Guidehouse

Opinion Dynamics

Attachment 1:

California Energy Efficiency Market Adoption Characteristics Study

Methodology and Results

Prepared for:

California Public Utilities Commission

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Summary

The California Public Utilities Commission (CPUC) sets energy efficiency goals on a bi-annual basis for California's major investor-owned utilities (IOUs), which includes Pacific Gas and Electric (PG&E), Southern California Edison (SCE), Southern California Gas, and San Diego Gas and Electric (SDG&E). CPUC conducts a bi-annual Potential and Goals Study (PG Study) to inform this goal setting process and provide forecasts of the remaining future opportunity for energy efficiency in IOU service territories. The PG Study uses an energy efficiency potential forecasting model (PG Model) to estimate the future customer adoption levels of new energy efficiency technologies across all building sectors.

Purpose

The 2021 PG Study included a market adoption study to research customer behavior and preferences and better inform the energy efficiency forecast. In addition, the CPUC commissioned this market adoption study to collect primary data on customer preferences in the residential and commercial sectors. This report describes the market adoption research that Opinion Dynamics conducted in support of the PG Study. The report provides insights into customer preferences on economic and non-economic factors and other characteristics that influence customers' willingness to adopt energy efficiency technologies.

Historically, the PG Model calculated customers' willingness to adopt energy efficiency technologies using simple factors like lifetime cost or payback period. Other potential studies in other jurisdictions have even used Delphi panels to provide opinions on technology adoption rates. However, true customer purchase decision behavior is not solely based on financial indicators, nor can the complexities of the decision for each unique measure be captured via a Delphi panel. This study gathered and analyzed survey data to inform the PG Model willingness to adopt algorithms to incorporate both financial and non-financial indicators in customer decision-making. This study used behavioral science research to identify non-financial indicators that include the customer's perception of a technology's environmental impacts, social status/statement signaling, hassle (or lack thereof) of installation, and aesthetics or features unrelated to energy use as key datapoints to model customer willingness to adopt. The PG Model used the analyzed survey results as key inputs to forecast residential and commercial customers' technology adoption and energy efficiency savings potential.

Key objectives of the study:

- Collect residential (non-low income single-family and multifamily) and commercial (non-industrial, non-agricultural, non-governmental) customer characteristics, attitudes, and behaviors to inform technology adoption decision-making for EE technologies, fuel substitution technologies, and demand response (DR) program participation.
- Identify the key value factors that customers consider in their decision-making processes and quantify their relative importance (customer preference weightings). Table 1 describes the six value factors.
- Create distinct clusters of non-low income single-family residential customers that share similar attitudes about the environment, energy conservation, social signaling (how they want to be perceived by peers), and financial outlook.

Table 1. Value Factor Descriptions

Value Factor	Customer Value Perspective
Lifetime Costs	Long-term energy costs and savings of the technology
Upfront Costs	Initial out-of-pocket price of the technology
Hassle Factor	Ease in installing and using a technology, which is also related to convenience of the purchase and installation
Non-consumption Performance	Other non-financial and non-energy elements that customers likely consider when deciding to purchase a new appliance or technology
Eco Impacts	Environmental impacts from energy consumption
Social Signaling	Being perceived as environmentally or socially responsible by one's peers, which is captured in the social signaling value factor

Source: Guidehouse team

Methods

The Opinion Dynamics team collected data from web surveys of non-low income residential single-family, residential multifamily, and commercial customers of the four IOUs in California. Table 2 outlines the survey results and topics.

Table 2. Customer Survey Results and Topics

Customer Groups Surveyed	Number Sampled	Number Completed	Response Rate
Single-Family Residential: Customers who earn more than 200% of federal poverty guidelines (non-low income), live in a single-family home with fewer than five units, and make decisions about technologies in their home.	4,476	598	13.4%
Multifamily Residential: Owners and managers of buildings with five or more market rate units who make decisions about technologies in their respective units.	1,673	104	6.7%
Commercial: Customers who own or are employed by a non-industrial, non-agricultural, non-governmental commercial business or organization and make decisions about technologies in their respective facilities.	12,582	757	5.9%
Survey Topics: a) technology, building, and general characteristics; b) IOU energy efficiency program awareness and participation; c) environmental, energy, and financial attitudes; d) motivations, barriers, and willingness to purchase energy efficient technologies, make a gas-to-electric fuel substitution, and participate in DR programs; and e) feedback on how the COVID-19 pandemic affected their decisions and plans.			

Source: Opinion Dynamics Analysis

Value Factor Analysis Methods: The survey included several five-point scale questions about factors that customers value and consider as important in their decisions about technology

purchases. Opinion Dynamics combined and averaged customer responses to the survey questions to create the six value factors on five-point scales where “1” means the factor is not at all important and “5” means it is extremely important in customers’ decisions. Survey responses to the COVID-19 pandemic questions were used to create a pandemic adjustment factor on a five-point scale for three of the value factors, where “1” means the pandemic has not had any impact on the value factors and “5” means it has had a great impact.

Single-Family Cluster Analysis Methods: Statistical analyses were used to divide the non-low income single-family respondents into distinct clusters based on their answers to the five-point scale survey questions about their attitudes regarding the environment, energy conservation, social signaling, and financial well-being.

Key Findings

The two key market adoption analyses resulted in important findings to the overall PG Study.

Value Factors: The surveyed residential and commercial customers reported that Eco Impacts and, to a lesser extent, Lifetime Costs are the most important factors, on average, in their purchase decisions. Respondents also reported that the Hassle Factor, Non-Consumption Performance, and Social Signaling are moderately important, and the Upfront Cost is the least but still somewhat important factor in their decisions. The research team found these trends were consistent across all customer clusters, business segments, and technologies asked about in the surveys.

Surveyed residential and commercial customers also reported that the COVID-19 pandemic has somewhat increased the importance of the Hassle Factor when making decisions about technology installations in their home or business. This implies they are considering how comfortable they are with a contractor or installer entering their building during the pandemic. Respondents also reported the pandemic slightly raised the importance of the Upfront Costs and, to a lesser extent, the Lifetime Costs factors in their purchase decisions.

The six technology value factors are composite measures of customers’ multiple attitudes toward an EE technology’s lifetime and upfront costs, hassle, non-consumption performance, environmental impacts, and social signals. These value factors are unique to this study but can be used comparatively across technologies and segments to inform attitudes and preferences outside of the PG Study for future customer messaging and program design.

Single-Family Clusters: The cluster analysis resulted in four clusters, or distinct groups, of non-low income single-family residential customers based on their survey responses on customers’ environmental concerns, conservation attitudes, social signaling, and financial well-being. These clusters are also unique to this study but could be replicated in future studies with the battery of attitudinal questions (included in the Appendix 4.2B.1.2). The team applied these terms to the clusters:

- “Average Californians” reported *average* levels of environmental concern, energy conservation, social signaling, and financial well-being.

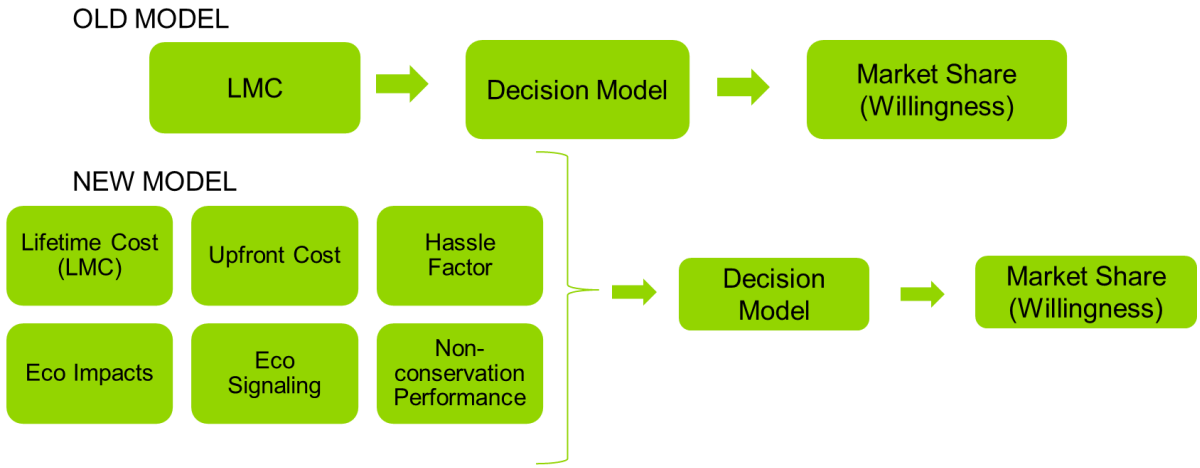
- "Eager Adopters" reported *higher than average* levels of environmental concern, energy conservation, social signaling and financial well-being.
- "Likely Laggards" reported *lower than average* levels of environmental concern, energy conservation, and social signaling, but higher than average financial well-being.
- "Economically Strained Environmentalists" reported *higher than average* levels of environmental concern, energy conservation, and social signaling but *lower than average* levels of financial well-being.

The Opinion Dynamics team concludes that this study developed the requisite detail and type of data necessary to inform the PG Study and Model by the Guidehouse team.[1]

Results

The results of the study become inputs to the PG Model. **Error! Reference source not found.** shows the 2021 PG Study updated willingness model that incorporates the six value factors into the decision model compared to the old model that has one value factor.

Figure 1. Old and New Model Willingness Calculation



Source: Guidehouse

This study determined the levels to which a customer group cares about one of these value factors more than the others. We refer to this set of information as "customer preference weights." The customer preference weights indicate how much of the customer's total decision to adopt is attributed to a given value factor. The market study calculated average preference weights for each customer group.

Building on the customer preference weights that are associated with the six value factors, the PG Study developed corresponding characteristics across the same six value factors for all technologies being forecasted in the PG Study. These two datasets (customer preference weights and technology characteristics) combined allow the PG Model to quantify how a customer group with a certain preference weighting will assess two competing equipment, each

[1] The Guidehouse report will be released in first quarter (Q3) of 2021.

with different characteristics. In short, the technology that has characteristics that best align with the customer's preferences is more likely to be adopted than a competing technology that does not align well.

The data collected from this market study informs the core of the PG Study forecast improving the fundamental decision science the forecast is based upon.

1. Introduction

The California Public Utilities Commission (CPUC) sets energy efficiency goals on a bi-annual basis for California's major investor-owned utilities (IOUs). CPUC conducts a bi-annual Potential and Goals Study (PG Study) to inform this goal setting process and provide forecasts of the remaining future opportunity for energy efficiency in IOU service territories. The PG Study uses an energy efficiency potential forecasting model (PG Model) to estimate the future customer adoption levels of new energy efficiency technologies across all building sectors. In past iterations of the potential and goals model (PG Model), economics was the primary driver for forecasting adoption of technologies. PG Study stakeholders previously commented that economics are not the only driver of technology adoption behavior, and in some cases, may not even be the primary driver.[2] Thus, the CPUC commissioned this study to research customer behavior and preferences and better inform the energy efficiency forecast.

To execute this study, the Opinion Dynamics evaluation team (the team) collected survey data from customers of three IOUs: Pacific Gas and Electric (PG&E), Southern California Edison (SCE),[3] and San Diego Gas and Electric (SDG&E). The customers include residential single-family customers, residential multifamily building owners and managers, and small, medium, and large commercial customers.

The customer survey measured respondents' willingness to adopt energy efficient and fuel substitution technologies and participate in demand response (DR) programs. The customer survey data also provided adoption-related metrics like customers' attitudes, barriers, and preferences regarding energy-using technologies.

The team's survey data analyses resulted in two additional composite metrics. The first metric is the segmentation of residential single-family customers into distinct clusters based on their stated attitudes in the survey. The second metric is the creation of unique value factors that customers weigh and use to make their adoption decisions as reported by their responses to survey questions. The raw data and the metrics were then used by Guidehouse as key inputs to (PG Model).[4] For additional analyses of survey data and the results from PG Model, see the Guidehouse report.[5]

The remainder of this report is organized into two sections and two appendices. Section 2 describes the methodological and analytical approaches used to collect the data and compute the results. Section 3 presents the key findings from the analyses of the residential customer clusters and the value factors. The three appendices include the sampling plans, the materials for the customer surveys, including outreach letters and emails used to contact potential participants and the survey itself, and tables and figures of detailed survey results.

Key objectives of the study:

[2] Comments received during and after an October 2019 workshop held at the CPUC titled: *Approaches for Assessing Energy Efficiency Potential & Goals Workshop*

[3] The research team did not request Southern California Gas (SCG) customers to minimize duplicates in the samples of the electric IOU customers.

[4] The raw data for the PG Model inputs for customers' reported willingness to adopt energy efficient technologies, program awareness, and characteristics were collected in surveys and then provided to Guidehouse for analysis and reporting. The raw data are not reported here.

[5] The Guidehouse report will be released in first quarter (Q3) of 2021.

- Collect residential (non-low income single-family and multifamily) and commercial (non-industrial, non-agricultural, non-governmental) customer characteristics, attitudes, and behaviors to inform technology adoption decision-making for energy efficiency technologies, fuel substitution technologies, and DR program participation.
- Identify the key value factors customers consider in their decision-making processes and quantify their relative importance (customer preference weightings). Table 1-1 defines the six value factors.
- Create distinct clusters of non-low income single-family residential customers that share similar attitudes about the environment, energy conservation, social signaling (how they want to be perceived by peers), and financial outlook.

Table 1-1. Value Factor Descriptions

Value Factor	Customer Value Perspective
Lifetime Costs	Long-term energy costs and savings of the technology
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Eco Impacts	Environmental impacts from energy consumption
Social Signaling	Being perceived as environmentally or socially responsible by one's peers, which is captured in the social signaling value factor

Source: Guidehouse team

The study's results can inform the CPUC, the IOUs, and other interested parties in decisions about Marketing, Education and Outreach (ME&O), design, and other aspects of relevant energy efficiency and DR programs and efforts to improve program participation and wider market adoption. In aggregate, the study's results can provide insight to questions from the interested parties, such as:

- What measures may be ripest for adoption in the short term? What kind of programmatic efforts may support their adoption?
- What are the drivers of customer adoption for different technologies and segments?
- How do these results provide insight to the overall pool of potential customers?
- Can programs adjust incentive and program delivery based on measure type and customer targeting?
    - Should IOUs focus on subsets, or still go for a mass market approach?
    - Is there a clear need for programs to target clusters differently based on market adoption characteristics?

The analysis here does not provide direct answers to these questions but provides findings from

the surveys that can support informing these type of program design and implementation topics.

Purpose

This report describes the market adoption research that Opinion Dynamics conducted in support of the PG Study. The report provides insights into customer preferences on economic and non-economic factors and other characteristics that influence customers' willingness to adopt EE technologies.

Historically, the PG Model calculated customers' willingness to adopt energy efficiency technologies using simple factors like lifetime cost or payback period. Other potential studies in other jurisdictions have even used Delphi panels to provide opinions on technology adoption rates. However, true customer purchase decision behavior is not solely based on financial indicators, nor can the complexities of the decision for each unique measure be captured via a Delphi panel. This study gathered and analyzed survey data to inform the PG Model willingness to adopt algorithms to incorporate both financial and non-financial indicators in customer decision-making. This study used behavioral science research to identify non-financial indicators that include the customer's perception of a technology's environmental impacts, social status/statement signaling, hassle (or lack thereof) of installation, and aesthetics or features unrelated to energy use as key datapoints to model customer willingness to adopt. The PG Model used the analyzed survey results as key inputs to forecast residential and commercial customers' technology adoption and EE savings potential.

2. Market Adoption Research Methodology

Historically, customer adoption characterization in the PG Study was based on the payback period of an energy efficient technology, leveraged from out-of-state, third-party utility data and subsequently vetted by stakeholders. This data was limited in scope and excluded the complexities that influence California customers' decisions to implement energy efficiency projects, as well as the evolution of programs, products, and markets in California. Due to these specific data and information gaps, the 2021 PG Study will leverage primary data and information critical to customer adoption in the California energy efficiency market.

As part of the primary data collection, the team surveyed residential single-family customers, multifamily building owners or managers, and small to medium and large commercial customers. The team developed and implemented the instruments necessary for the primary data collection activities. This section describes the analysis methods to group the findings across customer types (for single-family only) and technology types.

2.1 Survey Methods and Dispositions

The team surveyed three IOU customer groups:

1. Non-low income residential customers in single-family buildings with less than five units (598 respondents)
2. Owners and managers of multifamily properties with five or more units, at least one of which is rented at market rate (104 respondents)
3. Large, medium, and small commercial customers, excluding the industrial, agricultural, and government sectors (757 respondents)

The survey data includes metrics used as key inputs to the PG Model. These metrics included customers' willingness to adopt energy efficient technology, fuel switching technology, and DR programs, as well as their attitudes, motivators, and barriers to adopt. The following sections describe the survey methods and dispositions for each customer group.

2.1.1 *Single-Family Residential Customer Survey*

The team received survey responses from 598 single-family non-low income IOU customers in California. Respondents answered questions about:

- One of three high touch energy efficient technologies that included a refrigerator, clothes dryer, or smart thermostat (e.g., technologies that customers physically touch or see frequently)
- One of four low touch energy efficient technologies that included a furnace, central AC, water heater, or insulation (e.g., technologies that customers do not frequently see or touch physically)
- One of two fuel substitution technologies (gas furnace to electric air source heat pump and gas water heater to electric heat pump water heater)

- Participation in a DR program with a smart thermostat

2.1.1.1 Eligibility Criteria

Sampled single-family residential customers needed to meet five criteria to be eligible for the study. Eligible customers had to have:

1. An active electric account with PG&E, SCE, or SDG&E at the time of the study data request. SocalGas customers are not excluded and are captured by overlap with SCE customers.
2. A single-family residence in California with fewer than five units.[6]
3. An annual 2019 household income above the 200 percent federal poverty guideline thresholds used by the CPUC and IOUs (non-low income).[7, 8]
4. Some or all responsibility for energy-related decision-making in their household.
5. At least one of the high and low touch technologies asked about in the survey.

The IOUs provided the study team with a list of customers identified as having an active electric account, survey questions confirmed whether respondents met the remaining eligibility criteria.

