-5]**
3.	Freezer-only units	**[RECORD NUM 0-5]**

each of the following cooking and kitchen appliances do you have in your home?

	Stoves / Cooktops / Ovens	Number of Units
4.	Stove top/ Cooktop	**[RECORD NUM 0-5]**
5.	Oven	**[RECORD NUM 0-5]**
6.	Combination stove / oven	**[RECORD NUM 0-5]**

	Other Kitchen Appliances	Number of Units
7.	Microwaves	**[RECORD NUM 0-5]**
8.	Dishwashers	**[RECORD NUM 0-5]**

[IF QK1_4, QK1_5, or QK1_6 = "1 OR MORE," CONTINUE, OTHERWISE SKIP TO QL1]

QK2. What type of fuel is used in the stove top, cooktop, or oven that you use as your primary cooking appliance?

1. Natural gas
2. Electricity
3. Propane
4. Something else (Please specify)
5. Not sure

QL1. Let's turn to traditional laundry appliances. How many of each of the following laundry appliances do you have in your home?

	Laundry equipment	Number of Units
1.	Clothes washers	**[RECORD NUM 0-5]**
2.	Natural gas fueled clothes dryers	**[RECORD NUM 0-5]**
3.	Electric clothes dryers	**[RECORD NUM 0-5]**

LIGHTING

Thank you for your responses so far! Next, we are going to ask you about your home's lighting, but before we do that, we would like to make sure you are familiar with the most common types of lighting used in homes these days.

The table below reviews the different types of lamps and bulbs most commonly used in American households. Please click "next" when you feel like you are familiar with each of these different types of lighting.

Lamp/fixture type		Example Images
Conventional Incandescent / Halogen bulbs	These are traditional screw-in light bulbs that are being phased out in many places.	
Wide-faced "down" lights or spotlights	These light bulbs have a wide, curved face and are typically used as "down" lights in ceiling fixtures, or in other places that need spotlighting.	
Compact fluorescent lamp (CFL)	A newer type of bulb that screws into a regular light socket, but which is a fluorescent light, and which also often has a non-traditional swirly or curved internal shape.	
Fluorescent tubes	Fluorescent tubes are less common in residences, but traditional fluorescent bulbs sometimes appear in homes as 2-foot or 4-foot tubes, or possibly shaped as a circle.	
LED lamps or bulbs	LED lamps or bulbs are electronic forms of lighting that do not use filaments like traditional incandescent bulbs, but instead, uses solid state electronics.	
Other LEDs, such as tubes, flat panel lights, or "down lights"	LED lights are also now becoming available in shapes other than bulbs, including tubes that replace traditional fluorescents, as well as flat panel lights and others.	

QL1. Now that you are familiar with the different types of lighting, please indicate in the table below about how many of each of different types of light bulbs/lamps you would say are currently present inside your home?

Please try to capture all of the bulbs or tubes in your home, including those in any free-standing lamps, as well as any lamps or tubes in any pantries or under cabinets, closets, or other places. Please also count any lamps in wall or ceiling fixtures. Remember that we want to count all of the bulbs and tubes, so if some fixtures have more than one tube or bulb, we'll want to count all of the actual tubes and bulbs as well.

Your best estimate is fine, but please enter a whole number for each type of lamp, bulb, or tube.

Lamp/fixture type		Total Number in Your Home
A)	Conventional Incandescent / Halogen bulbs	_____
B)	Wide-faced "down" lights or spotlights (non-LED)	_____
C)	Compact fluorescent lamps (CFL)	_____
D)	Fluorescent tubes	_____
E)	LED lamps or bulbs	_____
F)	Other LEDs, including tubes, flat panels, or "down" lights	_____
G)	Other types of lights	_____

QL2. Approximately how many of each of the following devices do you have to control lighting inside your home?

1. Timers: **[RECORD NUMBER 0-50]**
2. Motion detectors or occupancy sensors: **[RECORD NUMBER 0-50]**
3. Wi-fi enabled or smart-controllable lights: **[RECORD NUMBER 0-50]**

[IF S5_D=1, CONTINUE; OTHERWISE, SKIP TO QL4]

QL3. And about how many of each of the types of light bulbs/lamps would you say are currently on the outside of your home or residence?

Your best estimate is fine, but please enter a whole number for each type of lamp / fixture.

Lamp/fixture type		Total Number Outside Home
A)	Conventional Incandescent / Halogen bulbs	_____
B)	Wide-faced "down" lights or spotlights (non-LED)	_____
C)	Compact fluorescent lamps (CFL)	_____
D)	Fluorescent tubes	_____
E)	LED lamps or bulbs	_____
F)	Other LEDs, including tubes, flat panels, or "down" lights	_____
G)	Other types of lights	_____

QL4. Over the last 2 years, about how many **compact fluorescents, or CFL, bulbs** would you say you installed that replaced traditional incandescent bulbs?

_____ [**RECORD NUMBER**]

QL5. Over the last 2 years, about how many **LED bulbs or lamps** would you say you installed that replaced traditional incandescent bulbs?

_____ [**RECORD NUMBER**]

QE1. How many of each of the following types of electronic devices are regularly used in your home?

a)	Flat Screen Televisions	_____
b)	Non-Flat Screen TV	_____
c)	Set Top Boxes (Cable / DVR / Satellite boxes / Streaming devices)	_____
d)	Gaming Boxes or Consoles	_____
e)	Stand Alone Audio Equipment such as External Speakers / Sound	_____
f)	Laptop computers or 2-in-1 computers like a Microsoft Surface	_____
g).	Tablet computers like iPads or a Kindle Fire	_____
h)	Desktop Computers / Monitors	_____
i)	Printers / Scanners / Copiers	_____
j)	Smart Speakers / Smart Hub (such as Amazon Alexa or Google	_____

QE2. **[IF QE1_J = "1 OR MORE, CONTINUE, OTHERWISE SKIP TO QEV1]** Which of the following things are connected to your Smart Speaker / Smart Hub system? Please check all that apply. [**PROGRAMMER: MULTIPLE RESPONSES ARE ALLOWED, EXCEPT FOR OPTION "7" WHICH IS EXCLUSIVE**]

1. One or more Smart thermostats
2. Your home's water heater
3. Your home's security system
4. Some or all of your home's lighting
5. Some home appliances such as refrigerators or dishwashers
6. Some home electronics such as televisions or gaming systems
7. None of these

QEV1. How many of each of the following types of vehicles regularly "overnight" at this residence?

	Vehicle Types	**Number**
1.	All-Electric vehicles, such as a Tesla, Chevy Bolt, Nissan Leaf, BMW i3, Ford Focus Electric or others	**[RECORD NUM 0-5]**
2.	Plug-In Hybrid vehicles such as a Toyota Prius Prime, or a Chevy Volt, but most manufacturers have at least one model	**[RECORD NUM 0-5]**
TOT.	**Total # of vehicles:**	**[CALCULATE TOTAL]**

[IF QEV1_TOT >0 CONTINUE; ELSE SKIP TO QEV3]

QEV4. About how many times each week do you charge your electric vehicle(s) at each of the following locations?

	Charging locations	Number of Weekly Charges at this location
1.	At a charger at my home	**[RECORD NUM 0-21]**
2.	At a public charging station	**[RECORD NUM 0-21]**
3.	At a shared charger at my apartment or condo	**[RECORD NUM 0-21]**
4.	At work	**[RECORD NUM 0-21]**

QEV5. How likely would you say it is that your household will acquire one or more [**IF QEV1_1 = 1 OR MORE, ADD THE WORD "additional"**] all-electric vehicles within the next 2-3 years?