2.1.1.2 Sample Design

In May 2020, the study team requested a set of 20,000 randomly selected residential customers from the three IOUs. From that customer set, the team initially sampled 5,000 customers for the survey based on an anticipated 12 percent response rate and a completion goal of 600 respondents needed for 90/10 confidence/precision.[9] To be representative of the coverage area, the team stratified the sample proportionally by IOU with 55 percent of customers from PG&E, 35 percent from SCE, and 10 percent from SDG&E. Customers were randomly sampled within each IOU customer group.

After collecting the responses, 36 percent of respondents were screened out because they were low income or because they lived in a building with five or more units. This screen-out rate was higher than anticipated. As a result, nearly 2,500 more respondents were added to the sample from the original pool of 20,000 to better ensure the completion goal of 600 respondents was reached.

[6] This includes single-family attached homes with four or fewer units, like townhomes, condos, and du-, tri-, and quad-plexes.
[7] The income guidelines are also used to determine eligibility in low income programs like CARE and ESA, and can be found here: https://www.cpuc.ca.gov/lowincomerates/
[8] Low income customers with annual incomes at or below the 200 percent FPG thresholds were included in a separate data collection activity for this study performed by Guidehouse.
[9] 90/10 confidence/precision means the sample is large enough at the technology-level (e.g., smart thermostat, water heater, fuel substitution, etc.) that we have 90 percent confidence that the survey results fall within 10 percent of the true values in the California population. It is a standard benchmark used in many industry studies.

Error! Reference source not found. shows the breakdown of the customer data request and the final sample by IOU. See the sample plan memo in Appendix A for more details about the sample design.

Table 2-1. Single-Family Residential Customer Survey Sample Design

IOU	Number of Customers Received from IOUs	Number of Customers Sampled for the Survey	Proportion of Sampled Customers
PG&E	11,000	4,111	55%
SCE	7,000	2,616	35%
SDG&E	2,000	748	10%
Total	**20,000**	**7,475**	**100%**

Source: Opinion Dynamics Analysis

2.1.1.3 Survey Fielding and Outreach Approach

The team fielded the online survey with the customer sample through a mixed-mode mail-to-web approach (Figure 2-1). All 5,000 sampled customers received an invitation letter in the mail that included a link to the survey website and a phone number customers could call to complete the survey with an interviewer if they preferred.

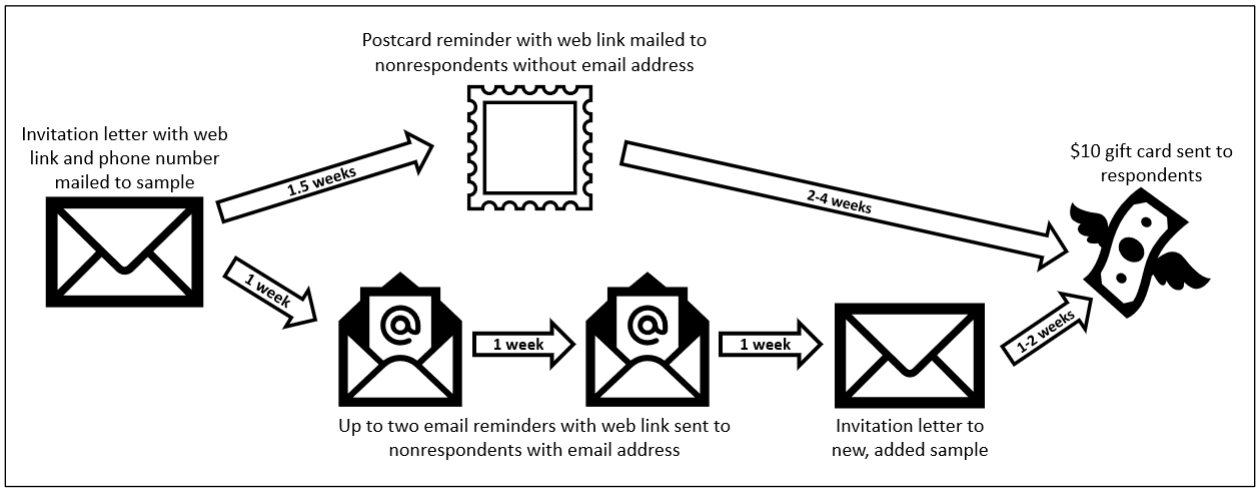
Next, the team mailed nonresponding customers without an email address a postcard reminder that included the web link and phone number. Nonresponding customers with an email address on record were sent two similar reminder emails.

At this point, the completion goal had not been met, so the team added an additional 2,475 customers to the sample and sent them an invitation letter, which helped to achieve the completion goal. See Appendix B for examples of the outreach letters and emails.

The team fielded the survey for approximately six weeks in the summer of 2020, between July 20 and September 4. The team distributed the first reminder email and postcard to the initial sample of 5,000 within seven to 10 days after the invitation, and the second reminder email was sent approximately one week later. Approximately one week after distributing the second email reminder to the initial sample, the team mailed an invitation to the additional sample of 2,475 customers.

The team offered respondents a $10 gift card to complete the survey to boost the survey response rate. Customers with an email address received electronic gift cards and customers without an email address received physical gift cards.

Figure 2-1. Single-family Residential Customer Survey Approach



Source: Opinion Dynamics

2.1.1.4 Survey Disposition Results

The survey achieved 598 completes, which translates to a 13.4 percent response rate. All the respondents completed the survey on the web (none called to take the survey on the phone). The survey closed after achieving 612 completes but in subsequent analyses the team identified 14 respondents as those who sped through the survey too quickly to provide reliable and valid data, so they were excluded from the completes. Table 2-2 shows the disposition and results.

Out of the sample of 7,475 customers, over 15 percent started the survey or replied to opt-out and 85 percent did not respond or were undeliverable. Of those who started the survey, 36 percent were ineligible based on being low income, living in multifamily housing, not having any of the technologies asked about in the survey, or not having any responsibility in energy-related household decisions. The team applied the ineligibility rate to the nonresponding sample to calculate the total eligible sample. Per the Response Rate #3 formula established by the American Association for Public Opinion Research (AAPOR), the team divided the total completed surveys (n=598) by the total eligible sample (n=4,476) to arrive at the 13.4 percent response rate.[10]

[10] American Association for Public Opinion Research (2016). "Standard Definitions, 9th Edition." https://www.aapor.org/Standards-Ethics/Standard-Definitions-(1).aspx

Table 2-2. Single-Family Residential Customer Survey Disposition

Disposition	Number	Percent of Total
Total sample	7,475	100%
Completes	598	8.0%
Speeders [a]	14	0.2%
Break-offs [b]	124	1.7%
Screened out as ineligible for survey [c]	421	5.6%
Opt-outs	4	0.1%
Non-contacts and nonrespondents	5,877	78.6%
Undeliverable addresses	437	5.9%
Result	**Number or Rate**	
Contact rate [d]	15.6%	
Ineligibility rate [e]	36.4%	
Total eligible sample [f]	4,476	
Response rate [g]	13.4%	

[a] Completed the survey in less than five minutes.

[b] Started survey and was determined eligible but did not complete the survey.

[c] Screened out due to being below 200 percent federal poverty guidelines, residing in home with five or more units, not having any technologies asked about in the survey, or not having responsibility for making energy-related decisions.

[d] (Screened out as ineligible [421] + passed eligibility [598+14+124] + opted-out [4]) / total sample [7,475]

[e] Screened out as ineligible [421] / (screened out as ineligible [421] + passed eligibility [598+14+124])

[f] Total sample [7,475] – (screened out as ineligible [421] + undeliverable addresses [437] + (Ineligibility rate [0.364] * non-contacts/nonrespondents/opt-outs [5,881]))

[g] AAPOR Response Rate 3: completes [598] / total eligible sample [4,476]

Source: Opinion Dynamics Analysis

2.1.1.5 Surveyed Topics and Technology Types

The single-family residential survey included several topic areas (see the instrument in Appendix B). The survey began with some screening questions about customers' 2019 household size and income, type of residence, and decision-making responsibility. Questions then followed about respondents' existing technology in their home, their awareness of and participation in IOU energy efficiency program(s), and their attitudes toward the environment, energy consumption, and their financial situation.

Next, the main sections of the survey included questions about customers' motivators, barriers, and willingness to adopt energy efficient technology, to participate in a DR program with a smart thermostat, and to substitute electric for natural gas technology. The survey asked respondents about only one technology type in each of the three technology categories included in the survey.

Respondents answered questions on the following technology categories and types:

- High touch energy efficient technologies that included a refrigerator, clothes dryer, or

smart thermostat (e.g., technologies that customers physically touch or see frequently).

- Low touch energy efficient technologies that included a furnace, central AC, water heater, or insulation (e.g., technologies that customers do not frequently see or touch physically).
- Fuel substitution technologies that included a switch from a gas furnace to an electric air source heat pump or a from a gas water heater to an electric heat pump water heater.

The team assigned each surveyed customer a technology type to answer questions based on two criteria. First, customers had to have the technology in their home. For example, the team did not ask customers without a heating or cooling system, or without a gas technology, questions about those technology types in the survey.

Second, the team stratified the high touch technologies so half of respondents were assigned the smart thermostat and the remaining half were split equally between the refrigerator and clothes dryer. This stratification helped establish that there were enough customers to answer the questions about DR program participation with a smart thermostat. For the low touch and fuel substitution technologies, the team randomly assigned respondents so each technology had about an equal proportion of respondents who answered questions about the technologies. Table 2-3 shows the distribution of respondents by technology type.

Table 2-3. Single-Family Residential Respondents by Technology Type They Were Asked About

Technologies	Number of Respondents	Percent of Total Respondents
Total respondents	598	100%
High touch technologies	598	100%
Refrigerator	150	25%
Clothes dryer	149	25%
Smart thermostat	299	50%
Low touch technologies	598	100%
Furnace	148	25%
Central air conditioner	148	25%
Water heater	150	25%
Insulation	152	25%
Fuel substitution technologies	598	100%
Gas furnace to electric air source heat pump	263	44%
Gas water heater to electric heat pump water heater	260	44%
None	75	12%
Demand response with smart thermostat	336	56%
Has smart thermostat	154	26%
Does not have smart thermostat	182	30%

Source: Opinion Dynamics Analysis

The team questioned respondents about the technologies by presenting them with scenarios in which they needed to replace or add the technology to their home. The scenarios included five-point scale questions to ask respondents about each of the following topics.[11]

- Motivators for adopting the technology such as look and feel, features, and energy savings
- Barriers to adopting the technology such as the upfront cost, access to financing, and the inconvenience of upgrading
- Willingness to adopt the efficient (vs. standard) or electric (vs. gas) technology:
    - Without any incentive
    - With an incentive that reduced the payback period to half
    - With an incentive that reduced the payback period to zero[12,13]
    - For the energy efficient technologies, approximately half of the customers were asked about their willingness to adopt with an on-bill financing option instead of with an incentive

These metrics are key to the PG Model created by Guidehouse.

The final sections of the survey included questions about how COVID-19 had impacted customers' households and decision-making, and about their demographic and household characteristics. Upon completing the survey, customers were asked to verify their email or mailing address for the gift card.

2.1.1.6 Representativeness and Weighting

Single-family residential survey results are weighted to correct for sampling and non-response bias present in the survey data. To improve representativeness of survey results, the team used raked weights to adjust the sample to reflect California population proportions of age, income, education, race, and gender.[14, 15] The team also adjusted raked weights for known customer

[11] For motivators to adopt, the five-point scale was 'not at all important' (1), 'slightly important' (2), 'moderately important' (3), 'very important' (4), and 'extremely important (5). For barriers, the five-point scale was 'not a barrier' (1), 'minor barrier' (2), 'moderate barrier' (3), 'considerable barrier' (4), and 'major barrier' (5). For willingness to adopt, the five-point scale was 'not at all likely' (1), 'slightly likely' (2), 'somewhat likely' (3), 'very likely' (4), and 'extremely likely' (5).
[12] Respondents who reported they were "extremely likely" to adopt a technology in one scenario were not asked the follow-up scenario(s) that included the larger incentive and shorter payback period.
[13] The payback period is the amount of time it would take for the estimated energy savings to equal the difference in upfront costs between the standard and the energy efficient models. For example, if a standard refrigerator costs $500, an energy efficient model costs $800, and the efficient model saves $60 per year, the payback period would be 5 years without an incentive ($800 - $500 = $300, and $300/$60 per year = 5 years).
[14] Raked weighting is a procedure that iteratively adjusts the weight for each respondent until the distribution of the survey sample aligns with the distribution of the California population on the variables we weighted on (age, income, education, race, and gender). The procedure ensures the survey sample is more representative of the population.
[15] Since this survey was limited to non-low income California adults residing in single-family attached or detached properties located in PG&E, SCE, or SDG&E territory (and if a renter, had decision-making authority over upgrades to the home), there is no exact Census categorization that provides precise population estimates for this particular grouping of customers. To remedy this issue, we combined various statewide Census estimates from the 2018 American Community Survey one-year estimates for California that aimed to best represent this microtargeted group: adults (18+), homeowners, single-family attached/detached residents, and those with incomes above the poverty line.

distributions across IOUs. Survey responses informed the sample demographic estimates. Customer IOU was appended from IOU records to each respondent. Table 2-4 provides the unweighted sample distributions and the corresponding Census and IOU estimates used to develop the weights. The Census estimates are from the 2018 American Community Survey one-year estimates for California.

Table 2-4. Single-Family Residential Respondents and Population Estimates by Demographic Characteristics

Characteristics	Unweighted Proportion of Sample	Population Estimate
Age		
18 to 34	5%	10%
35 to 54	36%	35%
55 to 64	21%	23%
65 and older	38%	32%
2019 Annual Household Income		
$25,000 to $49,999	6%	21%
$50,000 to $74,999	13%	20%
$75,000 to $99,999	25%	16%
$100,000 to $149,999	26%	21%
$150,000 or more	31%	22%
Education		
Less than high school graduate	1%	12%
High school graduate (including equivalency)	3%	18%
Some college or Associates degree	23%	30%
Bachelor's degree or higher	72%	41%
Race		
White	74%	61%
Asian	16%	16%
Other	10%	23%
Gender		
Male	55%	50%
Female	45%	50%
IOU		
PG&E	62%	55%
SCE	24%	35%
SDG&E	14%	10%

[a] Population estimates from IOUs and 2018 American Community Survey one-year estimates for California.

Source: Opinion Dynamics Analysis

2.1.2 *Multifamily Residential Property Survey*

The team received survey responses from owners and managers of 104 multifamily properties in California. Respondents answered questions about:

- One of two in-unit minor investment technologies (refrigerator and smart thermostat)
- One of two in-unit major investment technologies (water heater and insulation)
- One in-unit fuel substitution technology (gas water heater to electric heat pump water heater)

2.1.2.1 Eligibility Criteria

Sampled properties needed to meet a few criteria to be eligible for this study. Eligible properties had to have:

- An active electric account with PG&E, SCE, or SDG&E at the time of the survey
- Five or more units, of which at least one had to be a market rate rental[16]
- A responding owner or property manager with some or all responsibility for making energy-related decisions about the units
- At least one of the minor and major investment technologies asked about in the survey

The survey included screening questions to ensure the responding property met the criteria.

2.1.2.2 Sample Design

In June 2020, Dun & Bradstreet's Hoovers database provided a list of nearly 19,000 multifamily properties. The properties in the list are located in California and classified under the NAICS code for lessors of residential buildings (531110) or under the SIC code for apartment building operators (651300). After the team cleaned the list to remove realtors, duplicate records, and single-family rentals with fewer than five units, 13,280 properties remained in the list. All properties included in the list were assumed to have an electric account since the list provider, excludes properties that are closed for business.

The team sampled approximately 3,000 properties for the survey based on an anticipated three percent response rate and a completion goal of 100 respondents needed for 90/10 confidence/precision. After grouping properties in the list by IOU territory, the team then randomly sampled within each territory. The team stratified the sample proportionally by IOU to be representative of the coverage area, where 55 percent of properties are in PG&E service territory ZIP codes, 35 percent are in SCE ZIP codes, and 10 percent are in SDG&E ZIP codes.

Table 2-5 shows the breakdown of the Hoovers list and the final sample by IOU territory. The sample plan memo in Appendix A provides more details about the sample design.

[16] Multifamily properties with only affordable rate units were included in a separate data collection activity for this study performed by Guidehouse.

Table 2-5. Multifamily Residential Property Survey Sample Design

IOU	Number of Properties Received from Hoovers	Number of Properties Sampled for the Survey	Proportion of Sampled Properties
PG&E	7,483	1,666	55%
SCE	3,888	1,061	35%
SDG&E	1,909	303	10%
Total	**13,280**	**3,030**	**100%**

Source: Opinion Dynamics Analysis

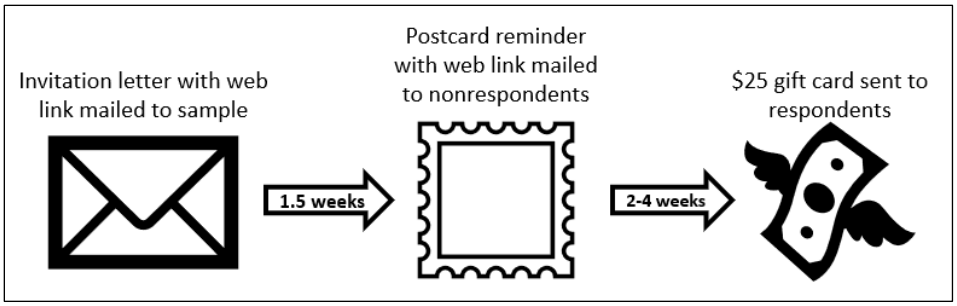
2.1.2.3 Survey Fielding and Outreach Approach

The team used a mixed-mode mail-to-web approach to field an online survey with the sample of multifamily properties (Figure 2-2). All sampled properties received a mailed invitation letter that included a link to the survey website. Next, the nonresponding properties received one postcard reminder that included the web link. See Appendix B for examples of the outreach letter and postcard.

The team fielded the survey for approximately three weeks between August 4 and August 28, 2020. The team sent the first reminder postcard approximately 10 days after the invitation.

The team offered respondents a $25 gift card to complete the survey to boost the survey response rate. The team sent respondents with an email address electronic gift cards and mailed a physical gift card to the respondents who preferred that instead.

Figure 2-2. Multifamily Residential Property Survey Approach



Source: Opinion Dynamics

2.1.2.4 Survey Disposition Results

The survey achieved a total of 104 completes, which translates to a 6.7 percent response rate. The survey was closed after obtaining 114 completes. In subsequent analyses, the team identified 10 respondents who sped through the survey too quickly to provide reliable and valid data and excluded them from the completes. Table 2-6 shows the disposition and results.

Out of the sample of 3,030 customers, approximately 10 percent started the survey and nearly 90 percent did not respond or were undeliverable. Of those who started the survey, 42 percent were ineligible based on not having the following:

- Five or more units or any market rate units
- Any of the technologies asked about in the survey
- Any responsibility for energy-related decisions in the rental units

The team applied the ineligibility rate to the nonresponding sample to calculate the total eligible sample. Per the Response Rate #3 formula established by AAPOR, the team divided the total completed surveys (n=104) by the total eligible sample (n=1,673) to arrive at the 6.7 percent response rate.[17]

Table 2-6. Multifamily Residential Property Survey Disposition

Disposition	Number	Percent of Total
Total sample	3,030	100%
Completes	104	3.4%
Speeders [a]	10	0.3%
Break-offs [b]	71	2.3%
Screened out as ineligible for survey [c]	133	4.4%
Non-contacts and nonrespondents	2,248	74.2%
Undeliverable addresses	284	9.4%
Result	**Number or Rate**	
Contact rate [d]	10.5%	
Ineligibility rate [e]	41.8%	
Total eligible sample [f]	1,673	
Response rate [g]	6.7%	

[a] Completed the survey in less than five minutes.

[b] Started survey and was determined eligible but did not complete the survey.

[c] Screened out due to having fewer than five units, not having any market rate units, not having any technologies asked about in the survey, or not having responsibility for making energy-related decisions about rental units.

[d] (Screened out as ineligible [133] + passed eligibility [104+10+71]) / total sample [3,030]

[e] Screened out as ineligible [133] / (screened out as ineligible [133] + passed eligibility [104+10+71])

[f] Total sample [3,030] – (screened out as ineligible [133] + undeliverable addresses [284] + (Ineligibility rate [0.418] * non-contacts/nonrespondents/opt-outs [2,248]))

[g] AAPOR Response Rate 3: completes [598] / total eligible sample [4,476]

Source: Opinion Dynamics Analysis

2.1.2.5 Surveyed Topics and Technology Types

The multifamily property survey included several topic areas (see the instrument in Appendix B). The survey began with some screening questions about the property, buildings, and units. Questions then followed about respondents' existing technology in the units; their awareness of and participation in IOU energy efficiency program(s); their attitudes toward the environment,

[17] American Association for Public Opinion Research (2016). "Standard Definitions, 9th Edition." https://www.aapor.org/Standards-Ethics/Standard-Definitions-(1).aspx

energy consumption, and their financial situation; and what constitutes as a minor and major purchase for their property.

Next, the main sections of the survey included questions about customers' motivators, barriers, and willingness to adopt energy efficient technology and to substitute electric for natural gas technology for their rental units. The survey asked respondents about only one technology type in each of the three technology categories included in the survey.

The technology categories and types are:

- Minor energy efficient technologies that included a refrigerator and a smart thermostat
- Major energy efficient technologies that included a water heater and insulation
- A fuel substitution technology that was a switch from a gas water heater to an electric heat pump water heater

The team assigned respondents a technology type to answer questions about whether the technology was in or used for their rental units. The technologies were chosen in part because most rental units do include them. Table 2-7 shows the distribution of respondents by technology type.

Table 2-7. Multifamily Residential Respondents by Technology Type They Were Asked About

Technologies	Number of Respondents	Percent of Total Respondents
Total respondents	104	100%
Minor technologies	104	100%
Refrigerator	54	52%
Smart thermostat	50	48%
Low touch technologies	104	100%
Water heater	52	50%
Insulation	52	50%
Fuel substitution technologies	104	100%
Gas water heater to electric heat pump water heater	68	65%
None	36	35%

Source: Opinion Dynamics Analysis

The survey asked respondents about the technologies by presenting them with scenarios in which they needed to replace or add the technology in one of their units. The scenarios included five-point scale questions asking respondents about each of the following topics.[18]

- Motivators for adopting the technology such as look and feel, features, and energy

[18] For motivators to adopt, the five-point scale was 'not at all important' (1), 'slightly important' (2), 'moderately important' (3), 'very important' (4), and 'extremely important (5). For barriers, the five-point scale was 'not a barrier' (1), 'minor barrier' (2), 'moderate barrier' (3), 'considerable barrier' (4), and 'major barrier' (5). For willingness to adopt, the five-point scale was 'not at all likely' (1), 'slightly likely' (2), 'somewhat likely' (3), 'very likely' (4), and 'extremely likely' (5).

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- Barriers to adopting the technology such as the upfront cost, access to financing, and the inconvenience of the installation
- Willingness to adopt the efficient (vs. standard) and electric (vs. gas) technology:
    - Without any incentive
    - With an incentive that reduced the payback period to half
    - With an incentive that reduced the payback period to zero[19, 20]

These metrics are key to the PG Model Guidehouse created.

The final sections of the survey asked how COVID-19 impacted respondents' business and decision-making, and about their firmographic characteristics. Upon completing the survey, respondents were asked to verify their email or mailing address for the gift card.

2.1.2.6 Representativeness and Weighting

The unweighted responding multifamily properties were disproportionately located in PG&E and SDG&E territories (Table 2-8). The team applied weights to the data to make the distribution of respondents equal to that in the population.

Table 2-8. Multifamily Residential Respondents and Population by IOU

IOUs	Number of Respondents	Percent of Total Respondents	Percent of Population
Total respondents	104	100%	100%
PG&E	64	62%	55%
SCE	24	23%	35%
SDG&E	16	15%	10%

Source: Opinion Dynamics Analysis

2.1.3 *Commercial Customer Survey*

The team received survey responses from 757 small, medium, and large commercial customers in 10 different business sectors in California. Respondents answered adoption-related questions about:

- One of four minor investment technologies (refrigerator, clothes dryer, and smart thermostat)
- One of four major investment technologies (furnace, central AC, water heater, and

[19] Respondents who reported they were "extremely likely" to adopt a technology in one scenario were not asked the follow-up scenario(s) that included the larger incentive and shorter payback period.
[20] The payback period is the amount of time it would take for the estimated energy savings to equal the difference in upfront costs between the standard and the energy efficient models. For example, if a standard refrigerator costs $500, an energy efficient model costs $800, and the efficient model saves $60 per year, the payback period would be 5 years without an incentive ($800 - $500 = $300, and $300/$60 per year = 5 years).

insulation)

- A fuel substitution technology (gas water heater to electric heat pump water heater)
- Participation in a one of two DR programs (one with a smart thermostat or one with an energy management system [EMS])

2.1.3.1 Eligibility Criteria

Sampled commercial customers needed to meet five criteria to be eligible for this study. Eligible customers had to have:

- An active electric account at the time of the study data request
- A commercial business that was not primarily in the industrial, agricultural, or government sectors[21]
- Plans to open the business if it is temporarily closed or currently open with operating hours (permanently closed businesses are ineligible)
- Some or all responsibility for making energy-related decisions in their business or facility
- At least one of the major and minor investment technologies asked about in the survey

The IOUs identified and provided the study team with a list of customers who had an active electric account and were able to exclude some of the industrial and agricultural customers. Survey questions were included to ensure responding customers met the remaining eligibility criteria.

2.1.3.2 Sample Design

In May 2020, the team requested a set of 30,000 randomly selected commercial customers from the three IOUs. From that customer set, the team initially sampled 12,000 customers sampled for the survey based on an anticipated response rate of five percent and a completion goal of 600 respondents needed for 90/10 confidence/precision.

The team stratified the sample proportionally by IOU to be representative of the coverage area, where 55 percent of customers are from PG&E, 35 percent are from SCE, and 10 percent are from SDG&E. The team also stratified customers by size, where 67 percent were small or medium and 33 percent were large, based on their 2019 annual energy usage. They defined large commercial customers as those that consumed 300 or more kWh and defined small and medium customers as those that consumed less than 300 kWh. Customers were randomly sampled within each IOU and size group.

In the middle of fielding the survey, the response rate trended to be much lower than five percent. To address this, the team added nearly 7,270 more respondents to the sample to reach the completion goal of 600. This also forced a shift to the stratified IOU proportions of the sample since there was not enough of PG&E small-medium customers due to the inclusion of too many ineligible records in their customer list, such as hundreds of billboards and cable

[21] Industrial and agricultural sectors were included in a separate data collection activity for this study performed by Guidehouse.

boxes. The team drew a lower proportion of PG&E customers and a higher proportion of SCE and SDG&E customers for the added sample. Sample weights were applied to correct for the shift, Section 2.1.3.6 discusses this in more detail.

Table 2-9 shows the breakdown of the customer data request and the final sample by IOU and size. See the sample plan memo in Appendix A for more details about the sample design.

Table 2-9. Large and Small-Medium Commercial Customer Survey Sample Design

IOU	Number of Customers Requested from IOUs			Number of Customers Sampled for Survey			Proportion of Sampled Customers		
	Large	Small-Medium	Total	Large	Small-Medium	Total	Large	Small-Medium	Total
PG&E	5,600	10,700	16,300	4,341	4,529	8,870	55%	40%	46%
SCE	3,400	7,300	10,700	2,700	5,434	8,134	35%	48%	42%
SDG&E	1,000	2,000	3,000	822	1,444	2,266	10%	13%	12%
Total	**10,000**	**20,000**	**30,000**	**7,863**	**11,407**	**19,270**	**100%**	**100%**	**100%**

Source: Opinion Dynamics Analysis

2.1.3.3 Survey Fielding and Outreach Approach

The team used a mixed-mode mail- and email-to-web approach to field an online survey with the commercial customer sample (Figure 2-3). All sampled customers without an email on record (approximately 60 percent of the sample) were mailed an invitation letter that included a link to the survey website. Those customers with an email address on record (approximately 40 percent of the sample) were sent the invitation via email.

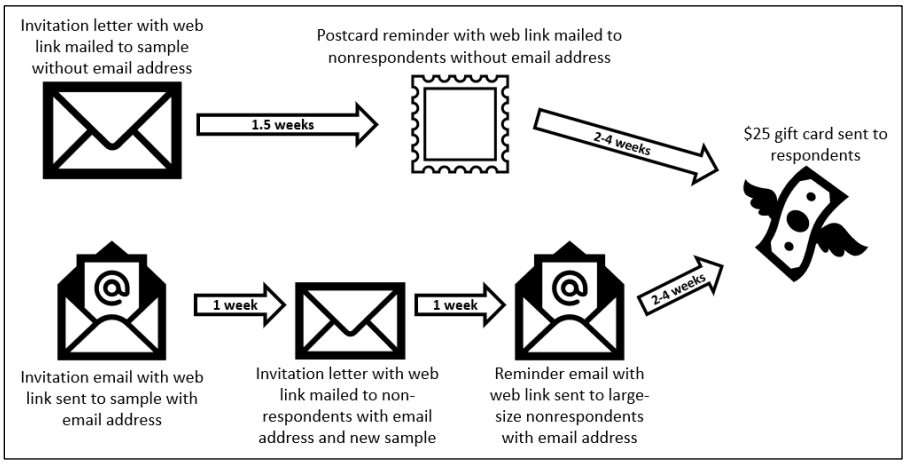
Next, the team mailed nonresponding customers without an email address a postcard reminder that included the web link. The customer group with an email address obtained a much lower than expected response rate from the invitation email, so the team added 7,272 customers to the sample. These customers and the email nonrespondents were then mailed an invitation letter.

Last, the team emailed a reminder to nonresponding large-sized commercial customers with an email address to achieve the completion goal. Appendix B includes examples of the outreach letters and emails.

The team fielded the survey between August 7 and September 4, 2020. The team mailed the postcard reminder to the sample without email approximately one and a half weeks after the invitation letter. Approximately one week after the invitation email, the team mailed an invitation letter to the sample with email and the new added sample. Large-sized nonrespondents were sent an email reminder approximately one week after the invitation letter.

The team offered respondents a $25 gift card to complete the survey to boost the survey response rate. The team sent customers with an email address electronic gift cards and the mailed physical gift cards to customers who preferred that instead.

Figure 2-3. Commercial Survey Approach



Source: Opinion Dynamics

2.1.3.4 Survey Disposition Results

The survey achieved a total of 757 completes, which translates to a 5.9 percent response rate. The survey closed after achieving 810 completes. In subsequent analyses, the team identified 53 respondents who sped through the survey too quickly to provide reliable and valid data and excluded them from the completes. Table 2-10 shows the disposition and results.

Out of the sample of 19,270 customers, over 10 percent started the survey and nearly 90 percent did not respond or were undeliverable. Of those who started the survey, 30 percent were ineligible based on being an industrial, agricultural, or government entity, being permanently closed, not having any of the technologies asked about in the survey, or not having any responsibility in energy-related decisions. The team applied the ineligibility rate to the nonresponding sample to calculate the total eligible sample. Per the Response Rate #3 formula established by AAPOR, the team divided the total completed surveys (n=757) by the total eligible sample (n=12,582) to arrive at the 5.9 percent response rate.[22]

Table 2-10. Commercial Customer Survey Disposition

Disposition	Number	Percent of Total
Total sample	19,270	100%
Completes	757	3.9%
Speeders [a]	53	0.3%
Break-offs [b]	655	3.4%
Other eligible incomplete	18	0.1%
Screened out as ineligible for survey [c]	625	3.2%
Non-contacts and nonrespondents	16,137	83.7%
Undeliverable addresses or emails	1,016	5.3%

[22] American Association for Public Opinion Research (2016). "Standard Definitions, 9th Edition." https://www.aapor.org/Standards-Ethics/Standard-Definitions-(1).aspx

Result	Number or Rate
Contact rate [d]	10.9%
Ineligibility rate [e]	29.6%
Total eligible sample [f]	12,582
Response rate [g]	5.9%

[a] Completed the survey in less than five minutes.

[b] Started survey and was determined eligible but did not complete the survey.

[c] Screened out due to being an industrial, agricultural, or government entity, being permanently closed for business, not having any technologies asked about in the survey, or not having responsibility for making energy-related decisions.

[d] (Screened out as ineligible [625] + passed eligibility [757+53+655+18]) / total sample [19,270]

[e] Screened out as ineligible [625] / (screened out as ineligible [625] + passed eligibility [757+53+655+18])

[f] Total sample [19,270] – (screened out as ineligible [625] + undeliverable addresses [1,016] + (Ineligibility rate [0.296] * non-contacts/nonrespondents/opt-outs [16,137]))

[g] AAPOR Response Rate 3: completes [757] / total eligible sample [12,582]

Source: Opinion Dynamics Analysis

2.1.3.5 Surveyed Topics and Technology Types

The commercial survey included several topic areas (see the instrument in Appendix B). The survey began with some screening questions about the status of customers' business, their type of business, and decision-making responsibility. Questions then followed about respondents' existing technology in their business; awareness of and participation in IOU energy efficiency program(s), their attitudes toward the environment, energy consumption, and their financial situation; and what constitutes as a minor and major purchase for their property.

Next, the main sections of the survey included questions about customers' motivators, barriers, and willingness to adopt energy efficient technology, to participate in a DR program with a smart thermostat or EMS, and to substitute electric for natural gas technology. The team asked respondents about only one technology type in each of the four technology categories included in the survey.

The technology categories and types respondents were asked about are:

- Minor investment energy efficient technologies that included a smart power strip, computer power management device, occupancy sensor, or smart thermostat
- Major investment energy efficient technologies that included a refrigerated display case or storage unit, water heater, insulation, or EMS
- Fuel substitution technologies that included a switch from a gas water heater to an electric heat pump water heater
- DR program participation with either a smart thermostat or an EMS

The team assigned customers a technology type to answer questions based on two criteria. First, customers had to have the technology, or their facility had to be equipped to have the technology. For example, customers without a computer in the facility were not asked questions about a computer power management device, customers without a gas water heater were not asked questions about fuel substitution, and so on.

Second, the team stratified the assignment of the minor and major efficient technologies to ensure enough respondents answered questions for each type. For example, since refrigeration cases were only found in certain businesses, any customer with one in their facility was assigned to answer questions about that technology type. The team also assigned more customers to answer questions about adopting the smart thermostat or the EMS to ensure enough customers answered follow-up questions about DR program participation with those technologies. Table 2-11 shows the distribution of respondents by technology type.

Table 2-11. Commercial Respondents by Technology Type They Were Asked About

Technologies	Number of Respondents	Percent of Total Respondents
Total respondents	757	100%
Minor investment technologies	757	100%
Smart power strip	136	18%
Computer power management device	125	17%
Occupancy sensor	134	18%
Smart thermostat	362	48%
Major investment technologies	757	100%
Refrigeration display or storage case	137	18%
EMS	310	41%
Water heater	152	20%
Insulation	158	21%
Fuel substitution technologies	757	100%
Gas water heater to electric heat pump water heater	198	26%
None	559	74%
Demand response with smart thermostat [a]	83	11%
Has smart thermostat	9	1%
Does not have smart thermostat	74	10%
Demand response with EMS	467	62%
Has EMS	69	9%
Does not have EMS	398	53%

[a] Due to survey programming error and an unexpected large number of customers who reported having an EMS, the number of customers asked about DR with a smart thermostat, particularly those who have one, is small.

Source: Opinion Dynamics Analysis

The team asked respondents about the technologies by presenting them with a scenario to imagine they needed to replace or add the technology to their business or facility. The scenarios included five-point scale questions asking respondents about each of the following topics:[23]

- Motivators for adopting the technology, such as look and feel, features, and energy

[23] For motivators to adopt, the five-point scale was 'not at all important' (1), 'slightly important' (2), 'moderately important' (3), 'very important' (4), and 'extremely important (5). For barriers, the five-point scale was 'not a barrier' (1), 'minor barrier' (2), 'moderate barrier' (3), 'considerable barrier' (4), and 'major barrier' (5). For willingness to adopt, the five-point scale was 'not at all likely' (1), 'slightly likely' (2), 'somewhat likely' (3), 'very likely' (4), and 'extremely likely' (5).