Not at all Likely								Highly Likely	
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
○	○	○	○	○	○	○	○	○	○

QPV1. Do you have a solar (also known as a photovoltaic, or "PV") system installed at this residence?
1. Yes
2. No

QPV2. [**IF QPV1=1, CONTINUE, OTHERWISE SKIP TO QPV4]** When was your solar, or photovoltaic (PV), system first installed at this residence?
1. Before 2000
2. 2000 - 2004
3. 2005 - 2010
4. 2011 - 2015
5. Since 2015

QPV3. [**IF QPV1=1, CONTINUE, OTHERWISE SKIP TO QPV4]** One of the new technologies that is becoming available are batteries designed to work with a PV system to store electricity generated by the system for use by your home at a later time. Does your home have a battery storage system?
1. Yes
2. No

[IF QPV1=2, CONTINUE, OTHERWISE, SKIP TO QEE1]

QPV4. How likely is it that your household will acquire a solar (or PV) system for your home within the next 2-3 years?

Not at all Likely								Highly Likely	
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
○	○	○	○	○	○	○	○	○	○

QEE1. Which, if any, of the following items have you purchased for this residence in the **last 2 years**, and if these purchases have been made, were any of the new items specifically described as "high energy efficiency,"

or ENERGY STAR-qualified purchases?" *Please select one response for each row. [**RANDOMIZE LIST ITEMS A-D]***

	Did not Purchase (1)	Purchased "Standard Efficiency" (2)	Purchased Highly Energy Efficient (3)
A) A new heating system	☐	☐	☐
B) New air conditioning equipment	☐	☐	☐
C) A new water heater	☐	☐	☐
D) A new refrigerator	☐	☐	☐

QEE2. Which of the following other **energy efficiency measures** have been implemented in this home **within the last three years, or do you plan to implement in the next two years**?
Select any that apply for each time period.

	Energy Efficiency Measures	Have implemented in last 3 years (1)	Plan to implement in next 2 years (2)	Neither (3)
A)	Replacing windows with windows designated as "low-e" glass and/or have a gas core that increases their energy efficiency	☐	☐	☐
B)	Adding or upgrading insulation on exterior doors, walls, ceilings, or roofs	☐	☐	☐

QEE3. For each of the following types of equipment or appliances, please tell us how likely you are to replace that equipment or appliance with highly energy efficient equipment the next time you need to do so, **regardless of whether or not** there are discounts available to reduce the cost of that equipment?

[RANDOMIZE 1-5]	Not at all likely to replace with highly energy efficient option							Extremely likely to replace with highly energy efficient option			Not Applicable
	1	2	3	4	5	6	7	8	9	10	
1. Existing incandescent lights	○	○	○	○	○	○	○	○	○	○	○
2. Existing heating system	○	○	○	○	○	○	○	○	○	○	○
3. Existing cooling system	○	○	○	○	○	○	○	○	○	○	○
4. Existing water heater	○	○	○	○	○	○	○	○	○	○	○
5. Existing refrigerator	○	○	○	○	○	○	○	○	○	○	○
6. Existing dishwasher	○	○	○	○	○	○	○	○	○	○	○

QEE4. ENERGY STAR is a label (or sticker) that can appear on almost any kind of energy-using appliances in the US. It is a government-regulated label that can only be used on devices that meet certain energy efficiency standards. Using the scale below, please indicate how well you feel like you understand what the presence of an Energy Star label on an appliance tells you about that product? [INCLUDE PHOTO OF ENERGY STAR LOGO]

I do not really understand what the ENERGY STAR label tells me									I fully understand what the ENERGY STAR label tells me
1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

Now I'd like to ask you some questions about programs and rebates Liberty may considering offering customers in the future.

P1. New lighting technologies offer customers a way to control LED lighting remotely and adjust things like lighting colors, intensities, and fades, and to set automatic timers using a phone app or special controller. These bulbs, lamps, and associated technologies could also provide convenient ways to limit unnecessary consumption and reduce your overall electric bill.

Liberty could work with product manufacturers to lower the price of qualified lights of this sort (sometimes called Smart Lamps) at local retail locations across the state. This means that all you would have to do is shop for Smart Lamps at a participating retailer and automatically receive reduced pricing on those bulbs.

How likely would you be to seek out "Smart Lamps," and receive an instant discount from participating retailers, during the next year?

Not at all likely to do this									Extremely likely to do this	Already have / do this
1	2	3	4	5	6	7	8	9	10	
○	○	○	○	○	○	○	○	○	○	○

P2. Some utilities have offered a program where you install energy efficiency improvements to your home and pay nothing at the time of installation. Instead, you are charged a monthly fee on your energy bill that is lower than the expected savings from the energy efficient improvements until the total cost of the improvements is paid.

If Liberty were to offer a program like this, how likely do you think you would be to participate?

Not At All Likely To Look Into This **Extremely Likely to Look Into This**

1 2 3 4 5 6 7 8 9 10

P3. Some utilities offer programs that are designed to help the utility meet customer demand for electricity during summer weekday afternoons when consumption of electricity is the highest.

One way that Liberty could manage customer demand is to provide you with a Smart Thermostat (or use your existing Smart Thermostat) to cycle the compressor on your air conditioner on and off for 30 minutes out of every hour. These periods usually happen on hot summer weekday afternoons, for no more than 10 days each summer. There may also be other appliances (water heaters, dehumidifiers, etc.) which the customer could allow the utility to control. Customers participating in this program would receive a $25 bill credit each year.

How likely would you say it is that you would explore more information about this AC cycling program?

Not At All Likely To Do This									**Extremely Likely**	**Not applicable/ to Do This**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**

Not our decision

ADDITIONAL HOUSEHOLD DEMOGRAPHICS

Okay, In order to help us classify your responses, the last few questions are on demographics.

D1. What is your gender?
1. Male
2. Female
3. Other

D2. What is the highest level of education you have completed?
1. Less than a high school degree
2. High school degree
3. Technical/trade school program
4. Associates degree or some college
5. Bachelor's degree
6. Graduate / professional degree, e.g., J.D., MBA, MD, etc.

D3. Which of the following best describes your personal employment status?
1. Employed full-time
2. Employed part-time
3. Retired
4. Active military
5. Full-time student
6. Unemployed
7. Something else _____

D4. Which of the following categories includes your household's total annual income before taxes in 2020? Please include the income of **all** people living in your home in this figure.

1. Less than $15,000
2. $15,000 – $19,999
3. $20,000 – $29,999
4. $30,000 – $39,999
5. $40,000 –$49,999
6. $50,000 – $59,999
7. $60,000 – $74,999
8. $75,000 – $89,999
9. $90,000 – $99,999
10. $100,000 -- $114,999
11. $115,000 – $149,999
12. $150,000 or more
13. Don't know / Don't wish to say

CONCLUSION

[INCENTIVE NAME/ADDRESS COLLECTION SCREEN]
Those are all the questions we have for you today. Thanks for your participation!

Congratulations you are eligible to receive a $25 Amazon gift card as a thank-you payment for completing the survey.

C1. In order to receive the $25 Amazon gift card we will need to collect some additional information from you. Please enter your name, email address, and phone number in the space below. (note that we will only call you if we need to confirm information relating to your incentive payment).

A. Full name _____
B. Email address _____
C. Verify email address _____
D. Phone number _____
☐ Refused incentive

[SHOW AFTER RESPONDENT COMPLETES ABOVE INFORMATION: "YOU SHOULD RECEIVE YOUR GIFT CARD WITHIN 3-4 WEEKS FROM THE TIME THAT WE CLOSE THE SURVEY"]

[NEXT SCREEN]
Thank you very much for your help with our research. It is greatly appreciated!