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- Barriers to adopting the technology such as the upfront cost, access to financing, and the inconvenience of the installation
- Willingness to adopt the efficient (vs. standard) or electric (vs. gas) technology:
    - Without any incentive
    - With an incentive that reduced the payback period to half
    - With an incentive that reduced the payback period to zero[24, 25]
    - For the energy efficient technologies, approximately half the customers were asked about their willingness to adopt with an on-bill financing option instead of with an incentive

These metrics are key to the PG Model Guidehouse created.

The final sections of the survey included questions about how COVID-19 had impacted customers' business and decision-making, and about their firmographic and facility characteristics. Upon completing the survey, customers had to verify their email or mailing address for the gift card.

2.1.3.6 Representativeness and Weighting

The team weighted commercial customer survey results to correct for sampling and non-response bias present in the survey data. To improve representativeness of survey results, the team used weights to adjust the sample to reflect California known customer distributions across IOUs and business size based on annual energy usage. Large businesses are those that used 300,000 kWh or more in 2019.

Table 2-12 shows the unweighted sample distributions and the corresponding population values used to develop the weights. The team estimated that PG&E customers make up 55 percent of all customers, SCE customers make up 35 percent, and SDG&E customers make up 10 percent. Within each IOU, the team estimated that large businesses include approximately 15 percent of all businesses and small-medium businesses make up approximately 85 percent using data from the 2012 Commercial Building Energy Consumption (latest available CBECS) for California.

Table 2-12. Commercial Respondents and Population Estimates by Size and IOU

Size	PG&E		SCE		SDG&E		Total	
	Sample	Population	Sample	Population	Sample	Population	Sample	Population
Large	25%	8%	16%	5%	4%	2%	45%	15%

[24] Respondents who reported they were "extremely likely" to adopt a technology in one scenario were not asked the follow-up scenario(s) that included the larger incentive and shorter payback period.
[25] The payback period is the amount of time it would take for the estimated energy savings to equal the difference in upfront costs between the standard and the energy efficient models. For example, if a standard refrigerator costs $500, an energy efficient model costs $800, and the efficient model saves $60 per year, the payback period would be 5 years without an incentive ($800 - $500 = $300, and $300/$60 per year = 5 years).

Size	PG&E		SCE		SDG&E		Total	
Small-Med	30%	47%	19%	30%	6%	8%	55%	85%
Total	55%	55%	35%	35%	10%	10%	100%	100%

Source: Opinion Dynamics Analysis

Customers from each of the key business segments tracked by the CPUC responded to the survey (Table 2-13). The segments with 68 or more have 90/10 confidence/precision at the segment-level, which includes offices, retail, other, health, restaurants, and warehouses. Population data was unavailable for the distribution of the segments in California. The team used the available data sources for population estimates to group the businesses into different categories.

Table 2-13. Commercial Respondents by Business Segment

Segment	Small-Medium	Large	Total	Total Proportion
Total respondents	425	332	757	100%
Offices	137	103	240	32%
Retail	85	63	148	20%
Other	92	48	140	19%
Health	65	37	102	13%
Restaurants	43	55	98	13%
Warehouses	47	32	79	10%
Lodging	28	22	50	7%
Schools	20	19	39	5%
Grocery	16	14	30	4%
Colleges	5	4	9	1%

Source: Opinion Dynamics Analysis

2.2 Analysis Methods

Opinion Dynamic conducted two analyses with the survey data for Guidehouse to use in the PG Model and other analyses. The first is a cluster analysis of the surveyed single-family residential customers, which separated them into four distinct clusters or segments based on their responses to environmental and financial attitudinal questions. The second is the creation and assessment of six value factors from responses of surveyed residential and commercial customers about the relative importance of different aspects involved in their decision-making about adopting energy efficient technologies. The six value are the lifetime costs, upfront costs, environmental impacts, social signaling, non-energy impacts, and hassles or inconveniences.

The team collected, cleaned, and developed the survey data for downstream use in the PG Study. After these steps the team handed the data and metrics over to Guidehouse for downstream use in the PG Model. Any additional analysis for model use will be described in the 2021 Potential and Goals report (to be published in Q3 2021).

2.2.1 *Single-Family Residential Segmentation Methods*

The team conducted a cluster analysis on single-family residential respondents' self-reported attitudes and behaviors related to environmental concern, energy use and conservation, purchasing decisions, social signaling, and financial well-being.[26] The use of a latent profile analysis method resulted in four discrete clusters of residential customers that shared similar survey response patterns on the attitudinal and behavioral survey items.[27] The resulting clusters served as the residential customer groupings for subsequent market adoption analyses by Guidehouse.

The survey asked respondents if they agreed or disagreed with nine statements using a five-point scale where 1 is strongly disagree, 3 is neither, and 5 is strongly agree (Table 2-14). The team rescaled responses to the statements so that all were in the same direction, and then included them in the latent profile analysis to separate respondents into distinct groups based on their answers. See Section 3 for the clusters.

Table 2-14. Survey Question Used for Single-Family Residential Cluster Analysis [a]

Survey Question Statements	
Environmental challenges like climate change, pollution, and waste are not important issues	It is important for others to see me as environmentally conscious
Californians should change their lifestyles to reduce energy consumption	I am proud when I figure out ways to save a few dollars on my energy bill
It takes a lot of effort to be energy efficient	I will not pay more for energy efficient equipment even if it means I can save energy costs in the long term
I like being one of the first in my community to purchase the latest high-tech products	I am concerned that the money I have won't last
I have money left over at the end of the month	

[a] Respondents were asked to report their disagreement or agreement with each statement using a five-point scale (strongly disagree, somewhat disagree, neither, somewhat agree, and strongly agree).

Source: Opinion Dynamics Survey

2.2.2 *Value Factor Computation Methods*

The team used the single-family, multifamily, and commercial customers' survey responses to create six different value factors for each group. The value factors are aggregated elements that customers consider to various degrees in their decision-making about adopting an energy

[26] The team did not perform the cluster analysis with multifamily residential respondents or the commercial respondents. Unlike the single-family residential customers, these groups did not fit neatly into distinct clusters based on their environmental and financial attitudes. In addition, the counts for the surveyed multifamily respondents and within the surveyed commercial business segments (e.g., retail, office, health, restaurant, etc.) were too small for a robust cluster analysis.

[27] Latent profile analysis is a statistical methodology that classifies individuals into mutually exclusive profiles, or clusters, based on their pattern of responses to set of scale questions (i.e., questions that have a limited, fixed number of possible responses, like five-point scales).

efficient model over a standard efficiency model of technology. The steps taken to develop and assess the mean value factors for the single-family, multifamily, and commercial customers are outlined below.

2.2.2.1 Value Factor Descriptions

The team identified six key factors that customers' likely value when deciding to adopt energy efficient or standard efficiency technology. The value factors are lifetime costs, upfront costs, hassle factor, non-consumption performance, eco impacts, and social signaling. Each is described in further detail later in this section.

The team asked survey respondents about the first four value factors in regard to a specific technology assigned to them in the survey (e.g., refrigerator, smart thermostat, water heater, etc.) since the technologies vary by costs, non-energy benefits, and the amount of hassle involved in installation. Respondents considered these factors when comparing an energy efficient model to a standard efficiency model of one technology (as opposed to comparing two different technologies like, for example, a refrigerator versus a smart thermostat).

Before assigning any technologies to consider in the survey, the team asked respondents about the last two value factors (Eco Impacts and Social Signaling) since the factors are more general and are not likely to vary based on specific technology characteristics. For example, attitudes about Eco Impacts and Social Signaling are unlikely to be different for a refrigerator or smart thermostat.

- **Lifetime Costs.** This value factor covers the importance of long-term energy costs and savings of the technology. The team identified survey questions in each instrument that related to the lifetime costs of the technology:
    - The amount or cost of energy the technology uses
    - The potential for lower utility bills as a result of installing the technology
    - The uncertainty about whether the technology will save as much energy as estimated
- **Upfront Costs**. This value factor covers the importance of the initial out-of-pocket price of the technology. The survey questions in each instrument that mapped to upfront cost were related to the higher upfront price of the high efficiency technology (versus standard efficiency) and the possibility of limited access to financing options to pay for the technology.
- **Hassle Factor.** This value factor considers the importance of the ease in installing and using a technology, which is also related to convenience of the purchase and installation. The survey questions in each instrument that mapped to hassle factors related to ease of use, ease of installation, the time it takes to purchase and have the technology installed, the potential disruption in the home or facility caused by the installation of the new technology, and the potential changes in structure or technology location required by the new technology.
- **Non-Consumption Performance.** There are other non-financial and non-energy elements that customers likely consider when deciding to purchase a new appliance or technology. The non-consumption performance value factor captures these other considerations, such

as the importance of non-energy benefits, aesthetics, and features. The survey questions in each instrument that mapped to non-consumption performance of high efficiency technologies related to the look and feel, advanced features and settings, noise level, change in comfort, and size or capacity.

- **Eco Impacts.** This value factor covers the importance of environmental impacts from energy consumption. Survey questions that mapped to this value factor were primarily technology-agnostic and captured the respondents' attitudes toward environmental topics, such as the importance of climate change or the need to reduce energy consumption. In the context of fuel switching, the team asked respondents to rate the importance of switching to an electric water or space heating system to help reduce air and water pollution, as well as lower energy usage.
- **Social Signaling.** Somewhat related to the eco impacts value factor is the importance of being perceived as environmentally or socially responsible by one's peers, which is captured in the social signaling value factor. This value factor was also independent of specific technologies since respondents were asked about their general attitudes toward social signaling. Specific survey questions that mapped to this value measured importance to respondents of appearing environmentally conscious and being the first in the community or network to adopt the latest high-tech products.

2.2.2.2 Computing and Assessing Mean Value Factor Scores

The survey questions that mapped to the value factors were five-point Likert scale questions that measured agreement, importance, barriers, and motivation. Some of the scales were unipolar ("not a barrier" to "major barrier"), while others were bipolar ("strongly disagree" to "strongly agree"). Some the survey questions were rescaled so that a 1 on all questions means that the metric is not at all important and a 5 means it is extremely important to respondents' general attitudes and their decision-making about adopting energy efficient technologies.

The team combined the individual survey question metrics, and mapped them into their associated value factors, and computed mean value factor scores on the five-point scales. For each respondent, the team calculated the average score (between 1 and 5) for each of the six value factors and for each technology and technology type asked about in the survey.

Next, the team assessed whether there are significant differences in value factor mean scores across different technologies and respondent groups. Two-tailed t-tests were performed with a significance level of $p \leq 0.05$ to determine statistical differences. The team compared overall value factor mean scores across the following:

- Respondent groups including the single-family residential clusters, the commercial business segments, and the commercial business size (e.g., large versus small-medium).
- Technology type including the less expensive minor investment and high touch technologies, the more expensive major investment and low touch technologies, the DR programs, and the fuel substitution technologies.
- Specific technologies within each technology type such as the refrigerator and smart thermostat for minor and high touch technologies, the insulation and water heater for

major and low touch technologies, and the gas-to-electric water heater for fuel substitution.

2.2.2.3 COVID-19 Value Factor Adjustments

COVID-19-related impacts have influenced many customers' decisions about making purchases and allowing others (e.g., contractors) into their residences or buildings. To account for this impact, the team asked respondents the extent to which the COVID-19 pandemic had increased, reduced, or had no effect on the importance of lifetime costs, upfront costs, and hassle factors in their purchase decisions.

The survey included questions about the importance of lifetime and upfront costs for respondents' decision-making at the time of the survey (summer 2020). The same questions were repeated but asked respondents how important the value factors were before the pandemic in January 2020. The team subtracted the during-pandemic mean responses from the pre-pandemic mean responses to create a COVID-19 impact variable.

The team asked customers about the general impact of the COVID-19 pandemic on their household (single-family residential) and businesses (multifamily residential and commercial), and their outlook for the future. To create COVID-19 adjustment factors for lifetime and upfront costs, the team rescaled these variables and combined them with the impact variable. The adjustment factors are on a five-point scale, where 1 means the pandemic has not had any impact on respondents' lifetime or upfront cost decisions and a 5 means the pandemic has greatly increased the importance of those value factors on respondents' decisions.

For the hassle factor, the team asked respondents how comfortable or uncomfortable they would be having a contractor come into their residence or business to install technology. This COVID-19 adjustment factor was rescaled to be on a five-point scale where 1 means the pandemic has not had any impact on the importance respondents' place on the hassle factor and a 5 means the pandemic has greatly increased the importance of the hassle value factor on respondents' decisions.

3. Study Results

The team examined the results from the two analyses performed with the survey data, before passing them to Guidehouse for inclusion in both the PG Study and PG Model.[28] For the first analysis, the team divided single-family residential survey respondents into distinct clusters or segments based on their answers to survey questions about their environmental and financial attitudes. The second analysis involved computing the value factor mean scores and comparing them across customer groups and technologies. Both metrics are unique to this study.

The survey data collected and reported cannot be used to attribute customers' reported behaviors and actions to any direct program impacts. The survey results are unique to this study and may inform program ME&O, program design, and other program aspects, but there are two main limitations that prevent using the results for any degree of program attribution:

1) This is not an impact study and has no relationship to a particular program. The survey included questions for customers regarding whether they are aware of or had previously participated in any energy efficiency programs sponsored by their utility. They were not asked any additional details (such as the type of program, technology, intervention) that would be needed to make attribution possible. In addition, many surveyed customers had not heard of or participated in a program (see the 2021 Potential and Goals report [to be published in Q3 2021] for estimates).

2) In the survey scenarios where the team asked customers about their adoption attitudes and behaviors, there was no mention of utility programs. Customers were only asked to imagine they would receive a rebate and how the rebate would impact their adoption decisions. The only exception is in the DR scenarios, in which only the customers who reported not participating in such a program were asked any of the DR questions.

The value factors presented here provide insight of relative preferences respondents may react to in making decisions on whether to adopt a particular measure. Program designers and program implementers can extract information to capture the attitudinal and behavioral drivers for the targeted customers. For example, if the program is looking to promote heat pumps, the programs can decide:

- Should they promote the efficiency (kWh and CO_2 savings), the lifetime savings, or (for example) the amazing quality of heating and cooling?
- Should they increase incentives or provide more services to reduce the hassle of installing a new technology?

The study's results provide information that can support the program team to ask the right questions to guide critical features of programs to meet their specific program goals in the target market segment.

In aggregate, the study's results can provide insight to questions from the interested parties, such as:

- What measures may be ripest for adoption in the short term? What kind of programmatic efforts may support their adoption?

[28] The Guidehouse report will be released in first quarter (Q3) of 2021.

- What are the drivers of customer adoption for different technologies and segments?
- How do these results provide insight to the overall pool of potential customers?
- Can programs adjust incentive and program delivery based on measure type and customer targeting?
    - Should IOUs focus on subsets, or still go for a mass market approach?
    - Is there a clear need for programs to target clusters differently?

The analysis here does not provide direct answers to these questions but provides findings from the surveys that can support informing these types of program design and implementation topics.

3.1 Single-Family Residential Segmentation Results

The cluster analysis yielded four discrete groups (or segments) of residential customers that shared similar survey response patterns on the attitudinal and behavioral survey items. Table 3-1 summarizes the segments, including their ascribed segment name, their relative incidence among non-low income Californian adults residing in single-family dwellings, and the attitudinal and behavioral trends that characterize each segment. These attitudes and clusters are unique to this study and there are no comparable prior studies in California or elsewhere.

- The largest cluster is Average Californians, who reported an average, normal distribution of environmental concern, conservation attitudes, social signaling, and financial well-being. Average Californians are likely to require moderate to high amounts of ME&O with a mix of environmental, social, and financial messages.

- Next are the Eager Adopters, who are defined by positive environmental concern, conservation attitudes, social signaling, and financial well-being. Eager Adopters are likely to require low amounts of ME&O targeted to their environmental attitudes and are less likely to need financial aid to afford energy efficient technologies.

- Likely Laggards, who have negative environmental concerns, conservation attitudes, and social signaling but have positive financial well-being, are similar in size to the Eager Adopters. Likely Laggards are likely to change with the market and be less responsive to most ME&O and other program efforts.

- The smallest cluster is the Economically Strained Environmentalists, who have positive environmental concerns, conservation attitudes, and social signaling but negative financial well-being. Economically Strained Environmentalists are likely to require moderate to high amounts of ME&O targeted to their environmental attitudes, social signaling, and financial concerns, and are most likely to need financial aid to afford energy efficient technologies.

Table 3-1. Single-Family Residential Cluster Analysis Results [a]

Segment Name	Segment Size (Weighted Proportion of Sample)	Attitudinal and Behavioral Characteristics
Average Californians	50%	Attitudes and values are average and normally distributed (does not strongly skew in either direction on most items).
Eager Adopters	20%	Believes strongly in environmental issues, wants to save energy, and has the financial means for energy upgrades.
Likely Laggards	19%	Not very concerned with environmental issues, saving energy, or social signaling but has financial means for energy upgrades.
Economically Strained Environmentalists	11%	Extremely concerned with environmental issues but efficiency upgrades can be out of financial reach, so desire to save energy is both altruistic and pragmatic; social signaling is important.

[a] Non-low income residential customers whose 2019 household income was greater than 200 percent of the federal poverty guidelines.

Source: Opinion Dynamics Analysis

The demographic and household characteristics of the non-low income single-family residential survey respondents further highlight key differences between the clusters (Table 3-2). The Eager Adopters are most likely to live in a detached house, have a smaller household, be older, non-Hispanic, and white, and to have higher education and income. In contrast, the Economically Strained Environmentalists are most likely to live in a single-family attached house, have a larger household, be younger, Hispanic, and non-white, and to have lower education and income.

In between the Eager Adopters and the Economically Strained Environmentalists are the Average Californians and Likely Laggards. The Average Californians are closer to the Eager Adopters in regard to their housing type, household size, age, and race/ethnicity but are closer to the Environmentalists in terms of their education and income. The Likely Laggards are closer to the Environmentalists in regard to their housing type, household size, age, race/ethnicity but are closer to the Eager Adopters in terms of their education and income.

Table 3-2. Single-Family Residential Clusters' Demographic and Household Characteristics [a]

Characteristics	Average Californians	Eager Adopters	Likely Laggards	Economically Strained Environmentalists
Housing Type				
Single-family detached	91%	97%	85%	83%
Single-family attached	8%	3%	8%	17%
Other [b]	1%	0%	7%	0%
Household Size				
1 to 2 members	50%	61%	44%	37%
3 to 4 members	33%	33%	46%	48%
5 or more members	17%	6%	10%	15%
Average Age	57	58	55	55
Latino/a, Hispanic, Spanish Ethnicity	20%	9%	23%	28%
Race [c]				
White or Caucasian	67%	70%	63%	50%
Asian	13%	21%	16%	28%
Black or African American	2%	5%	0%	7%
Other	18%	4%	21%	15%
Education				
High school or less	23%	15%	19%	15%
Some college, no degree	23%	19%	25%	24%
2-year college degree	8%	8%	13%	19%
4-year college degree	26%	21%	27%	19%
Graduate or professional degree	21%	37%	15%	24%
Annual Household Income (2019)				
$25,000 to under $50,000	20%	2%	8%	9%
$50,000 to under $75,000	12%	10%	6%	33%
$75,000 to under $100,000	18%	14%	10%	9%
$100,000 to under $150,000	16%	22%	18%	20%
$150,000 to under $200,000	10%	8%	10%	7%
$200,000 or more	10%	24%	18%	9%
Prefer not to say/Don't know	13%	21%	27%	11%

[a] Non-low income residential customers whose 2019 household income was greater than 200 percent of the federal poverty guidelines.

[b] Other includes apartments, manufactured/mobile homes, and other.

[c] Respondents could select more than one race; Other includes American Indian or Alaska Native, Pacific Islander, and other.

Source: Opinion Dynamics Analysis

3.2 Value Factor Results

This section discusses the high-level takeaways resulting from the value factor analyses for each customer group. This section only includes the significant findings and trends that emerged from the assessment. The values reported in the tables in each subsection that follows are converted to percentages and used as inputs to the PG Model in the PG Study by Guidehouse.[29] Any indication of value factor impacts on market adoption will be part of the PG Study in its aggregated reporting of savings. The PG Study will explain the use of the value factors in the adoption logic and how the values provide indicators for market share analysis between technologies.

3.2.1 *Single-Family Residential*

Overall, single-family residential respondents perceive the eco impacts (environmental issues and repercussions) as highly important considerations in their decision-making about replacing or upgrading technology in their homes (Table 3-3). Respondents also rated the lifetime costs of technologies as very important, followed by the hassle factor, non-consumption performance, and social signaling as moderately important. Respondents rated the upfront costs of a technology as a somewhat important aspect of making a purchase decision, and the least important of the six value factors.

These overall trends are also found across the residential clusters and across the technologies asked about in the survey. There are few significant differences on each value factor between clusters or between the high touch, low touch, and fuel substitution technologies, but a few are discussed below:

- **Lifetime Costs.** The Likely Laggards cluster reported that lifetime costs of technology are of lower importance compared to the other clusters, whereas, the Eager Adopters rated lifetime costs as very important. In other words, the Eager Adopters are more concerned about the payback time than Likely Laggards. Additionally, the clusters rated the lifetime costs of the fuel substitution technologies as slightly less important than the high and low touch technology lifetime costs.
- **Upfront Costs.** The Economically Strained Environmentalists rated upfront costs of technology as much more important than the other clusters. At the technology-level, all the clusters rated the upfront cost of installing high efficiency insulation as more important compared to most other technologies (not shown in table).
- **Hassle Factor.** The Economically Strained Environmentalists rated the hassle factor of purchasing and installing technology as slightly more important compared to the other residential clusters. All the clusters rated the hassle factor of a refrigerator purchase and installation as more important than for the other high touch technologies (not shown in table). In addition, across all the clusters, the surveyed customers who reported not having a smart thermostat rated the hassle factor of participating in a DR program as more important compared to those who reported having a smart thermostat (not shown in table).
- **Non-Consumption Performance.** The Likely Laggards cluster reported that the non-

[29] The Guidehouse report will be released in first quarter (Q3) of 2021.

consumption performance of technologies is of lower importance compared to the other clusters. Additionally, all the clusters rated the non-consumption performance of the refrigerator and central AC technologies as more important than for the other high and low touch technologies (not shown in table).

- **Eco Impacts.** The eco impacts value factor was not technology-specific (unlike the value factors above) except for the fuel substation technologies, which included additional eco impacts questions in the survey. There was significant variation in the reported importance of eco impacts among the customer clusters: Eager Adopters and Economically Strained Environmentalists perceived eco impacts as substantially more important than Average Californians and especially the Likely Laggards.
- **Social Signaling.** The social signaling value factor was not technology-specific. There is some variation in the reported importance of social signaling across the clusters where the Eager Adopters and Economically Strained Environmentalists rated as more important than the other customer clusters.
- **COVID-19 Adjustment Factor.** Respondents reported that the COVID-19 pandemic has slightly to somewhat increased the importance of lifetime costs, upfront costs, and hassle factors in their decision-making. The pandemic appears to have had a greater impact on the hassle factor (respondents are not comfortable allowing contractors in their homes) and has had a lower impact on upfront costs and an even lower impact on lifetime costs.

Table 3-3. Single-Family Residential Customer Value Factor Mean Scores by Cluster and Technology Type [a, b]

Technology Type/Cluster	Lifetime Costs	Upfront Costs	Hassle Factor	Non-Consumption Performance	Eco Impacts [c]	Social Signaling [c]
Overall (n=598)	3.6	2.7	3.2	3.2	4.1	3.1
High Touch Technologies (n=598)	3.6	2.6	3.2	3.0	N/A	N/A
Average Californians (n=299)	3.6	2.7	3.2	3.0	N/A	N/A
Eager Adopters (n=120)	3.9	2.0	3.2	3.2	N/A	N/A
Likely Laggards (n=114)	3.1	2.3	3.1	2.9	N/A	N/A
Economically Strained Environmentalists (n=66)	3.6	3.2	3.3	3.0	N/A	N/A
Low Touch Technologies (n=598)	3.7	2.8	3.2	3.2	N/A	N/A
Average Californians (n=299)	3.7	2.9	3.2	3.4	N/A	N/A
Eager Adopters (n=120)	4.1	2.3	3.3	3.2	N/A	N/A
Likely Laggards (n=114)	3.2	2.5	3.0	2.8	N/A	N/A
Economically Strained Environmentalists (n=66)	3.9	3.6	3.4	3.2	N/A	N/A
Fuel Substitution (n=513)	3.4	2.8	3.2	3.3	3.4	N/A

Technology Type/Cluster	Lifetime Costs	Upfront Costs	Hassle Factor	Non-Consumption Performance	Eco Impacts [c]	Social Signaling [c]
Average Californians (n=248)	3.4	2.9	3.2	3.2	3.4	N/A
Eager Adopters (n=105)	3.4	2.4	3.1	3.5	3.9	N/A
Likely Laggards (n=107)	3.0	2.9	3.4	2.9	2.4	N/A
Economically Strained Environmentalists (n=53)	3.9	2.3	3.5	3.6	3.9	N/A
Demand Response with Smart Thermostat (n=314) [d]	N/A	N/A	3.0	N/A	N/A	N/A
Average Californians (n=152)	N/A	N/A	3.1	N/A	N/A	N/A
Eager Adopters (n=79)	N/A	N/A	2.5	N/A	N/A	N/A
Likely Laggards (n=51)	N/A	N/A	3.0	N/A	N/A	N/A
Economically Strained Environmentalists (n=32)	N/A	N/A	3.1	N/A	N/A	N/A
COVID-19 Adjustment Factor (n=598)	1.2	1.7	2.6	N/A	N/A	N/A
Average Californians (n=299)	1.2	1.7	2.7	N/A	N/A	N/A
Eager Adopters (n=120)	1.1	1.4	2.6	N/A	N/A	N/A
Likely Laggards (n=114)	1.2	1.5	2.8	N/A	N/A	N/A
Economically Strained Environmentalists (n=66)	1.2	2.0	2.4	N/A	N/A	N/A

[a] Non-low income residential customers whose 2019 household income was greater than 200 percent of the federal poverty guidelines.

[b] Mean value factor scores on a 5-point scale where 1 means not at all important and 5 means extremely important in decision-making. Counts of less than 67 have less than 90/10 confidence/precision.

[c] The eco impacts and social signaling value factors are not technology-specific, except for the eco impacts value factor for fuel substitution.

[d] The only value factor for DR participation is the hassle factor since participating in a DR program does not involve any other factors.

Source: Opinion Dynamics Analysis

3.2.2 *Multifamily Residential*

Overall, multifamily property owners and managers rated eco impacts as very important in their decisions about replacing or upgrading technology in their buildings' units (Table 3-4). They also rated social signaling, lifetime costs, and hassle factor as moderately important, and rated the upfront costs and non-consumption performance as somewhat important.

The team found these overall trends across the technologies asked about in the survey. In addition, there are few significant differences on each value factor between the minor, major, and fuel substitution technologies, with two exceptions:

- Surveyed customers rated the lifetime and upfront costs and non-consumption performance of water heaters as less important than for most of the other technologies.

- Surveyed customers rated the upfront costs and non-consumption performance of insulation as more important than for most the other technologies (not shown in table).

Surveyed customers reported that the COVID-19 pandemic has slightly to somewhat increased the importance of lifetime costs, upfront costs, and hassle factors in their decision-making about purchasing technology for their units. The pandemic appears to have had a greater impact on the hassle factor, in which respondents are not comfortable allowing contractors in their units. The pandemic has had a lower impact on upfront costs and an even lower impact on lifetime costs.

Table 3-4. Multifamily Residential Customer Value Factor Mean Scores by Technology Type [a, b]

Technology Type	Lifetime Costs	Upfront Costs	Hassle Factor	Non-Consumption Performance	Eco Impacts [c]	Social Signaling [c]
Overall (n=104)	3.4	2.8	3.4	2.8	4.2	3.6
Minor Investment Technologies (n=104)	3.4	2.7	3.4	2.7	N/A	N/A
Major Investment Technologies (n=104)	3.5	2.8	3.5	2.9	N/A	N/A
Fuel Substitution (n=69)	3.3	2.8	3.3	3.1	3.0	N/A
COVID-19 Adjustment Factor (n=104)	1.3	1.7	2.1	N/A	N/A	N/A

[a] Owners and managers of multifamily properties (five or more units) with market rate rent.

[b] Mean value factor scores on a 5-point scale where 1 means not at all important and 5 means extremely important in decision-making. Counts of less than 67 have less than 90/10 confidence/precision.

[c] The eco impacts and social signaling value factors are not technology-specific, except for the eco impacts value factor for fuel substitution.

Source: Opinion Dynamics Analysis

3.2.3 *Commercial*

Overall, the commercial survey respondents perceive eco impacts as a highly important consideration in their decision-making about replacing or upgrading technology in their businesses or facilities (Table 3-5). Respondents also rated lifetime costs and social signaling as very important, followed by the hassle factor and non-consumption performance as moderately important. Respondents rated the upfront costs of a technology as a somewhat important aspect of making a purchase decision, and the least important of the six value factors.

These overall trends exist across the business sizes and segments and across the technologies asked about in the survey. In addition, there are few significant differences on each value factor between sizes or segments, and between the minor, major, and fuel substitution technologies. These differences are discussed below.

It should be noted that some of the counts (Ns) of the commercial business segments are too small (less than 67) for 90/10 confidence/precision. These results should be used with caution, as the means for these groups may be inflated or deflated as a product of small sample proportion and they may be less representative of the population:[30]

- **Lifetime Costs.** Surveyed commercial customers were consistent in their ratings of the importance of lifetime costs across business sizes and segments and across the technologies, with a couple of exceptions. They reported slightly lower importance of the lifetime costs for water heaters and insulation, and for fuel substitution, than for most of the other technologies (not shown in table).
- **Upfront Costs.** Office businesses rated upfront costs of lower importance than most other segments while grocery businesses reported a higher importance of upfront costs. In addition, all surveyed customers rated upfront costs as most important for the fuel substitution technology than for other technologies and as more important for the major than for the minor technologies. At the technology-level, respondents rated upfront costs of a thermostat significantly less important than all other technologies, both minor and major, and rated the upfront costs of a water heater as less important compared to other major technologies (not shown in Table 3-5).
- **Hassle Factor.** Large businesses rated the hassle factor of purchasing and installing technology as slightly more important than small to medium businesses. Health businesses also reported a higher importance of the hassle factor compared to most other business segments. At the technology-level, surveyed businesses rated the hassle factor of a water heater and insulation as less important compared to the other major technologies, a refrigeration display case and EMS (not shown in table). In addition, respondents rated the hassle factor of participating in a DR program of lower importance than for purchasing and installing any of the minor, major, and fuel substitution technologies.
- **Non-Consumption Performance.** Surveyed commercial customers were consistent in their ratings of the importance of non-consumption performance across business sizes and segments and across the technologies, with a couple of exceptions. Grocery businesses rated the non-consumption performance of technology higher than most other business segments. Respondents also rated the non-consumption performance of computer power management and occupancy sensors as more important than for the other minor technologies, a thermostat and smart power strip, and they rated non-consumption performance of water heaters as less important than the other major technologies (not shown in table).
- **Eco Impacts.** Respondents were mostly consistent in their ratings of the importance of eco impacts in their decisions. Grocery and warehouse segments rated eco impacts as slightly less important than many other business segments, and respondents also rated the eco impacts of fuel substitution of lower importance than their ratings of eco impacts more generally.

[30] Counts between 52 and 67 have 85/10 confidence/precision, counts between 31 and 51 have 90/15 confidence/precision, counts between 24 and 30 have 85/15 confidence/precision, and counts between 11 and 23 have 80/20 confidence/precision. As an example for interpreting confidence/precision, 85/10 means that there is 85% confidence that the result from the survey will be within 10 percentage points of the actual result in the population. 90/10 confidence/precision is a standard benchmark in the industry.

- **Social Signaling.** Surveyed businesses consistently rated importance of social signaling in their decisions. Grocery businesses rated social signaling of slightly greater importance while retail and the other business segments perceived social signaling as less important than other segments.
- **COVID-19 Adjustment Factor.** Respondents reported that the COVID-19 pandemic has slightly to somewhat increased the importance of lifetime costs, upfront costs, and hassle factors in their decision-making to purchase technology for their business. The pandemic appears to have had a greater impact on the hassle factor, in which respondents are not comfortable allowing contractors in their facilities. The pandemic has had a lower impact on upfront costs and an even lower impact on lifetime costs.

Table 3-5. Commercial Customer Value Factor Mean Scores by Size, Segment, and Technology Type [a, b]

Segment/Size/ Technology Type	Lifetime Costs	Upfront Costs	Hassle Factor	Non-Consumption Performance	Eco Impacts [c]	Social Signaling [c]
Overall (n=757)	3.6	2.5	3.2	3.0	4.1	3.6
Size						
Large (n=332)	3.6	2.6	3.3	3.0	4.1	3.7
Small-Medium (n=425)	3.6	2.5	3.1	2.9	4.0	3.6
Segments						
Office (n=175)	3.5	2.3	3.2	3.0	4.1	3.6
Health (n=102)	3.6	2.6	3.5	3.0	4.2	3.8
Retail (n=101)	3.5	2.7	3.3	2.9	4.0	3.5
Warehouse (n=82)	3.6	2.5	3.2	2.8	3.9	3.6
Restaurant (n=61)	3.5	2.5	3.2	3.0	4.1	3.7
Lodging (n=47)	3.6	2.7	3.1	3.1	4.2	3.8
Grocery (n=25)	3.7	2.9	3.3	3.4	3.7	4.0
School (n=31)	3.7	2.6	3.4	3.1	4.3	3.8
College (n=9)	3.7	2.6	3.0	2.9	4.1	3.8
Other (n=124)	3.5	2.7	3.1	2.8	4.0	3.5
Minor Investment Technologies (n=757)	3.5	2.3	3.2	2.9	N/A	N/A
Major Investment Technologies (n=757)	3.6	2.7	3.2	2.9	N/A	N/A
Fuel Substitution (n=195)	3.3	3.2	3.2	2.9	3.2	N/A
Demand Response with Smart Thermostat or EMS (n=517) [d]	N/A	N/A	2.8	N/A	N/A	N/A
COVID-19 Adjustment Factor (n=757)	1.2	1.9	2.2	N/A	N/A	N/A

[a] Excludes industrial, agricultural, and government customers.

[b] Mean value factor scores on a 5-point scale where 1 means not at all important and 5 means extremely important in decision-making. Counts of less than 67 have less than 90/10 confidence/precision.

[c] The eco impacts and social signaling value factors are not technology-specific, except for the eco impacts value factor for fuel substitution.

[d] The only value factor for DR participation is the hassle factor since participating in a DR program does not involve any other factors.

Source: Opinion Dynamics Analysis

3.3 Detailed Survey Results

The team included detailed results from each survey in the tables and figures in Appendix C. The topics for which results are available include:

- Awareness and participation in IOU energy efficiency programs and awareness of select energy efficiency technologies
- Technology adoption-related attitudes and behaviors regarding energy usage, environment, and finances[31]
- Technology adoption factors, barriers, and willingness[32]
- Demand response program awareness, barriers, and willingness to participate
- COVID-19 pandemic impacts[33]

The study team notes that all results in Appendix C are weighted (see sections 2.1.1.6, 2.1.2.6, 2.1.3.6 for more details on weighting) and that the willingness to adopt results are presented in the five-point Likert scale.[34] Guidehouse's 2021 PG Study includes additional adjustments to these data for use in the PG Model. Those additional adjustments and results will be described in PG Study report. [35]

In addition, the team also made each survey dataset available to the public for further exploration, with the ability to analyze the data by different IOUs, residential clusters, and commercial business sizes and segments. The datasets are in Excel format, include a read-me tab with variable definitions, labels, and other info needed to explore the data, and are available through the CPUC's public documents archive.[36]

The survey instruments may also be helpful in exploring the datasets because they have the full question text and skip logic. They are located in Appendix B and will also be available through the CPUC's public documents archive.[30]

3.3.1 *Key Findings from Detailed Survey Results*

There are several high-level key takeaways from the detailed survey results in Appendix C about customers' awareness of programs and technologies and their adoption factors and barriers (Table 3-6). Some of the findings may vary by specific technology or customer characteristic, which can be explored in the appendix tables and in the publicly available datasets.