DEFINITIONS

[THE DEFINITIONS IN THE TABLE BELOW WILL EACH BE SHOWN IN A POP-UP BOX THAT IS TRIGGERED BY A HYPERLINKED WORD OR PHRASE]

Word / Phrase	Definitions
Air-source heat pump	A single system that draws in outside air to use in both heating and cooling your home
Central boiler with hot water/steam radiators or baseboards in individual rooms	A furnace that sends either hot water or steam to individual room radiators or baseboards to heat your home
Central warm air furnace with ducts/vents to individual rooms	A furnace that sends warm air to ducts or vents to heat your home
Electric baseboard or electric coil radiant heating	Devices that use electricity directly to produce heat for your home from baseboards or under-floor heating.
Geothermal heat pump	A single system that uses water or fluid that circulates through underground piping to provide both heating and cooling for your home
Heat pump water heater	A system that uses a refrigeration cycle in reverse to draw heat out of the surrounding air to provide hot water in a traditional water heater storage tank
Motion detectors	Electronic devices that are used to control lights in a room so that when someone is moving in a room, the lights are on, but when there is no motion in the room for several minutes, the lights are turned off
Occupancy sensors	Electronic devices that are used to control lights in a room so that when someone is present the lights are on, but where there is no one in the room for several minutes, the lights are turned off
Smart Thermostat	A “learning” thermostat that is connected to the internet and also learns your schedule, so it can automatically adjust the temperature at different times of the day in order to maximize energy savings. An example of this is the “Nest” learning thermostat.
Tankless (instantaneous/on demand) water heater	A water heater that only heats water for delivery to your home when you ask for it by using hot water. These systems do not keep a tank of water hot at all times.
Timers	Timers are typically used to control lights, turning them on and off at specific times of the day
Whole-house fan	A ventilation fan mounted in the ceiling of a central part of a home that removes heat from the *entire* home. It does this by first drawing that heat from the living areas of the home into the home’s attic, and then pushing the heat trapped in the attic to the outside through vents. Unlike an attic fan, which only removes heat from a home’s attic, a whole-house fan removes heat from the entire home.

Nonresidential Survey

Welcome. This survey is sponsored by Liberty.

To complete this survey, you will need the 5-digit Survey ID # printed above your address on the invitation we sent to you. Enter it in the box below to begin the survey.

[PROGRAMMER: VERIFY VALID CODE AND READ IN ALL VARIABLES FROM SAMPLE FILE]

Thank you for your interest in taking our survey. Information from the survey will assist Liberty in its efforts to develop energy efficiency programs that are best suited to helping our customers save money.

The information you provide will be kept anonymous. Your completed survey will go directly to an independent research company, which will collect and analyze the results. If you have any concerns about the legitimacy of this survey, please call Liberty at **1-800-206-2300**.

We are hoping that you, or someone else who is familiar with the energy operations at the facility located at the address that was listed on the invitation you received, will be able to complete the survey. As a thank you for your time, we will provide the first 300 customers who qualify and complete the survey with a **$50** Amazon Gift Card as a thank you payment. You should receive the payment electronically within three to four weeks after the survey closes.

RESPONDENT SCREENING

S1. Which of the following best describes your familiarity with the energy-related aspects of your business operations at **[READ IN ADDRESS FROM SAMPLE]**?

1. You are **very familiar** with the energy-related aspects of your operations at this location
2. You are **fairly familiar** with the energy-related aspects of your operations at this location
3. You are **not very familiar** with the energy-related aspects of your operations at this location **[GO TO R1]**
4. Don't know **[GO TO R1]**

S2. Which of the following best describes how your business is billed for electricity at **[READ IN ADDRESS FROM SAMPLE]**?

1. We are **billed directly by Liberty** for the electricity we use
2. We are **NOT billed directly by Liberty** for the electricity we use; our electric **bill is handled by another part of our company or by a third party service provider** (e.g., City and Village Tax Office, etc.), but ultimately, our company is responsible for the cost of our electricity
3 We are **NOT billed directly by Liberty** for the electricity we use; the cost for our electricity is **included in our rent/lease**
4. We are **served by another electric utility, not Liberty**
5. Don't know

[IF S2>2, TERMINATE WITH STANDARD TERMINATE TEXT]

S3. Which of the statements best describes your organization's role in using or managing the space at this location? Again, we are referring specifically to the operations at **[MERGED_ADDRESS]**. *[***READ RESPONSES***]*

1. We own or lease the space for our own business operations
2. We own or lease the space, but another organization actually uses the space
3. We own or lease the space, but we use some of it and rent / lease out some of it
4. We manage this space for the owners.
5. Not sure [**TERMINATE**]

S4. Does your operation at this location occupy any enclosed space, or is it an outdoor structure or operation, such as a billboard, a parking lot, a communications tower, or the like?

1. Occupies enclosed space
2. Is an outdoor structure or facility

[IF S4=2, TERMINATE WITH STANDARD TERMINATE TEXT; OTHERWISE CONTINUE]

S5. Which of the following best describes the type of facility your organization occupies?

1. Office (finance, insurance, real estate, law, etc.)
2. Retail (department stores, services, boutiques, etc.)
3. Grocery (supermarkets, convenience store, market, etc.)
4. Restaurant (sit-down, fast food, coffee shop, etc.)
5. Warehouse
6. School (day care, pre-school, elementary, secondary)
7. College, university or trade school
8. Hospital
9. Other Health Care (Nursing home / assisted living facility / residential treatment facility / health practitioner office, urgent care center, etc.)
10. Lodging facility (hotel, motel, bed and breakfast, etc.)
11. Not-for profit housing facility (shelter, prison, jail, etc.)
12. Entertainment / recreation facility (movie theater, bowling alley, health club/gym, library, museum, etc.)
13. Public assembly facility (convention / conference center, etc.)
14. Worship (church, temple, etc.)
15. Multi-use or shopping mall (i.e., mixed use of space for offices, restaurants, stores, service, apartments, etc.)
16. Manufacturing, production, or processing facility (including for-profit businesses and governmental facilities)

990. Other **[SPECIFY]**

S6. Which of the following best describes the activity in which your business is engaged at this location? *Please select the <u>one option</u> that best describes the activity.*

[NOTE TO TEAM: IF THE RESPONDENT SELECTS RESPONSE "15" ABOVE ("MIXED USE"), THEY ARE SHOWN ALL POSSIBLE OPTIONS FOR BUSINESS ACTIVITY EXCEPT HOSPITAL, WAREHOUSE, AND MANUFACTURING / PROCESSING]

<u>Traditional Office-Based Business</u> [IF S5=1 OR 15 OR 990, DISPLAY CODES 1-7]	
1. Finance	○
2. Insurance	○
4. Real estate / construction	○
5. Government	○
6. Other not-for-profit	○
7. Other office **[SPECIFY]**	○
<u>Retail</u> [IF S5=2 OR 15 OR 990, DISPLAY CODES 8-19]	
8. Major retail store	○
9. Department store	○
10. Small retail (boutique, store in strip mall)	○
11. Convenience store	○
12. Supermarket	○
13. Market	○
14. Laundry	○
15. Dry cleaning	○
16. Copy center	○
17. Barber / salon	○
18. Gas station / auto shop	○
19. Other retail **[SPECIFY]**	○
<u>Grocery</u> [IF S5=3 OR 15 OR 990, DISPLAY CODES 20-23]	
20. Supermarket	○
21. Convenience store	○
22. Market	○
23. Other grocery **[SPECIFY]**	○
<u>Restaurant / Food Service</u> [IF S5=4 OR 15 OR 990, DISPLAY CODES 24-28]	
24. Sit-down restaurant	○
25. Fast food diner	○
26. Bakery	○
27. Coffee shop	○
28. Other restaurant **[SPECIFY]**	○
<u>Warehouse</u> [IF S5=5 OR 990, DISPLAY CODES 29-32]	
29. Refrigerated warehouse	○
30. Non-refrigerated warehouse	○
31. Combination of refrigerated and non-refrigerated space	○
32. Other warehouse **[SPECIFY]**	○
<u>School</u> [IF S5=6 OR 15 OR 990, DISPLAY CODES 33-36]	
33. Preschool / daycare	○
34. Elementary school	○
35. Secondary school	○
36. Other pre-college **[SPECIFY]**	○
<u>College, University or Trade School</u> [IF S5=7 OR 15 OR 990, DISPLAY CODES 37-40]	
37. College	○

38. University	○
39. Trade school	○
40. Other post-secondary **[SPECIFY]**	○
Health Care [IF S5=8 OR 9 OR 990, DISPLAY CODES 41-46 IF S5=15, DISPLAY CODES 41 AND 46]	
41. Medical / dental office or office for other health practitioners	○
42. General medical or surgical hospital	○
43. Veterinary hospital	○
44. Other hospital **[SPECIFY]**	○
45. Urgent care center	○
46. Other health care facility **[SPECIFY]**	○
Nursing Home / Assisted Living [IF S5=9 OR 15 OR 990, DISPLAY CODES 51-54]	
51. Nursing home	○
52. Assisted living facility	○
53. Residential treatment facility	○
54. Other care facility **[SPECIFY]**	○
Lodging [IF S5=10 OR 15 OR 990, DISPLAY CODES 55-58]	
55. Hotel	○
56. Motel	○
57. Bed & Breakfast	○
58. Other lodging **[SPECIFY]**	○
Not-For-Profit Housing [IF S5=11 OR 15 OR 990, DISPLAY CODES 59-61	
59. Shelter	○
60. Prison / jail	○
61. Other not-for-profit housing **[SPECIFY]**	○
Entertainment / Recreation [IF S5=12 OR 15 OR 990, DISPLAY CODES 62-68]	
62. Health club / gym	○
63. Movie theater	○
64. Theater	○
65. Library	○
66. Museum	○
67. Bowling alley	○
68. Other entertainment / recreation **[SPECIFY]**	○
Public Assembly [IF S5=13 OR 15 OR 990, DISPLAY CODES 59-71]	
69. Conference / convention center	○
70. Community center	○
71. Other public assembly **[SPECIFY]**	○
Worship [IF S5=14 OR 15 OR 990, DISPLAY CODES 72-75]	
72. Church	○
73. Temple	○
74. Synagogue	○
75. Other worship **[SPECIFY]**	○
Manufacturing / Production / Processing [IF S5=16 OR 990, DISPLAY CODES 76-89]	
76. Agricultural production or farming	○
77. Chemical processing	○
78. Electronics / technology	○
79. Food / beverage production or processing	○
80. General / light assembly or manufacturing	○
81. Glass production or processing	○
82. Metals production or processing or fabricated metal work	○

83. Machinery / appliance / equipment manufacturing	○
84. Paper products processing, printing or manufacturing	○
85. Petroleum Processing or Refining	○
86. Textiles / apparel production or processing	○
87. Water / wastewater treatment	○
88. Wood products manufacturing	○
99. Other manufacturing / processing **[SPECIFY]**	○
Something else [IF S6=15 OR 990, DISPLAY CODE 80]	
90. Something else **[SPECIFY]**	○

S6. How many total employees - whether full- or part-time -- are typically present at this location when the facility is "open for business" during a typical business day?

1. Fewer than 5 employees
2. 5 – 9
3. 10 – 19
4. 20 – 49
5. 50 – 99
6. 100 – 199
7. 200 – 299
8. 300 – 399
9. 400 – 499
10. 500 – 999
11. 1,000 or more

[IF NOT OVER-QUOTA, GO TO INVITATION LANGUAGE; OTHERWISE TERMINATE]

[IF S1=3 or 4, CONTINUE, OTHERWISE PROCEED TO EITHER "TERMINATE" OR "INVITATION" LANGUAGE AS APPROPRIATE]

R1. Thank you for taking the time to see if you are eligible to participate in this survey. At this time, we need responses from someone at your business who is familiar with the energy-related aspects of your operations at this location.
We would appreciate it if you would provide that person with the invitation letter or postcard you received or refer them to the following link so that they may complete this survey:
[INSERT URL THAT INCLUDES SURVEY ID#]
[THEN DISPLAY "Thank you for your time." AND TERMINATE]

TERMINATE LANGUAGE FOR NON-QUALIFYING OR OVER-QUOTA RESPONDENTS

[STANDARD TERMINATE TEXT]

We appreciate the time and effort you have spent in responding to our survey invitation and answering these initial questions. The questions were designed to see if your organization was eligible to participate in this research study.

Unfortunately, at this point, we have reached the number of respondents we can accept from organizations like yours. Again, we would like to thank you for your time and effort.

INVITATION LANGUAGE FOR QUALIFYING RESPONDENTS

Thank you for your responses so far. You and your business have qualified to complete this survey.

The survey should take about 20 minutes to complete. Information about how to receive the **$50 Amazon gift card** will be provided at the end of the survey.

Your responses are important to us, so please press "Next" to begin answering the survey questions. All information provided in this survey will be kept strictly confidential, and at no time will you be asked to purchase anything.

Note that if you need to pause the survey at any time, you can come back later and begin again where you left off. Simply save the URL and the Survey ID# from your survey invitation to access your survey again. The survey will automatically take you to the point where you left off.

Please note: any word or phrase that appears in blue, underlined font will have a hyperlinked definition that pops-up in a separate browser window when you click on that word or phrase. Clicking on any of these hyperlinks will NOT make you navigate away from the survey site.

As you complete the survey, you will **not** be able to use your browser's "back" button. If you mistakenly press your browser's "back" button, you will need to press the "refresh" button to continue the survey.
[PROGRAMMER NOTE: THROUGHOUT THIS SURVEY, WORDS OR PHRASES WITH BLUE, UNDERLINED FONT WILL HAVE HYPERLINKED DEFINITIONS THAT POP-UP WHEN THE RESPONDENT CLICKS ON THE WORD OR PHRASE. HYPERLINKED DEFINITIONS ARE PROVIDED AT THE END OF THIS DOCUMENT.]

Q1. Does the Liberty account that is billed to your company and associated with this location cover electricity usage for . . . ?

1. The entire building
2. Part of the building
3. Multiple buildings (a campus, or a collection of buildings)
4. Something else – Please specify _____

Q2a. **[IF Q1=1 OR 2, CONTINUE, OTHERWISE SKIP TO Q2d]** How many floors are there in the entire building?

[RECORD NUMBER 1-100] floors

Q2b. **[IF Q1=2, CONTINUE, OTHERWISE, SKIP TO Q2e]** What percentage of the total space in the building does **your** organization occupy?
Your best estimate is fine, but please enter a whole number rather than a range of numbers.

[RECORD NUMBER 1-100]%

[IF Q1=3, CONTINUE, OTHERWISE SKIP TO Q2e]

Q2d. You indicated that your operations occupy multiple buildings at this site. How many of those buildings fall into each of the size categories listed in the table below?