[31] Used to create value factors and to segment the non-low income single-family residential customers into clusters.
[32] The adoption factors and barriers were used to create the value factors.
[33] Used to create the COVID-19 adjustment factor.
[34] For willingness to adopt, the five-point scale was 'not at all likely' (1), 'slightly likely' (2), 'somewhat likely' (3), 'very likely' (4), and 'extremely likely' (5).
[35] The Guidehouse report will be released in first quarter (Q3) of 2021.
[36] https://pda.energydataweb.com

- A majority of customers are reportedly aware of utility rebate or incentive programs but only 12% to 28% reported participating. Awareness and participation are lowest among commercial customers, followed by market rate multifamily owners/managers, and then non-low income single-family customers.

- About half of non-low income single-family customers and commercial customers are reportedly aware of utility DR programs and only 9% to 13% reported participating in a DR program.

- Most customers are reportedly aware of smart thermostats but about one-fourth or less are aware of other less common energy efficient technologies like heat pump water heaters, air source heat pumps, and EMSs.

- Factors most important to customers for adopting an energy efficient technology include ease of use, energy savings, time to install, ease of install, lifespan, noise level, comfort benefits, and info on available models. The most important barriers include uncertainty about energy savings, upfront costs, and the potential disruption to install the technology. Aesthetic qualities, advanced features, and availability of credit were rated by customers as less important.

- Factors important to customers for fuel switching include energy savings, lifespan, comfort benefits, performance, and lower environmental impacts. The most important barriers include potential disruption or changes caused by installation, upfront costs, uncertainty about energy savings, and unfamiliarity with the technology.

- The most important barriers to participating in DR programs reported by customers include allowing their utility to control their technology and making adjustments during high demand events.

Table 3-6. Key Findings from Detailed Survey Results

Awareness/Participation	Single-Family Residential Customers [a]	Multifamily Residential Customers [b]	Commercial Customers [c]
Awareness of Programs and EE Technologies			
Aware that utility offers rebates and incentives to save energy	75%	71%	59%
Received a rebate or incentive for EE technology from utility	28%	18%	12%
Aware that utility offers demand response program	56%	N/A [d]	44%
Participated in demand response program	9%	N/A [d]	13%
Aware of smart thermostats	81%	80%	83%
Aware of heat pump water heater	23%	26%	18%
Aware of air source heat pump	21%	N/A [e]	N/A [e]
Aware of EMS	N/A [e]	N/A [e]	21%
EE Technology Adoption			
Extremely to moderately important factors	-Ease of use -Energy savings -Noise level -Comfort benefits -Ease of install -Info on models	-Ease of use -Time to install -Ease of install -Lifespan -Energy savings -Noise level -Comfort benefits	-Ease of use -Energy savings -Comfort benefits -Noise level -Info on models -Time to install
Major to moderate barriers	-Uncertain savings -Upfront cost	-Upfront cost -Uncertain savings -Install disruption	-Uncertain savings -Upfront cost -Install disruption
Fuel Switching			
Extremely to moderately important factors	-Energy savings -Lifespan -Comfort benefits -Lower impacts	-Lifespan -Energy savings -Performance -Lower impacts	-Lifespan -Energy savings -Lower impacts
Major to moderate barriers	-Install disruption -Upfront costs -Uncertain savings -Unfamiliarity	-Install disruption -Upfront costs -Uncertain savings	-Install disruption -Upfront costs -Uncertain savings -Unfamiliarity
Demand Response Participation			
Major to moderate barriers	-Allowing utility to adjust settings -Adjusting settings during events -Sharing data	N/A [d]	-Allowing utility to adjust settings -Adjusting settings during events

[a] Non-low income residential customers whose 2019 household income was greater than 200 percent of the federal poverty guidelines and who reside in a single-family building with fewer than five units.

[b] Owners and managers of multifamily properties with five or more market rate units.

[c] Excludes industrial, agricultural, and government customers.

[d] Not asked about demand response programs.

[e] Not asked about technology.

Source: Opinion Dynamics Analysis

4. Conclusions and Recommendations

The team collected the data and analyzed results from this study to inform the 2021 PG Study and final adjusted adoption calculated and reported on by the Guidehouse team.[37] The customer clusters, value factors, and other detailed findings in this report will be used as key inputs to the PG Model for non-low income single-family residential customers, market rate multifamily property owners and managers, and commercial (non-industrial, non-agricultural, non-governmental) customers.

4.1 Conclusions

The results from this study can help inform the CPUC, IOUs, and other interested parties in decisions related to ME&O, design, and other aspects of relevant energy efficiency and DR programs and efforts to improve program participation and wider market adoption.

- The six technology value factors are composite measures of customers' multiple attitudes toward an energy efficient technology's lifetime and upfront costs, hassle, non-consumption performance, environmental impacts, and social signals. The value factors are unique to this study and their relative importance are overall mostly consistent across, but do slightly vary by, market segments, technologies, and customer characteristics.
    - The most important value factors reported by customers are a technology's Eco Impacts and Lifetime Costs.
    - Customers also moderately valued a technology's Hassle Factor, Non-consumption Performance, and Social Signaling, and somewhat valued the technology's Upfront Cost.
- The detailed survey findings about customers' program and technology awareness and adoption factors and barriers show what most and least motivates and limits customers' purchase decisions.
    - Factors most important to customers for adopting an energy efficient technology include ease of use, energy savings, time to install, ease of install, lifespan, noise level, comfort benefits, ease of install, and information on available models.
    - The most important barriers include uncertainty about energy savings, upfront costs, and the potential disruption to install the technology.
    - In addition, customers' moderate levels of awareness of IOU energy efficiency programs and low levels of awareness of less common energy efficient technologies can also serve as adoption barriers.
- The non-low income single-family residential market splits into four distinct clusters based on customers' environmental concerns, conservation attitudes, social signaling,

[37] The Guidehouse report will be released in first quarter (Q3) of 2021.

and financial well-being. The clusters are unique to this study but could be replicated in future studies with the battery of attitudinal questions included in the survey for this study and could likely be applied to the IOUs' population of customers with additional research.

  - Average Californians who have average attitudes and financial outlook (50%) are the largest cluster, followed by the Eager Adopters (20%) who have positive attitudes and financial outlook and the Likely Laggards (19%) who have negative attitudes but positive financial outlook, and then by the Economically Strained Environmentalists (11%) who have positive attitudes but negative financial outlook.

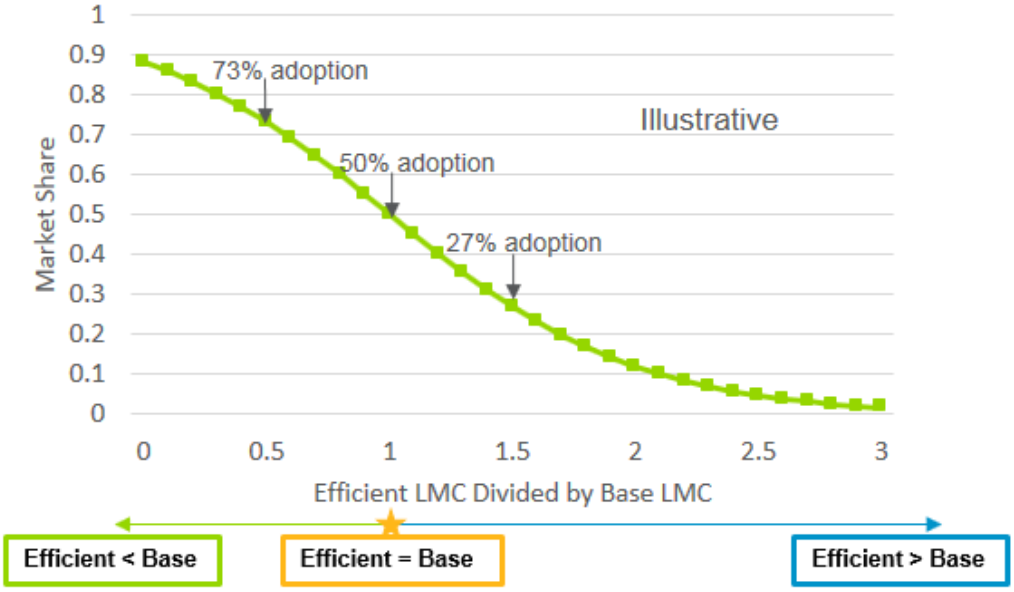
- Findings should be used in combination when possible.

  - The value factors can be combined with the detailed findings to assist in ME&O message framing, customer service responses, contractor training, and other aspects of energy efficiency programs. For example, Eco Impacts are an important value factor that could be emphasized in advertising and the detailed findings can help identify which Eco Impacts will have the greatest appeal.

  - For the single-family customers, the value factors, detailed findings, and customer clusters could be used in combination to train and provide contractors with more targeted marketing strategies and materials. For example, with a few questions to a customer, a contractor could identify which cluster they fit in and use messaging that most appeals to that cluster. For an Eager Adopter, the contractor would focus mostly on Eco Impacts and, more specifically, on how the technology will reduce environmental impacts through conserving energy and other characteristics.

This market study provided the PG Study critical data for the PG Study's adoption algorithms. The adoption algorithms have historically relied on single attribute analysis using lifetime measure cost in the form of payback periods relationship to willingness to adopt as exhibited in Figure 4-1.

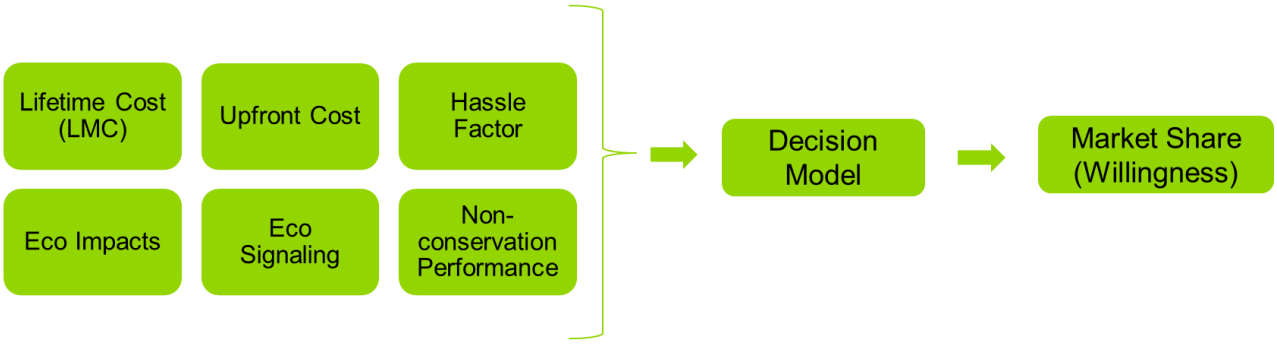
Figure 4-1. Illustration of Logit Willingness Curve



Source: Guidehouse, 2021

The market adoption study provides inputs to the PG Model to allow for new algorithms using a multi-attribute analysis. The PG Study outlines the theory on the need to differentiate beyond simple model of one value factor to describe the complexities involved in customer decision-making. As a result, the PG Model use the value factors into the decision model exhibited in Figure 4-2.

Figure 4-2. 2021 Model Willingness Calculation



Source: Guidehouse

Using a clustering analysis of these preference weights, the market study created customer groups in the residential single-family customer segment. The survey analysis resulted in four distinct residential customer groups: Average Californians, Eager Adopters, Likely Laggards, and Economically Strained Environmentalists. Each of these customer groups had their own set of customer preference weights defining how they approach making purchase decisions differently. After forming these groups, the market study calculated average preference weights

for each customer group. For multifamily and commercial, there is only one customer group each.

Building on the customer preference weights associated with the six value factors, the Guidehouse team developed corresponding characteristics for equipment across the same six value factors. These datasets combined allow the Guidehouse team to quantify how a customer with a certain preference weighting will assess two competing equipment each with different characteristics. In short, technology's characteristics that best align with the customer's preferences drive the decision to adopt.

The Guidehouse team calculated the equipment characteristics for each of the value factors. The 2021 PG Study report details this analysis.

4.2 Recommendations

The market adoption study and the subsequent PG Model algorithms based on the value factor approach are new to the energy efficiency potential modeling world. As a result, the Opinion Dynamics and Guidehouse team recommend continuing implementing the approach prescribed in this study for future years. Longitudinal analysis, both in recovery from COVID-19 and steady state market conditions, can provide insight in customer willingness to adopt. This study explores the many equipment characteristics to model adoption.

Unlike what past potential studies modeled, customer preferences are not based solely on the financial attributes of the product. Instead, customers make decisions based on multiple product attributes. Switching to a multi-attribute model in a potential study offers two key advantages:

1) Accounts for customers' different price sensitivities to different types of products (for example dishwasher price, capacity and noise level versus white heater may just be price and capacity).
2) Accounts for the different customer responses for the same product based on each customer's unique set of preferences and attitudes (for example customer attitudes toward sustainability, waste, environment, and climate).

Future studies should explore how the customer attitudinal and behavioral metrics change over time and how the sensitivity of parameters impact these metrics.

Furthermore, to understand the greater value of this study, the research term suggests gathering input from the program administrators and program implementers on the type of value factors and representative technologies to include in future studies that will support their program delivery. This addition would be compatible to the type of analysis presented in the PG Model by aligning the forecast to existing or planned program models.

Appendix A. Sampling Plan Memo

Memorandum

To: Peter Franzese and Coby Rudolph, CPUC

From: Melanie Munroe and Benn Messer, Opinion Dynamics
Karen Maoz and Tyler Capps, Guidehouse

Date: May 27, 2020

Re: Sampling Plan – CPUC Potential and Goals Market Adoption Study

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Introduction

In support of the California Public Utilities Commission (CPUC) Potential and Goals Market Adoption study, Opinion Dynamics will conduct surveys with three groups of investor-owned utility (IOU) customers:

1. Residential customers in single-family buildings with less than five units
2. Owners and managers of multifamily buildings with five or more units
3. Large and small-medium commercial customers

The surveys will collect data that will be used as key inputs to the PG Model, such as customers' willingness to adopt energy efficient technology upgrades, fuel switching, and demand response programs, as well as, their attitudes, motivators, and barriers to energy efficiency upgrades. We have submitted data requests to the IOUs for samples of single-family residential and commercial customers, and will use a third-party vendor, Dun & Bradstreet, for the multifamily customer sample. The sections below outline our sampling plan for each of these groups.

Single-Family Residential Sample Design

Opinion Dynamics will collect data from 600 non-low income single-family residential customers to have a minimum of 90/10 confidence/precision in results for the PG Model. To reach this objective, we will field a web survey with a sample size of 5,000 such customers, using the sampling and survey methods described below:

Sample Unit

The sample unit will be unique, active individual residential electric accounts of customers living in single-family homes.

- We requested IOUs to sample from only residential customers residing in buildings with fewer than five units. However, IOUs' capabilities to identify single-family customers are

limited, so we will screen out any multifamily customers through our sample cleaning procedures and with questions we will include in the survey.

- We will further limit the sample to non-low income customers through the use of screening questions in the survey.

Survey Outreach

Using a mail-to-web approach and a $10 gift card incentive, we estimate a 12 percent survey response rate for qualified customers.

- The approach includes mailing an invitation letter to the sample, followed by two reminders via email to those with an email address and via mail to those without an email address. The survey website will be included in the mail and email outreach, along with a number to call to complete the survey on the telephone (for customers without Internet).
- Based on the 12 percent response rate, we will need a sample size of 5,000 customers to achieve our goal of 600 qualified completes (Table A-1).

Sample Overview

We requested a total random sample of 20,000 single-family residential customers from the electric IOUs (PG&E, SCE, & SDG&E) (Table A-1). We have requested data from only the electric IOUs so that customer overlap from their natural gas accounts will not be a concern. We will ask customers if they have a natural gas account and their natural gas utility in the survey. The sample from each IOU is proportional to the size of their residential customer base out of all electric IOU residential customers in California.

- We will create a random subsample of 5,000 of the customers for the survey after filtering out any multifamily customers we can identify.
- The random subsample will be as representative as possible of non-low income residential single-family customers across electric IOU service territories, climate zones, and different types of single-family residents.
- We will collect key characteristics in the survey, such as housing tenure, housing type and size, whether customers also use natural gas or other fuels, and other key demographics like race, income, and age to use for survey screening, statistical weighting, and PG Model inputs.

Table A-1. Single-Family Residential Customer Survey Sample Design

IOU	Number of Customers Requested from IOUs	Number of Customers Sampled for the Survey	Number of Survey Completes (based on 12% response rate)
PG&E	11,000	2,750	330
SCE	7,000	1,750	210
SDG&E	2,000	500	60
Total	**20,000**	**5,000**	**600**

Multifamily Residential Sample Design

Opinion Dynamics will collect data from 100 multifamily residential building owners and managers. To achieve this objective, we will field a web survey with a sample of 3,000 multifamily building owners and managers, using the sampling and survey methods described below:

Sample Unit

The sample unit will be owners or managers of unique residential multifamily apartment or condo properties with five or more units in the IOUs service territory.

Survey Outreach

We estimate a three percent survey response rate for qualified owners/managers of qualified multifamily properties, using a mail-to-web approach and a $25 gift card.

- The approach includes mailing an invitation letter to the sample followed by two mail reminders and, if possible and needed to meet the completion goal, outbound phone calls. The survey website will be included in the mail outreach with a unique survey access code.
- Based on the three percent response rate, we will need a sample size of 3,000 multifamily properties to achieve our goal of 100 qualified completes (Table A-2).

Sample Overview

We will purchase sample from Dun and Bradstreet. We will purchase their complete list of over 18,000 owners and managers of multifamily building properties located in the IOUs' service territories in California (PG&E, SCE, & SDG&E) (Table A-2).