	Building Size	Number of Buildings of This Size
a.	1 floor; single story	_____ Number of buildings with this many floors
b.	2 floors	_____ Number of buildings with this many floors
c.	3-5 floors	_____ Number of buildings with this many floors
d.	6-10 floors	_____ Number of buildings with this many floors
e.	11-20 floors	_____ Number of buildings with this many floors
f.	21 or more floors	_____ Number of buildings with this many floors
		_____ Total number of buildings [**CALCULATE AND SHOW**]

Q2e. Has this facility been renovated or undergone any significant tenant improvements in the last 5 years?

1. Yes
2. No
3. Not sure

Q3. What is the approximate total square footage that your business occupies at this location?
Please give your best estimate, including only indoor or enclosed space. If your business shares the space with other companies / organizations, only list the space your business uses. If your business occupies several floors or buildings, add the square footage together.

Please enter a whole number rather than a range of numbers.

1. **[RECORD NUMBER]** square feet
2. Not sure

[IF Q3_1=0, ASK Q4 IN ORDER TO VALIDATE Q3 RESPONSE; OTHERWISE SKIP TO Q5]

Q4. You said the approximate total square footage that your business occupies at this location is…**[INSERT Q3_1 RESPONSE, USING COMMAS] square feet**
Is this what you intended?
1. Yes
0. No, I would like to edit my response

[IF Q4=1, SKIP TO Q6; OTHERWISE SKIP BACK TO Q3]

[IF Q3=2, ASK Q5; OTHERWISE SKIP TO Q6]

Q5. We understand you aren't sure, so using the ranges listed below, please just choose the best estimate of the total square footage of your business at this location.
Please give your best estimate, including only indoor or enclosed space. If your business shares the space with other companies / organizations, only list the space your business uses. If your business occupies several floors or buildings, add the square footage together.

	Typical Examples
1. Less than 1,000 sq. ft.	*Small Convenience Store*
2. 1,000 – 4,999	*Small Restaurant*
3. 5,000 – 9,999	*Large Restaurant*
4. 10,000 – 14,999	*Medium Retail*
5. 15,000 – 24,999	*Medium Grocery, Small Office*
6. 25,000 – 49,999	*Medium School*
7. 50,000 – 99,999	*Medium Warehouse*
8. 100,000 – 499,999	*Large Office Building*
9. 500,000 – 999,999	*Large Warehouse or Industrial Facility*
10. 1 million sq. ft. or more	*Very Large Facility*

Q6. Which of the following best describes your typical operating hours during most of the year?

	Typical Operating Hours
1) 8 hours a day; 5 days a week	◯
2) 12 hours a day; 5 days a week	◯
3) 8 hours a day; 7 days a week	◯
4) 12 hours a day; 7 days a week	◯
5) 24 hours a day; 7 days a week	◯

Q7. What is the **total number of people who are typically present at this location when it is "open for business**," including customers, clients, and / or other visitors during a typical business day? .

	Total Number of PEOPLE Present During a Typical Business Day
1) Fewer than 5	◯
2) 5 – 9	◯
3) 10 – 19	◯
4) 20 – 49	◯
5) 50 – 99	◯
6) 100 – 199	◯
7) 200 – 499	◯
8) 500 – 999	◯
9) 1,000 or more	◯

Q8. Approximately when was the building that houses this space originally constructed? *If your business is located in several buildings across a campus or complex, please answer for the building that accounts for the largest portion of your total energy use.*

1. Before 1900
2. 1900-1919
3. 1920-1929
4. 1930-1939
5. 1940-1949
6. 1950-1959
7. 1960-1969
8. 1970-1979
9. 1980-1989
10. 1990-1999
11. 2000-2009
12. 2010-present
13. Not sure

Q8a. Has your building undergone any major renovation since it was built?

1 Yes
2 No
3 Don't know

Q9. What percentage of the total enclosed floor space your business occupies at this location can be characterized by each of the following area descriptions?

Your best estimate is fine, but please enter whole numbers that will add up to 100%.

Area description [SET DEFAULT RESPONSE AT O]	**% of total enclosed floor space**
1. Office	**[RECORD NUM 0-100]%**
2. Data center, server room, or other computer area	**[RECORD NUM 0-100]%**
3. Food preparation, food service or food sales (e.g., kitchen, cafeteria, restaurant, coffee shop, convenience store, supermarket, market, etc.)	**[RECORD NUM 0-100]%**
4. Retail (e.g., mall, department store, small retail/boutique etc.)	**[RECORD NUM 0-100]%**
5. Common area space (e.g., lobby, hallway, meeting room, auditorium, library, bathroom, workout area, worship area, etc.)	**[RECORD NUM 0-100]%**
6. Sleeping quarters, guest rooms, bedrooms in nursing home, etc.)	**[RECORD NUM 0-100]%**
7. Patient care rooms	**[RECORD NUM 0-100]%**
8. Laboratories	**[RECORD NUM 0-100]%**
9. Open / Assembly space / Classrooms	**[RECORD NUM 0-100]%**
10. Warehouse / Storage space	**[RECORD NUM 0-100]%**
11. Manufacturing / processing / production	**[RECORD NUM 0-100]%**
12. Enclosed parking	**[RECORD NUM 0-100]%**
13. Laundry facilities	**[RECORD NUM 0-100]%**
990. Other **[SPECIFY ONE AREA]**	**[RECORD NUM 0-100]%**
991. Other **[SPECIFY ONE AREA]**	**[RECORD NUM 0-100]%**
992. Other **[SPECIFY ONE AREA]**	**[RECORD NUM 0-100]%**
TOT. **Total**	**[CALCULATE TOTAL]%**

[PROGRAMMER: Q9TOT MUST EQUAL 100 IN ORDER TO CONTINUE TO NEXT SCREEN]

Q10. Please indicate in the table below how many of each of the following types of computers, or other items of computer-related equipment, there are in your facility. *Your best estimate is fine.*

	Total Number
A. Desktop computers	**[RECORD NUMBER]**
B. Computer monitors	**[RECORD NUMBER]**
C. Cash registers / Point of sale terminals	**[RECORD NUMBER]**
D. Laptop computers that are usually plugged in	**[RECORD NUMBER]**
E. Scanners / Printers / Copiers / Fax machines	**[RECORD NUMBER]**
F. Computer servers / server cabinets / blades, etc.	**[RECORD NUMBER]**
G. Networking equipment (Routers / switches / modems, etc.)	**[RECORD NUMBER]**

Q11. And how many of the following types of food or drink banquet tables, display cases, or dispensers in total do you have anywhere in your facility? [**PROGRAMMER: ENTER WHOLE NUMBERS**]

	Total Number
A. Reach-in refrigerators or freezers (solid door)	**[RECORD NUMBER]**
B. Walk-in refrigerators or freezers	**[RECORD NUMBER]**
C. Glass door refrigerated or freezer display cases	**[RECORD NUMBER]**
D. Open refrigerated display cases	**[RECORD NUMBER]**
E. Vending machines	**[RECORD NUMBER]**
F. Ice machines	**[RECORD NUMBER]**

Q12. Does this facility have food preparation or cooking equipment?

1. Yes
2. No

[IF Q12 = 2; SKIP TO QWH1]

Q13. How many of each of the following types of equipment are there in your food prep area? [**PROGRAMMER: PRECODE "0" VALUES FOR EACH, BUT ALSO ADD A BOX AT THE BOTTOM OF THE TABLE TO CLICK FOR "DO NOT HAVE ANY OF THESE THINGS"]**

	Total Number
A. Fryers	**[RECORD NUMBER]**
B. Flattops/griddles	**[RECORD NUMBER]**
C. Ovens (electric)	**[RECORD NUMBER]**
D. Ovens (natural gas)	**[RECORD NUMBER]**
E. Stovetop burners (electric)	**[RECORD TOTAL N OF BURNERS]**
F. Stovetop burners (natural gas)	**[RECORD TOTAL N OF BURNERS]**
G. Induction ranges	**[RECORD TOTAL N OF BURNERS]**
H. Wok burners (electric)	**[RECORD TOTAL N OF BURNERS]**
I. Wok burners (natural gas)	**[RECORD TOTAL N OF BURNERS]**
J. Broilers (electric)	**[RECORD NUMBER]**
K. Broilers (natural gas)	**[RECORD NUMBER]**
L. Steamers (electric)	**[RECORD NUMBER]**
M. Steamers (natural gas)	**[RECORD NUMBER]**
N. Dishwashers	**[RECORD NUMBER]**
O. Hot food holding cabinets	**[RECORD NUMBER]**

QWH1. What type of heater is used as your primary source of hot water for this space?

1. Hot water either purchased or provided by the building to tenants
2. Self-contained or stand-alone storage water heaters/boilers
3. Central boiler
4. Tankless (instantaneous) water heater
5. Heat pump water heater
6. Heat recovery water heater
7. Solar thermal water heating
8. Other *(please specify:)*

998. Not sure

QWH2. [**IF QWH1 EQ 2, 3, OR 4, CONTINUE, OTHERWISE SKIP TO QCOOL1** Is your water heater or boiler fueled by natural gas or electricity?

1. Natural gas
2. Electricity
3. [Something else _____]

QWH3. For which of the following purposes do you heat hot water at this facility at all? And which of those purposes accounts for the largest portion of your hot water usage?

		All purposes for which you use hot water (Select all that apply)	**Accounts for largest portion of hot water use (Select only one response)**
1.	General / "domestic" hot water usage	☐	◯
2.	Washing, dishwashing, cleaning	☐	◯
3.	Other cooking usage	☐	◯
4.	Pools / Spas / Hot tubs	☐	◯
5.	Showers / baths	☐	◯
6.	Laundry	☐	◯
7.	As part of your manufacturing / processing	☐	◯
8.	Something else: Please specify _____	☐	◯

QCOOL1. Approximately what percentage of the space your business occupies, or uses, at this location is cooled?
[ENTER RESPONSE: 1-100%]

QCOOL2. Listed in the table below are several different types of space cooling systems sometimes found in commercial or industrial facilities. Please review these systems and click "***NEXT***" when you are ready to answer a question about the primary cooling system at this facility.

Type of Cooling System	Cooling System Description
1. Air-cooled chiller	Chilled water air conditioning plants are typically installed when large buildings, shopping malls, airports, hotels, or the like, require space conditioning. They first cool water, which is then pumped to different parts of the building or campus to cool the space. An air-cooled system is typically cooled by fans on the unit.
2. Water-cooled chiller	Like an air-cooled chiller, these are typically found in large spaces, cooling water that is then pumped to different parts of the building or campus to cool the space. A water-cooled system is typically connected to cooling towers outside the building or on the roof through a condenser water loop.
3. Rooftop or pad-mounted packaged air conditioner units	A Packaged AC unit is an all-in-one system that creates cool air for a business space. It typically includes a compressor unit on the outside of the building, often on a pad located on the side of a building, or on the roof where they may be called an RTU (or rooftop unit).
4. Ducted split air conditioning system	These systems also have indoor units providing cool air to individual rooms, along with an outdoor AC compressor. In addition, ducted systems offer climate control for multiple rooms or areas, utilizing a network of air ducts with a single set of equipment. These systems are often used to create specific climate zones.
5. Air-source or geothermal heat pump	Heat pumps provide cooling just as do the other air conditioning systems, but they can also provide warm air for heating if this is required.
6. Wall / window units or Packaged Terminal ACs (PTACs)	Air conditioners installed into a wall opening or window are single, self-contained units that exhaust heat and humidity from the room to the outside and create cool air that is fed directly into the cooled space. In some commercial spaces like guest rooms, special units called "Packaged Terminal Air Conditioners" or "PTAC" units are common.
7. Packaged terminal heat pump (PTHP)	Packaged Terminal Heat Pumps (PTHP) are a through-the-wall, all-in-one heating and cooling solution most often found in hotel guestrooms and similar spaces. Heating is mostly provided by the heat pump instead of an electric strip or natural gas.
8. Ductless mini-split air conditioning system	These systems have indoor units providing cool air to individual rooms. The indoor units connect to an outdoor AC compressor that uses a conduit to carry refrigerant and power from the outside unit to the indoor units.

QCOOL3. Which of the air conditioning systems listed below best describes the system used at this location to condition the largest portion of your cooled space? [**SELECT ONE RESPONSE]**

	Primary AC System
1. Air-cooled chiller	☐
2. Water-cooled chiller	☐
3. Rooftop unit (RTU)	☐
4. Ducted split multi-zone air conditioning system	☐
5. Air-source / geothermal heat pump	☐
6. Wall or window AC units, or PTACs	☐
7. Packaged terminal heat pump (PTHP)	☐
8. Ductless mini-split air conditioning system	☐
9. Something else: Please specify _____	☐
10. Not sure	☐

QCOOL4. Now, please indicate which – if any -- of these cooling systems best describes the air conditioning system that is your most significant secondary or auxiliary air conditioning system.

	Secondary / Auxiliary AC System
1. Air-cooled chiller	◯
2. Water-cooled chiller	◯
3. Rooftop unit (RTU)	◯
4. Ducted split multi-zone air conditioning system	◯
5. Air-source / geothermal heat pump	◯
6. Wall or window AC units, or PTACs	◯
7. Packaged terminal heat pump (PTHP)	◯
8. Ductless mini-split air conditioning system	◯
9. Something else: Please specify _____	◯
10. No secondary cooling system **[EXCLUSIVE]**	◯
11. Not sure	◯

QHEAT1. Approximately what percentage of the space your business uses or manages at this location can be heated?
[ENTER RESPONSE: 1-100%]

QHEAT2. What is the primary type of system that is used to heat this space when necessary**?**

	Heating Equipment	**Primary Heating System**
1.	Natural gas warm air furnace with ducts/vents to individual rooms	◯
2.	Electric warm air furnace with ducts/vents to individual rooms	◯
3.	Natural gas boiler with hot water/steam radiators or baseboards in individual rooms	◯
4.	Electric boiler with hot water/steam radiators or baseboards in individual rooms	◯
5.	Electric resistance, or baseboard heating	◯
6.	Under-floor or, radiant heating	◯
7.	Air-source heat pump (including mini split heat pumps, and any multi split/multi zone heat pump units as well)	◯
8.	Geothermal heat pump (ground loop or water loop)	◯
9.	Natural gas unit heater or wall furnace	◯
10.	Electric unit heater or wall furnace	◯
11.	Wood / pellet stove(s)	◯
810.	None	◯
999.	Not sure	◯
990.	Other (please specify)	◯

QCTRL1. What type of thermostat/temperature control is primarily used for your heating and/or cooling system(s)?

1. Manual thermostat
2. Programmable thermostat
3. "Smart" thermostat (interactive & web-enabled)
4. Energy management system
5. None of the above

QLIGHT1. There are many different types of lighting available for use in commercial or industrial facilities. The table below outlines some of the more common lighting options that might be found in your facility. Please review these lighting options and click "***NEXT***" when you are ready to answer a question about how often these different types of lights can be found at this facility.