- We will create a random subsample of 3,000 multifamily properties for the survey and will stratify the subsample proportionally by IOU.
- We will filter out of the list any multifamily buildings that are not apartments or condos with five or more units using sample cleaning techniques and screening questions in the survey.
- The random subsample will be as representative as possible of residential multifamily building properties across IOU service territories, climate zones, and different building characteristics.
- We will collect key characteristics in the survey, such as building type and size, whether the buildings also use natural gas or other fuels, common area technologies, and other key characteristics useful for survey screening, statistical weighting, and PG Model inputs.

Table A-2. Multifamily Residential Customer Survey Sample Design

IOU	Number of Multifamily Properties Listed from Dun and Bradstreet	Number of Multifamily Properties Sampled for the Survey	Number of Survey Completes (based on 3% response rate)
PG&E	~9,900	1,650	55
SCE	~6,300	1,050	35
SDG&E	~1,800	300	10
Total	**18,000+**	**3,000**	**100**

Commercial Sample Design

Opinion Dynamics will collect data from 600 commercial customers to have a minimum of 90/10 confidence/precision in results for the PG Model. One-third of the customers (200) will be large-sized commercial businesses and two-thirds (400) will be small- and medium-sized commercial businesses. To reach this objective, we will field a web survey with a sample size of 12,000 such customers (4,000 large and 8,000 small-medium), using the sampling and survey methods described below:

Sample Unit

The sample unit will be unique, active individual commercial customer electric accounts.

- We requested IOUs to sample from only commercial customers and to exclude industrial and agricultural customers. However, IOUs' capabilities to identify commercial customers may be limited, so we will screen out any industrial and agricultural customers through our sample cleaning procedures and with questions we will include in the survey.
- We are initially stratifying the sample into large and small-medium commercial customers by using their 2019 annual kWhs as a proxy measure for business size, in which those with 300 or less kWh annual usage are small-medium sized businesses and those with more than 300 kWh annual usage are large sized businesses.
- We will further refine the business size segments by the criteria set forth by the U.S. Small Business Administration through the inclusion of questions in the survey about the number of employees and annual revenues.

Survey Outreach

We estimate a five percent survey response rate for qualified customers, using a mail-to-web and email-to-web approach and a $25 gift card.

- The approach includes sending an invitation and two reminders to the sample via email for those who have email and via mail for those who do not have email. If possible and needed to meet the completion goal, we can send additional reminders or make outbound phone calls. The survey website will be included in the email and mail outreach.
- Based on the five percent response rate, we will need a total sample size of 12,000 commercial customers to achieve our goal of 600 qualified completes, with one-third in the large business group and two-thirds in the small-medium business group (Table A-3).

Sample Overview

We requested a total random sample of 30,000 commercial customers from the electric IOUs (PG&E, SCE, & SDG&E) (Table A-3). We have requested data from only the electric IOUs so that customer overlap from their natural gas accounts will not be a concern. We will ask customers if they have a natural gas account and their natural gas utility in the survey. The sample from each IOU is proportional to the size of their commercial customer base out of all electric IOU nonresidential customers in California.

- We will create a random subsample of 12,000 of the customers for the survey after filtering out any industrial and agricultural customers we can identify.
- The random subsample will be as representative as possible of large and small-medium

commercial customers across electric IOU service territories, climate zones, and different types of single-family residents.

- We will collect key characteristics in the survey, such as business type, building size and technologies, whether customers also use natural gas or other fuels, and other key firmographics like number of employees and annual revenues to use for survey screening, statistical weighting, and PG Model inputs.

Table A-3. Large and Small-Medium Commercial Customer Survey Sample Design

IOU	Number of Customers Requested from IOUs			Number of Customers Sampled for the Survey			Number of Survey Completes (based on 5% response rate)		
	Large	Small-Medium	Total	Large	Small-Medium	Total	Large	Small-Medium	Total
PG&E	5,600	10,700	16,300	2,240	4,480	6,720	112	224	336
SCE	3,400	7,300	10,700	1,360	2,720	4,080	68	136	204
SDG&E	1,000	2,000	3,000	400	800	1,200	20	40	60
Total	**10,000**	**20,000**	**30,000**	**4,000**	**8,000**	**12,000**	**200**	**400**	**600**

COVID-19 Considerations

Based on our experience thus far with fielding residential surveys during the pandemic, they have been performing as at least as well during the pandemic as before the pandemic since many people are home more often. Our experience with commercial surveys, on the other hand, indicate a lower response rate during than before the pandemic since many businesses are closed or have reduced hours.

We are prepared to make special considerations to reduce potential COVID-19 effects on our survey fielding processes and response rates, including:

- Adding more time to the survey fielding timeline to account for potential delays in mail delivery and, for commercial customers, delays in checking their mail and email.
- Reducing or increasing the number of survey reminders to limit higher than expected or to improve lower than expected response rates.

Using multiple modes such as mail, email, and phone to contact hard-to-reach multifamily or business customers.

Appendix B. Survey Materials

B.1 Single-family Residential Customer Survey

B.1.1 Outreach

Invitation Letter

STATE OF CALIFORNIA

PUBLIC UTILITIES COMMISSION

<Name>
<Address>
<City> <State> <Zip Code>

Dear <Name>,

We need your help! The California Public Utilities Commission (CPUC) invites you to participate in its 2020 Household Energy Survey. You are part of a small group of California residents that has been chosen to participate in this important research. **In these challenging times, your feedback is particularly appreciated.**

The questions in this survey are related to your energy use, including appliances or equipment you use for heating, cooling, and water heating, as well as your decision-making around making upgrades in your home. The CPUC will use the results to help California meet its energy needs and help shape future programs so it is very important that we hear from households like yours.

To show our appreciation for completing the survey, you will receive a **$10 gift card** that you can use with popular retailers such as Target, Amazon, Lowe's, or Walmart.

Please complete the survey by **August 15th** by typing the link below into the address field of your web browser and then entering your access code.

Survey Link: www.efficiencyCAsurvey.com

Access Code: <ODCID>

If you do not have Internet access, please call toll-free 1-888-681-6084 to complete the survey over the telephone. Any information you provide will remain confidential. The CPUC has partnered with Opinion Dynamics, an independent research firm, to administer the survey. If you have any questions or technical difficulties with the survey, you may contact Taylor Williams at Opinion Dynamics at (888) 308-3845 or taylor.williams@opiniondynamics.com.

Thank you in advance for taking the time to complete this important survey!

Sincerely,

Peter Franzese
Regulatory Analyst
California Public Utilities Commission

Reminder Postcard and Email

We need your help! It is not too late to complete this important survey!

Dear <Name>,

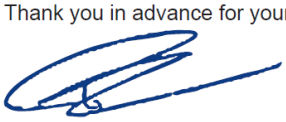
You should have recently received an invitation asking for your help with the California Public Utilities Commission (CPUC) 2020 Household Energy Survey. Please take this opportunity to complete our survey about your household's energy use and energy efficiency decision-making. The CPUC will use the results to help California meet its future energy needs, and we really need to hear from households like yours. As a thank you for completing this survey, you will receive a **$10 gift card**. The deadline to complete the survey is **August 15th**.

If you have already completed the survey, thank you and disregard this reminder!

To complete the survey, please visit **www.efficiencyCAsurvey.com**
Enter the following access code to access the survey: **<ODCID>**

If you don't have Internet access, please call 1-888-681-6084 to complete the survey over the telephone. If you have any questions about this survey, please contact Taylor Williams at Taylor.Williams@opiniondynamics.com.

Thank you in advance for your support.



Peter Franzese
Regulatory Analyst
California Public Utilities Commission

B.1.2 Instrument

Landing Page

Welcome to the CPUC Household Energy Survey!

Thank you for helping us with this important research study. We understand that you may be experiencing hardships due to the situation surrounding COVID-19. The California Public Utilities Commission (CPUC) is here to support you during this difficult time. For information about consumer protections the CPUC has put in place as a result of COVID 19, please see: https://www.cpuc.ca.gov/covid19protections/.

Opinion Dynamics, an independent research firm, is administering this survey. If you have any questions or technical difficulties with the survey, you may contact Taylor Williams at Opinion Dynamics at taylor.williams@opiniondynamics.com. Your responses to this survey will be kept strictly confidential.

As a thank you for completing this survey, we are offering a $10 electronic gift card that can be used at a wide variety of stores including Walmart, Home Depot, Amazon, and many more.

Please enter your 6-digit Survey Access Code provided in the survey invitation to start the survey:

Introduction

In this survey we will ask you about energy-using equipment in your home at <ADDRESS> in <CITY> and your decision-making around making energy efficiency upgrades. If you are not the best person to answer these questions, please ask another member of your household who makes decisions about your energy bills to complete this survey.

Household and Housing Characteristics For Screening

[ASK ALL]
Q1. First, we have a few general questions about you and your home to ensure we are hearing from a wide variety of Californians.

Which of the following best describes the home at <ADDRESS> in <CITY>?

[SINGLE RESPONSE]

1. Single-family detached home
2. Single-family attached home such as townhouse or row house
3. Apartment or condominium
4. Mobile home
0. Other, please specify: [OPEN-ENDED RESPONSE]

[ASK IF Q1 = 3]
Q2. How many housing units are in your apartment or condo complex?

[SINGLE RESPONSE]

1. 1
2. 2
3. 3
4. 4
5. 5 or more
98. Don't know

[ASK IF Q2 = 98]
Q2A. Is it more than five units?
1. Yes
2. No
98. Don’t know

[IF Q2 = 4 OR 5 OR Q2A = 1 or 98, THANK AND TERMINATE: We’re sorry, but we need to hear from customers living in buildings with fewer units or who know about how many units are in their building. We truly appreciate the time you took to help us.]

[ASK ALL]
Q3. Including yourself, how many people live in your household?

1. [OPEN END NUMERICAL, 1 – 15]

[GENERATE INCOME_AMT = $34,000 IF Q3 = 1 OR 2; $43,000 IF Q3=3; $52,000 IF Q3=4; $60,000 if Q3=5; $69,000 IF Q3=6; $78,000 IF Q3=7; $87,000 IF Q3=8; $96,000 IF Q3=9; $105,000 IF Q3=10; $113,000 IF Q3=11; $122,000 IF Q3=12; $131,000 IF Q3=13; $140,000 IF Q3=14; $149,000 IF Q3=15]

[ASK ALL]
Q4. In 2019, did your household earn more than <INCOME_AMT>, before taxes? *Please consider all income your household earned from employment, investments, and/or retirement accounts during the year.*

1. Yes
2. No
98. Don't know

[THANK AND TERMINATE IF Q4=2 OR 98; We're sorry, but we're no longer accepting any more survey responses from households in your income bracket. We truly appreciate the time you took to help us.]

[ASK ALL]
Q5. Do you own the home at <ADDRESS>?

[SINGLE RESPONSE]

1. Yes
2. No

[GENERATE OWNER = 1 IF Q1 = 1 OR 4 AND Q5 = 1; ELSE OWNER = 0]

[ASK IF Q5=2]
Q6. Is the cost of your electricity included in your rent or do you pay it separate from rent?

[SINGLE RESPONSE]

1. Included in rent
2. Paid separately from rent
97. Not applicable, I don't pay for rent and/or electricity

Energy and Equipment Characteristics

[ASK IF OWNER = 0]
Q7. If the following appliances and equipment in your home needed to be replaced or upgraded, would you (and your household) or would someone outside your household (like a landlord or property manager or owner's association) be responsible for making the decision to replace or upgrade them? [1 = Me and my household are responsible, 2 = Someone outside my household is responsible, 97 = Not applicable, my home does not have this, 98 = Don't know]

[SINGLE RESPONSE]

1. Refrigerator
2. Clothes dryer
3. Thermostat that controls your heating and/or cooling equipment
4. Heating and cooling equipment like a furnace, heat pump, or central air conditioner

5. Water heater
6. Windows or insulation in your home's walls, ceiling, or floors [DO NOT DISPLAY 97]

[PROCEED IF (Q7_1, Q7_2, OR 7_3 = 1) AND (Q7_4, Q7_5, OR Q7_6 = 1) OTHERWISE THANK AND TERMINATE; For this study, we need to hear from someone who is responsible for making decisions about the energy-related appliances in your home. We really appreciate you taking the time to help us.]

[ASK IF OWNER = 1, OR (Q7_4 OR Q7_5 OR Q7_2 = 1)]

Q8. What do each of the types of equipment in your home at <ADDRESS> use to operate? [1 = Electricity, 2 = Natural gas, 3 = Propane, 0 = Something else, please specify: [OPEN END], 97 = Not applicable, my home does not have this; 98 = Don't know]

1. [DISPLAY IF OWNER=1 OR Q7_4 = 1] Primary heating equipment [DISPLAY 97 IF OWNER = 1]
2. [DISPLAY IF OWNER=1 OR Q7_5 = 1] Water heater [DISPLAY 97 IF OWNER = 1]
3. [DISPLAY IF OWNER=1 OR Q7_2 = 1] Clothes dryer [DISPLAY 97 IF OWNER = 1]

[ASK IF Q8_1 OR Q8_2 OR Q8_3 = 2]

Q9. Which utility provides natural gas service to your home?

[SINGLE RESPONSE]

1. Pacific Gas and Electric Company (PG&E)
2. Southern California Gas (SoCalGas/SCG)
3. San Diego Gas & Electric (SDG&E)
0. Another provider, please specify: [OPEN-ENDED RESPONSE]
97. Not applicable, my home does not have natural gas
98. Don't know

[GENERATE GAS = 1 IF Q8_1 OR Q8_2 OR Q8_3 = 2 OR 3; ELSE GAS = 0]

[ASK IF Q7_4 = 1 OR (Q8_1 = 1, 2, 3, 0, OR 98)]

Q10. Which types of heating equipment do you have in your home? *Please select all you have.*

[MULTIPLE RESPONSE]

1 Central forced air furnace

Forces warm air through ducts to rooms in the home. Typically, a central unit is used to heat multiple rooms.

2 Boiler

Heats water to create either steam or hot water that is then distributed throughout your home through radiators and radiant baseboard or floor heating. Typically, a central unit is used to heat multiple rooms.

3 Heat Pump

Air source heat pumps are typically central units used to heat multiple rooms. They transfer heat from outside to inside the home or vice versa. They are sometimes called reverse-cycle air conditioners.

Ground source or geothermal heat pumps use a ground loop or well to transfer heat from the ground to your home. They are typically central units used to heat multiple rooms.

4 Electric Baseboard or Wall Heaters

Contains <u>electric</u> heating elements that generate heat for the room. They are individual units that heat individual rooms, require no central heating or duct work, and are typically located along the base of the wall. Do not mark this box if your baseboards use a fuel type other than electricity.

0 Other, please specify: [OPEN END]

97 None, my home does not have heating equipment [EXCLUSIVE]

98 Don't know [EXCLUSIVE]

[ASK IF Q7_4 = 1 OR OWNER = 1]

Q11. Which types of cooling equipment do you have in your home? *Please select all you have.*

[MULTIPLE RESPONSE]

1 Central air conditioning system

Forces cool air through ducts to rooms in the home. Typically, a central unit is used to cool multiple rooms.

2 Window or room air conditioner

A window or room air conditioner is a simple form of conditioning, where a single unit is mounted on a window or a wall and cools the room.

3 Heat Pump

Air source heat pumps are typically central units used to heat multiple rooms. They transfer heat from outside to inside the home or vice versa. They are sometimes called reverse-cycle air conditioners.

Ground source or geothermal heat pumps use a ground loop or well to transfer heat from the ground to your home. They are typically central units used to heat multiple rooms.

4 Evaporative or swamp cooler

An evaporative or swamp cooler is a unit that cools air efficiently through the direct evaporation of water. These devices are typically installed on the roof, exterior wall, or windows of a home. They consist of a fan, a thick pad, a water reservoir, controls, and/or air filters.

0 Other, please specify: [OPEN END]

97 None, my home does not have cooling equipment [EXCLUSIVE]

98 Don't know [EXCLUSIVE]

[IF Q10 = 3 OR Q11 = 3, SKIP TO Q13]

Q12. Before today, had you heard of an air source heat pump?

An air source heat pump is a heating and cooling system that uses electricity to transfer heat from outside of the home to inside of the home or vice versa. They can be used as a space heater or cooler. To move the heat, heat pumps work like a refrigerator in reverse and are sometimes called reverse-cycle air conditioners.

[SINGLE RESPONSE]

1. Yes
2. No

[ASK IF OWNER = 1 OR Q7_3 = 1]

Q13. Which type(s) of thermostat(s) do you have in your home to control your heating and/or cooling system? *Please select all that apply.*

[MULTIPLE RESPONSE]

Thermostat Type	
1. Manual Thermostat Allows the user to set the temperature and adjust it up or down as desired by manually turning a dial or moving a lever; the temperature setting only changes when the user adjusts the thermostat	
2. Programmable Thermostats (Not Wi-Fi-Connected) Uses the built-in calendar and clock to adjust the temperature according to programmed settings by day and time.	
3. Wi-Fi-Connected Smart Thermostat In addition to doing everything a programmable thermostat does, these thermostats connect to the internet and allow the user to adjust the temperature through smartphones or tablets.	

4. Remote style thermostat A portable version of the programmable thermostat that can be used like a remote control. Many models have just the basic temperature settings and are often in homes that also have another programmable or smart thermostat with more features and settings.	
5. Dials Typically located on the actual heating or cooling unit instead of on the wall of your home. They operate like a manual thermostat.	
97. None, my home does not have any thermostats [EXCLUSIVE]	
98. Don't know [EXCLUSIVE]	

[ASK IF Q13 <> 3]
Q14. Before today, had you heard of a smart thermostat?

A smart thermostat, also called a Wi-Fi or connected thermostat, connects to the Internet and allows you to adjust the temperature remotely, using a smartphone, tablet, or computer. It can be programmed to adjust the temperature over the course of the day and week, and many models can "learn" your habits over time and adjust accordingly.

[SINGLE RESPONSE]

1. Yes
2. No

[ASK IF Q8_2 IS ASKED AND <>97]
Q15. Which type of water heater does your home have?

[SINGLE RESPONSE]

1. Conventional storage tank water heater
   Typically consists of a storage tank with electric or gas heating elements inside.