1. **Traditional Incandescent bulbs**
2. **Screw-in LED bulb**: A "light emitting diode" is an electronic form of lighting that does not use filaments like a traditional incandescent bulb, but instead uses solid state electronics. LED bulbs now come in a wide variety of shapes and wattages and use much less electricity to generate a given amount of light.
3. **Compact fluorescent bulbs**: These bulbs screw into a regular light socket, but they are fluorescent lights rather than traditional incandescent bulbs. They often have a non-traditional swirly or curved shape.
4. **Quartz / Halogen bulbs** use a different type of filament and operate at a higher temperature than do traditional incandescent bulbs. Due to lighting standards that began in 2012, these bulbs have been replacing traditional incandescent bulbs because of their greater efficiency and longevity.
5. **Traditional fluorescent tubes** work by creating light when a gas inside the tube fluoresces. These tubes are often linear (2-foot to 4-foot tubes), but can also be circular, U-shaped, or panel lights.
6. **LEDs that replace traditional fluorescent tubes** – these can be linear / circline / U-shaped, or otherwise.
7. **Wide-faced "down" lights or spotlights** have a wide, curved face and are typically used as "down" lights in ceiling fixtures, or in other places that need focused lighting or spotlighting.
8. **High-intensity discharge (HID) lights**: Sometimes referred to as "high bay" lights, these bulbs are rarely used in residential applications. Most often, they are used where large amounts of light are needed in large areas. They can include mercury vapor lights, metal halide lights, high- and low-pressure sodium lights, and others.
9. **LEDs that replace other lights**: LEDs can take many other forms (from bulbs to tubes to flat panels). LEDs can serve the same purpose as HID lights, for example, or can replace other area lighting.
10. **Neon lights**
11. **Exit signs**

QLIGHT2. How many of each of these types of bulbs, lamps, or tubes are used in the **interior** of the building(s) at your business, considering only the areas your business occupies?

In some cases, lighting fixtures will contain more than one lamp or tube. In these cases we would like you to count all of the individual bulbs, lamps, or tubes. *Your best estimate is fine, but please enter a whole number for each type of lamp, bulb, or tube.*

	Total Number of These Lights Inside Your Space
1. Traditional Incandescent bulbs	[**TOTAL NUMBER: 0-10000**]
2. Screw-in LED bulb	[**TOTAL NUMBER: 0-10000**]
3. Compact fluorescent bulbs	[**TOTAL NUMBER: 0-10000**]
4. Quartz / Halogen bulbs	[**TOTAL NUMBER: 0-10000**]
5. Traditional fluorescent tubes	[**TOTAL NUMBER: 0-10000**]
6. LEDs that replace traditional fluorescent tubes	[**TOTAL NUMBER: 0-10000**]
7. Wide-faced "down" lights or spotlights	[**TOTAL NUMBER: 0-10000**]
8. High-intensity discharge (HID) lights	[**TOTAL NUMBER: 0-10000**]
9. LEDs that replace other lights	[**TOTAL NUMBER: 0-10000**]
10. Neon lights	[**TOTAL NUMBER: 0-10000**]
11. Exit signs	[**TOTAL NUMBER: 0-10000**]
12. Other lights	[**TOTAL NUMBER: 0-10000**]

QLIGHT3. Which of the following types of lighting controls are primarily used to control your interior lighting?

1. Manual – single switch
2. Manual – bi-level (dual) switch
3. Manual – circuit breaker
4. Occupancy sensor
5. Timers
6. Photocell
8. Daylighting sensor
9. Energy management system

990. Other **[SPECIFY]**

998. Not sure

QLIGHT4. Thinking about all of the lamps in this facility, how many have been replaced in the last 2 years with either high efficiency options? *Your best estimate is fine.*

	% that were replaced with new LED lighting options	% that were replaced with other higher efficiency options
1. Traditional fluorescent tubes that were in place two years ago	%	%
2. Incandescent or halogen lamps that were in place two years ago	%	%

QLIGHT5. Thinking about all of the fluorescent **ballasts** in this facility, how many have been replaced in the last 2 years with either high efficiency ballasts, or have been removed/disconnected? *Your best estimate is fine.*

	% that were replaced with new HIGH EFFICIENCY ballasts	% of ballasts that were removed or disconnected
1. Standard efficiency ballasts that were in place two years ago	%	%
2. High efficiency ballasts that were in place two years ago	%	%

QMOT0. Does this facility conduct any manufacturing / processing operations?

1. Yes
2. No

[IF QMOT0 = 2; SKIP TO QEV1]

QMOT1. About what percentage of your facility's total electricity usage would you estimate is due to electric motors of one form or another (including stand-alone motors, as well as motors used in machines, fans, pumps, conveyors, and all other applications)?

1. 0%
2. Less than 5%
3. 5% to less than 25%
4. 25% to less than 50%
5. More than 50%

[IF QMOT1 NE 1, ASK QMOT2; OTHERWISE SKIP TO QEV1]

QMOT2. About what percentage of all of the motors at your facility fall into each of the following types of use?

	Percentage accounted for
1. Fans & Blowers	%
2. Pumps	%
3. Compressed Air	%
4. Conveyors	%
5. Other	%
TOT. **Total**	**[PROGRAMMER: CALCULATE TOTAL MUST EQUAL 100%]**

QMOT3. About how many motors are there in your facility of the different sizes listed below? *Your best estimate is fine, but please enter whole numbers rather than ranges of numbers.*

	# of Motors
1. Less than 5 HP	**[RECORD NUM 0-999]**
2. 5–24 HP	**[RECORD NUM 0-999]**
3. 25–99 HP	**[RECORD NUM 0-999]**
4. 100–249 HP	**[RECORD NUM 0-999]**
5. 250–499 HP	**[RECORD NUM 0-999]**
6. 500 or more HP	**[RECORD NUM 0-999]**
TOT. **Total**	**[CALCULATE TOTAL]**

[TOTAL MUST BE GTE 1; BLANK CELLS TO BE AUTOCODED AS 0's]

QMOT4. Do these motors tend to operate continuously, or for extended periods of time, while this facility is operating, or only for short periods of time?
1. Continuously / long periods of time
2. Short periods of time
3. Varies / some of both

QMOT5. What percentage of these motors are high efficiency motors? What percentage use variable speed drives?
Your best estimate is fine.

	[SET DEFAULT RESPONSE AT 0]	% of all motors…
1.	High efficiency motors	**[RECORD NUM 0-100]**%
2.	Variable speed drives	**[RECORD NUM 0-100]**%

QEV1. How many electric vehicle charging stations are there at this location?
[RECORD NUM 0-999] charging stations

[IF QEV1=1 OR MORE, CONTINUE, OTHERWISE SKIP TO QEV3]
QEV2. Who pays for the charging stations?
1. Our company
2. The building management
3. Other (specify)
4. Not sure

QEV3. Does your company use electric vehicles for business purposes? If so, how many electric vehicles are used at this location?

1. Number of Electric Vehicles **[RECORD NUM 0-999]**
◯ **None**

QPV1. Do you have a solar / photovoltaic (PV) array that generates electricity for your facility?

1. Yes
2. No

QPV2. **[IF QPV1 EQ 1, CONTINUE, OTHERWISE SKIP TO QBACKUP1**] When was your current solar system installed?

1. Before 2000
2. 2000-2004
3. 2005-2010
4. 2011-2015
5. Since 2015

QPV3. What is the installed capacity of your PV system?

[**RECORD RESPONSE: 1-5,000**] kW installed capacity for our PV system
Don't Know

QBACKUP1. Do you have any standby, or backup, generators available for use at this facility?

Standby or backup generators are most often diesel or natural/synthetic gas generators that can provide electricity to some or all of a facility during an outage. They usually take a few minutes to start-up and can run for hours, days or weeks, depending on the details of their installation and fueling.

1. Yes
2. No

[**IF QBACKUP1=1, CONTINUE, OTHERWISE SKIP TO QCOGEN1]**

QBACKUP2. What fuel does your backup generation system use (or which fuel is primarily used)?

1. Traditional diesel fuel
2. Biodiesel fuel
3. Gasoline
4. Natural gas/synthetic gas through a pipeline
5. Propane (or other gas provided by an onsite tank)
6. Something else

QBACKUP3. About what portion of your total facility load can you meet with your backup generation system? [**RECORD RESPONSE 0-100%]** of total load that can be met with backup generation system

QCOGEN1. Do you have a **cogeneration system** operating at this location?

A cogeneration facility typically uses what is called "waste heat" from an industrial process or some other ongoing operation to power a turbine or other generator that is used to heat hot water, for example, or to generate electricity, or to use in some other way.

1. Yes
2. No
3. Not sure

QEFF1. Which, if any, of the following items have been purchased for this facility in the **last 2 years**, and if these purchases have been made, were any of new items specifically described as "high energy efficiency," or ENERGY STAR-qualified purchases?" *Please select one response for each row.*

[ROTATE 1-7]	**Did not Purchase**	**Purchased "Standard Efficiency"**	**Purchased Highly Energy Efficient**
1. Heating equipment used in your facility	☐	☐	☐
2. Air conditioning equipment used in your facility	☐	☐	☐
3. Water heating equipment	☐	☐	☐
4. Refrigeration equipment	☐	☐	☐
5. Motors / drives	☐	☐	☐
6. Office equipment (computers, printers, copiers)	☐	☐	☐
7. Ventilation equipment	☐	☐	☐

QEFF2. Which of the following other **energy efficiency measures** have either been implemented at this location **within the last three years, or do you plan to implement in the next two years**?
Select all that apply for each time period. Select "Neither" in the appropriate column if you have not implemented / do not plan to implement any of the measures within that time period.

	Energy Efficiency Measures	Have implemented in last 3 years	Plan to implement in next 2 years	Neither
1.	Upgrading or renovating fluorescent lighting system(s)	◯	◯	◯
2.	Eliminating some fluorescent fixtures and adding reflectors to others to reduce the total number of lighting fixtures or lamps without reducing the total light available (this is sometimes called "delamping")	◯	◯	◯
3.	Replacing windows with windows designated as "low-e" glass and/or have a gas core that increases their energy efficiency	◯	◯	◯
4.	Adding or upgrading insulation on exterior doors, walls, ceilings, or roofs	◯	◯	◯

P1. Please tell us how much you agree or disagree with each of the following statements about Liberty's energy efficiency programs, and about energy efficient appliances and equipment in general.

[RECORD NUMBER; 1=STRONGLY DISAGREE, 10=STRONGLY AGREE]

[ROTATE 1-3]	Strongly Disagree									Strongly agree
	1	2	3	4	5	6	7	8	9	10
1. I feel comfortable that we know exactly how to use Liberty's energy efficiency programs effectively	○	○	○	○	○	○	○	○	○	○
2. We are well informed about the benefits of Liberty's energy efficiency programs	○	○	○	○	○	○	○	○	○	○
3. We really believe in the value of energy efficiency	○	○	○	○	○	○	○	○	○	○

P2. For each of the following types of equipment, please tell us how likely you are to replace that equipment with highly energy efficient / ENERGY STAR-qualified equipment the next time you need to do so, **regardless of whether or not** there are rebates available to reduce the cost of that equipment?

[ROTATE 1-8]	Not at all likely to replace with highly energy efficient option								Extremely likely to replace with highly energy efficient option		Not Applicable
	1	2	3	4	5	6	7	8	9	10	
1. Existing fluorescent lights	○	○	○	○	○	○	○	○	○	○	○
2. Existing high intensity lights	○	○	○	○	○	○	○	○	○	○	○
3. Existing HVAC system	○	○	○	○	○	○	○	○	○	○	○
4. Existing water heating system	○	○	○	○	○	○	○	○	○	○	○
5. Existing oven	○	○	○	○	○	○	○	○	○	○	○
6. Existing dishwasher	○	○	○	○	○	○	○	○	○	○	○
7. Existing fryer	○	○	○	○	○	○	○	○	○	○	○
8. Existing vending machine	○	○	○	○	○	○	○	○	○	○	○

The next section of the survey asks for your reaction to energy efficiency programs that Liberty may be able to offer to businesses like yours.

P1. Some utilities are offering energy audits to their business customers where a contractor would come to your business and conduct a free energy assessment. This representative would recommend energy efficiency measures that you could have installed to lower your energy bills. The utility would also offer a rebate covering up to 70% of the cost of the measures.

If Liberty were to offer a program like this, how likely is it that you would request an energy audit?

Not At All Likely **Extremely Likely** **Not applicable/**
To Do This **to Do This**
Not our decision
1 2 3 4 5 6 7 8 9 10
11

P2. Liberty could also offer rebates on energy control systems that can help your business better manage and save energy. Now, for each of the energy control system improvements below, let's assume that the rebate from Liberty will save your business enough on electricity in **3 years** to pay for the additional cost associated with installing each control system improvement. If this were true, how likely would your organization be to make each improvement?

How likely would your organization be to…?

	Not at all likely to do this									Extremely likely to do this	Not our decision (i.e., Someone else decides)	Already have / do this
3 Year Payback Period	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
1. Install an Energy Management System that is designed to optimize the performance of all of your facility's energy using systems	○	○	○	○	○	○	○	○	○	○	○	○
2. Install occupancy / motion sensors to turn lights off when rooms are not in use	○	○	○	○	○	○	○	○	○	○	○	○
3. Install a Smart "learning" thermostat	○	○	○	○	○	○	○	○	○	○	○	○

CONCLUSION

Congratulations you are eligible to receive a $50 Amazon Gift Card as a thank-you payment for completing the survey.

C1. We'll need a way to set up that payment. Please enter your name, email address, and phone number (note that we will only call you if we need to confirm information relating to your incentive payment).

A. Full name _____
B. Email address _____
C. Verify email address _____
D. Phone number _____

[SHOW AFTER RESPONDENT COMPLETES ABOVE INFORMATION: "WE'LL PLAN ON SENDING YOU THE GIFT CARD WITHIN 3-4 WEEKS FROM THE TIME THAT THE SURVEY CLOSES."]

[END / COLLECT INFORMATION NECESSARY TO DISTRIBUTE INCENTIVES]

Those are all the questions we have for you today. Thank you so much for your participation!

DEFINITIONS

[THE DEFINITIONS IN THE TABLE BELOW WILL EACH BE SHOWN IN A POP-UP BOX THAT IS TRIGGERED BY A HYPERLINKED WORD OR PHRASE]

Word / Phrase	Definitions
Air-source heat pump	A single system that draws in outside air to use in both heating and cooling your home
Geothermal heat pump	A single system that uses water or fluid that circulates through underground piping to provide both heating and cooling for your home
Heat pump water heater	A system that uses a refrigeration cycle in reverse to draw heat out of the surrounding air to provide hot water in a traditional water heater storage tank
Occupancy sensors	Electronic devices that are used to control lights in a room so that when someone is present the lights are on, but where there is no one in the room for several minutes, the lights are turned off
Tankless (instantaneous/on demand) water heater	A water heater that only heats water for delivery to your home when you ask for it by using hot water. These systems do not keep a tank of water hot at all times.

B

SURVEY CROSSTABS

Residential and Non-Residential Crosstab results are included in separate excel spreadsheets included with this report:

Appendix B_Liberty 2021 MR _NonResidential Crosstabs.xlsx

Appendix B_Liberty 2021 MR _Residential Crosstabs.xlsx

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