2. Tankless water heater
Water is heated as it is used without the need for a storage tank.

3. Heat pump water heater
Uses heat from the air instead of generating its own heat to heat a tank of water.

0. Other, please specify: [OPEN END]
97. Not applicable, my home does not have a water heater
98. Don't know

[ASK IF Q15 <> 3]
Q16. Before today, had you heard of an electric heat pump water heater?

A heat pump water heater uses electricity to draw in heat in the air in the surrounding area instead of generating heat directly. Therefore, it can be two to three times more energy efficient than a conventional water heater. To draw in heat from the air, heat pumps work like a refrigerator in reverse.

[SINGLE RESPONSE]

1. Yes
2. No

Generate Variables

High Touch

GENERATE:
APPLIANCE_FL = 1 IF OWNER=1 OR Q7_1=1 (Refrigerator eligible: makes decisions about refrigerator)
APPLIANCE_FL = 2 IF (Q7_2=1 AND Q8_3 <> 97) OR (OWNER = 1 AND Q8_3 <> 97) (Clothes dryer eligible: has and makes decision about clothes dryer)
APPLIANCE_FL = 3 IF (OWNER = 1 AND Q13 =1-4) OR (Q7_3 = 1 AND Q13 =1-4) (Thermostat eligible: has and makes decisions about thermostat)
ELSE APPLIANCE_FL = 0: THANK AND TERMINATE: We appreciate your time and feedback, but we need to hear from a someone who has and makes decisions about other types of equipment in their home.

Low Touch

GENERATE:
EQUIPMENT_FL = 1 IF (Q7_4=1 AND Q10 = 1) OR (OWNER = 1 AND Q10 = 1) (Furnace: has and makes decisions about furnace)
EQUIPMENT_FL = 2 IF (Q7_4=1 AND Q11 = 1)) OR (OWNER = 1 AND Q11 = 1) (Central AC: has and makes decisions about CAC)
EQUIPMENT_FL = 3 IF (Q7_5=1 AND Q15 = 1) OR (OWNER = 1 AND Q15 = 1) (Water heater eligible: has and makes decisions about tank water heater)
EQUIPMENT_FL = 4 IF Q7_6=1 OR (OWNER=1 AND Q1 = 1, 2, OR 3) (Insulation eligible: makes decisions about insulation)
ELSE EQUIPMENT_FL = 0: THANK AND TERMINATE: We appreciate your time and feedback, but we need to hear from a someone who has and makes decisions about other types of equipment in their home.

Fuel Substitution

GENERATE:
FUEL_SUB = 1 IF EQUIPMENT_FL = 3 AND Q8_2 = 2 OR 3) (Water heater substitution eligible: has gas conventional water heater and makes decisions about it)
FUEL_SUB = 2 IF EQUIPMENT_FL = 1 AND Q8_1 = 2 OR 3 (Space heater substitution eligible: has gas furnace and makes decisions about it)
ELSE FUEL_SUB = 0

Program Awareness

[ASK ALL]
Q17. Are you aware that your electric [IF Q9 IS ASKED AND <> 97, INSERT: and natural gas] utility offers rebates and incentives for customers to save energy?

[SINGLE RESPONSE]

1. Yes
2. No

[ASK ALL]

Q18. Have you ever received a rebate or incentive for energy efficient equipment through your utility?

[SINGLE RESPONSE]

1. Yes
2. No
98. Unsure

General Attitudes, Motivations, and Barriers [ASK ALL]

Q19. Next, we want to ask you some questions about your energy usage and your opinions towards environmental challenges.

How concerned are you about managing your energy use as you go about your daily life?

[SINGLE RESPONSE]

1. Extremely concerned
2. Very concerned
3. Moderately concerned
4. Slightly concerned
5. Not at all concerned

Q20. How often, if ever, do you make an effort to live in ways that reduce your home's electric usage?

[SINGLE RESPONSE]

1. All or most of the time
2. Often
3. Sometimes
4. Rarely
5. Never

Q21. When purchasing products that use energy such as electronics or household appliances, how often does the amount of energy used by the product influence your decision about which product to buy?

[SINGLE RESPONSE]

1. All or most of the time
2. Often
3. Sometimes
4. Rarely
5. Never

Q22. To what extent do you agree or disagree with the following statements?

[MATRIX QUESTION]

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 - Strongly disagree	2 - Somewhat disagree	3 - Neither	4 - Somewhat agree	5 - Strongly agree
A. Environmental challenges like climate change, pollution, and waste are not important issues	○	○	○	○	○
B. It is important for others to see me as environmentally conscious	○	○	○	○	○
C. Californians should change their lifestyles to reduce energy consumption	○	○	○	○	○
D. I am proud when I figure out ways to save a few dollars on my energy bill	○	○	○	○	○
E. It takes a lot of effort to be energy efficient	○	○	○	○	○
F. I will not pay more for energy efficient equipment even if it means I can save energy costs in the long term	○	○	○	○	○
G. I like being one of the first in my community to purchase the latest high-tech products	○	○	○	○	○
H. I am concerned that the money I have won't last	○	○	○	○	○
I. I have money left over at the end of the month	○	○	○	○	○

High Touch Appliances [ASK IF APPLIANCE_FL = 1, 2, OR 3]

[RANDOMLY ASSIGN RESPONDENTS INTO ONE OF THREE GROUPS BASED ON THE FOLLOWING RULES AND QUOTAS]

Appliance Group:	Generate Variable:	Eligibility:	Quota:
Refrigerator	APPLIANCE= "refrigerator"	APPLIANCE_FL=1	150
Clothes dryer	APPLIANCE= "clothes dryer"	APPLIANCE_FL=2	150
Thermostat	APPLIANCE= "thermostat"	APPLIANCE_FL=3	300

Appliance Purchasing Decisions

Q23. Now, we have some questions about what you would do if you had to replace or upgrade a broken [APPLIANCE] in your home.

How important would each of the following factors be if you needed to purchase a new [APPLIANCE] for your home?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 -Not at all important	2 - Slightly important	3 - Moderately important	4 - Very important	5 – Extremely important
A. Look and feel	○	○	○	○	○
B. Ease of use	○	○	○	○	○
C. Advanced features or settings like Internet connectivity, remote control from a tablet or smartphone, etc.	○	○	○	○	○
D. [DISPLAY IF APPLIANCE = 1 OR 2] Noise level	○	○	○	○	○
E. [DISPLAY IF APPLIANCE = 3] Size of the thermostat	○	○	○	○	○
F. [DISPLAY IF APPLIANCE = 1 OR 2] Capacity and/or size of the unit	○	○	○	○	○
G. Ease of installation	○	○	○	○	○
H. Available information about different models	○	○	○	○	○
I. Amount of time required between making the purchase and installing it in your home	○	○	○	○	○
J. [DISPLAY IF APPLIANCE = 1 OR 2] The amount or cost of energy it uses	○	○	○	○	○

Q24. What about the factors you would consider when selecting the energy efficiency level of the new [APPLIANCE]?

[DISPLAY IF APPLIANCE=1 FOR THIS SECTION] *The cost of a typical standard efficiency refrigerator is about $1,250 and the cost of a high efficiency refrigerator is about $1,400. The energy efficient refrigerator can save a typical household about $60 a year in energy costs.*

[DISPLAY IF APPLIANCE= 2 FOR THIS SECTION*] The cost of a typical standard efficiency clothes dryer is about $500 and the cost of a high efficiency clothes dryer is about $800. An energy efficient clothes dryer can save a typical household about $40 a year in energy costs.*

[DISPLAY IF APPLIANCE=3 FOR THIS SECTION] *The cost of a standard efficiency programmable thermostat that does not connect to Wi-Fi is about $40 and the cost of a high efficiency smart thermostat that can connect to Wi-Fi is about $175. A high efficiency smart thermostat can save a typical household about $70 a year in energy costs.*

Given this information, how much would each factor below be a barrier for you to purchase an **energy efficient** [IF APPLIANCE=3, INSERT "**smart**"] [APPLIANCE] to replace a broken [APPLIANCE] in your home?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 - Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. The higher price of the higher efficiency [APPLIANCE] over the standard efficiency model	○	○	○	○	○
B. Limited or no access to financing options like a credit card, store credit account, or loan for the new [APPLIANCE]	○	○	○	○	○
C. Uncertainty about whether it will save as much energy as estimated	○	○	○	○	○
D. The potential disruption to your home to install the new [APPLIANCE]	○	○	○	○	○

[ASK IF Q24A = 2-5 OR Q24B = 2-5]

Q25. Thinking back to January 2020, **before COVID-19**, how much of a barrier would the following cost-related factors have been for you to purchase an energy efficient [IF APPLIANCE=3, INSERT "smart"] [APPLIANCE] to replace a broken one in your home?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 - Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. The higher price of the high efficiency [APPLIANCE]	○	○	○	○	○
B. Limited or no access to financing options like a credit card, store credit account, or loan for the [APPLIANCE]	○	○	○	○	○

Appliance Adoption Scenarios

Q26. If you had to replace a broken [APPLIANCE], how likely would you be to purchase an **energy efficient** model as a replacement?

[DISPLAY IF APPLIANCE=1 FOR THIS SECTION] *Again, the cost of a typical standard efficiency refrigerator is about $1,250 and the cost of a high efficiency refrigerator is about $1,400, a difference of $150. The energy efficient refrigerator can save a typical household about $60 a year in energy costs.*

[DISPLAY IF APPLIANCE= 2 FOR THIS SECTION*] Again, the cost of a typical standard efficiency clothes dryer is about $500 and the cost of a high efficiency clothes dryer is about $800, a difference of $300. An energy efficient clothes dryer can save a typical household about $40 a year in energy costs.*

[DISPLAY IF APPLIANCE=3 FOR THIS SECTION] *Again, the cost of a standard efficiency programmable thermostat is about $40 and the cost of a high efficiency smart thermostat is about $175, a difference of $135. A high efficiency smart thermostat can save a typical household about $70 a year in energy costs.*

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

[IF Q26<5, LEAST FILL RESPONDENTS INTO Q27 AND Q28 SO THAT THERE IS AN EVEN SPLIT IN EACH GROUP **BY APPLIANCE**]

Q27. What if a rebate was available to cover the additional cost to replace a broken [APPLIANCE] with an energy efficient model? The rebate would be a one-time payment provided shortly after purchasing the [APPLIANCE].

How likely would you be to replace your [APPLIANCE] with an energy efficient model if you received…? [SINGLE RESPONSE]

	1 – Not at all likely	2 – Slightly likely	3 - Somewhat likely	4 – Very likely	5 – Extremely likely
A. [DISPLAY IF APPLIANCE = 1] A $75 rebate for HALF the additional cost of the high efficiency refrigerator	○	○	○	○	○
B. [DISPLAY IF APPLIANCE = 1 AND Q27A < 5] A $150 rebate for ALL the additional cost of the high efficiency refrigerator	○	○	○	○	○
C. [DISPLAY IF APPLIANCE = 2] A $150 rebate for HALF the additional cost of the high efficiency clothes dryer	○	○	○	○	○
D. [DISPLAY IF APPLIANCE = 2 AND Q27C < 5] A $300 rebate for ALL the additional cost of the high efficiency clothes dryer	○	○	○	○	○

E. [DISPLAY IF APPLIANCE = 3] A $65 rebate for HALF the additional cost of the high efficiency smart thermostat	○	○	○	○	○
F. [DISPLAY IF APPLIANCE = 3 AND Q27E < 5] A $135 rebate for ALL the additional cost of the high efficiency smart thermostat	○	○	○	○	○

[ASK RANDOM HALF IN EACH APPLIANCE GROUP IF Q26<5]

Q28. What if a financing option was available that would allow you to pay some or all of the cost of the [APPLIANCE] over time through your monthly energy bills from your utility? With this on-bill financing option, you could choose how much to finance and for how long, and the monthly payments would be added to your energy bills.

How likely would you be to replace your broken [APPLIANCE] with the high efficiency model if on-bill financing were available to you? [SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

Demand Response Participation Scenarios

For Respondents Who Have a Smart Thermostat [ASK Q29-Q32 IF (OWNER = 1 AND Q13=3) OR (Q7_3 = 1 AND Q13=3); ELSE SKIP TO Q33]

Q29. Next, we have a few questions about *demand response* programs many utilities have available for customers like you who have a smart thermostat.

Customers who participate in a demand response program allow their utility to remotely connect to and change their smart thermostat settings for up to four hours a day on 10 or fewer 'event days' during the summer when demand for electricity is highest. The utility will lower participants' temperature settings to pre-cool their homes early in the day and will then raise participants' temperature settings 3 to 4 degrees to reduce electricity demand on the grid later in the day. On each event day, customers receive an advanced notification and can opt-out any time before or during the event.

What best describes your level of familiarity with a thermostat demand response program?

1. Never heard of the program
2. Heard of the program but never participated
3. Participated in the program before but not currently
4. Currently participating in the program

[ASK IF Q29 < 4]

Q30. How much would each factor below be a barrier for your household to participate in a thermostat demand response program?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. Allowing your utility to control your thermostat(s) during high demand events	○	○	○	○	○
B. Making changes to the temperature settings in your home during high demand events	○	○	○	○	○
C. Your level of familiarity or experience with a demand response program	○	○	○	○	○
D. Sharing thermostat data over the Internet	○	○	○	○	○
E. Your level of familiarity or experience with your smart thermostat	○	○	○	○	○

[ASK IF Q29 < 4]

Q31. Next, consider that your utility offers you a one-time $50 bonus to sign up for its thermostat *demand response* program.

How likely would you be to participate in your utility's demand response program with the $50 sign-up bonus? [SCALE SHOWN BELOW]

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

[ASK IF Q31<5]

Q32. How likely would you be to participate with the $50 sign-up bonus and…?

[SINGLE RESPONSE]

	1 – Not at all likely	2 – Slightly likely	3 - Somewhat likely	4 – Very likely	5 – Extremely likely
A. An additional annual incentive payment of **$25** each summer you participate in high demand event days	○	○	○	○	○

B. [ASK IF Q32A<5] An additional annual incentive payment of **$50** each summer you participate in high demand event days	○	○	○	○	○

For Respondents Who Were Asked Smart T-Stat Adoption Questions and Would Not Adopt a Smart T-Stat Without a Rebate [ASK Q33-Q36 IF APPLIANCE = 3 FOR Q23-Q28 AND Q26<5 AND Q13=1, 2, OR 4 AND Q13<>3; ELSE SKIP TO Q37]

Q33. Next, we have a few questions about *demand response* programs many utilities have available as a potential incentive for customers to get an energy efficient smart thermostat.

Customers who participate in a demand response program allow their utility to remotely connect to and change their smart thermostat settings for up to four hours a day on 10 or fewer 'event days' during the summer when demand for electricity is highest. The utility will lower participants' temperature settings to pre-cool their homes early in the day and will then raise participants' temperature settings 3 to 4 degrees to reduce electricity demand on the grid later in the day. On each event day, customers receive an advanced notification and can opt-out any time before or during events.

Have you heard of a demand response program like this before today?

1. Yes
2. No

Q34. How much would each factor below be a barrier for your household to get a smart thermostat and participate in this type of program? [RANDOMIZE LIST]

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. Allowing your utility to control your thermostat(s) during high demand events	○	○	○	○	○
B. Making changes to the temperature settings in your home during high demand events	○	○	○	○	○
C. Your level of familiarity or experience with the demand response program	○	○	○	○	○
D. Sharing thermostat data over the Internet	○	○	○	○	○
E. Your level of familiarity or experience with smart thermostats	○	○	○	○	○

[ASK IF Q27 IS ASKED (Respondent saw the rebate scenarios)]

Q35. Next, please consider the scenario we presented before but with a demand response program incentive payment [INSERT IF Q27E=5: instead of the one-time rebate payment].

The cost of a standard programmable thermostat is about $40 and the cost of a smart thermostat is about $175, a difference of $135. Average energy savings for a smart thermostat are about $70 per year for a typical household. With the smart thermostat, you would also enroll in the demand response program and get a one-time $50 sign-up bonus.

How likely would you be to purchase a smart thermostat and signup in your utility's demand response program if you received…?

	1 – Not at all likely	2 – Slightly likely	3 - Somewhat likely	4 – Very likely	5 – Extremely likely
A. [ASK IF Q27E = 5] The **one-time $50 bonus** for signing up in the demand response program.	○	○	○	○	○
B. [ASK IF Q35A<5 AND Q27E = 5] The $50 sign-up bonus and an **annual $25 payment** each summer you participate in high demand event days.	○	○	○	○	○
C. [ASK IF Q35B<5 AND Q27E = 5] The $50 sign-up bonus and an **annual $50 payment** each summer you participate in high demand event days.	○	○	○	○	○
D. [ASK IF Q27F = 5] The **one-time $50 bonus** for signing up in the demand response program and a one-time $65 rebate for HALF the additional cost of a smart thermostat over a standard programmable one.	○	○	○	○	○
E. [ASK IF Q35D<5 AND Q27F = 5] The $50 sign-up bonus, the $65 rebate for HALF the additional cost of a smart thermostat, and an **annual $25 payment** each summer you participate in high demand event days.	○	○	○	○	○
F. [ASK IF Q35E<5 AND Q27F = 5] The $50 sign-up bonus, the $65 rebate for HALF the additional cost of a smart thermostat, and an **annual $50 payment** each summer you participate in high demand event days.	○	○	○	○	○

G. [ASK IF Q27F < 5] The **one-time $50 bonus** for signing up in the demand response program and a one-time $135 rebate for ALL the additional cost of a smart thermostat over a standard programmable one.	○	○	○	○	○
H. [ASK IF Q35G<5 AND Q27F < 5] The $50 sign-up bonus, the $135 rebate for ALL the additional cost of a smart thermostat, and an **annual $25 payment** each summer you participate in high demand event days.	○	○	○	○	○
I. [ASK IF Q35H<5 AND Q27F < 5] The $50 sign-up bonus, the $135 rebate for ALL the additional cost of a smart thermostat, and an **annual $50 payment** each summer you participate in high demand event days.	○	○	○	○	○

[ASK IF Q28 IS ASKED (Respondent saw the OBF scenarios)]

Q36. Next, please consider the scenario we presented before but with a demand response program incentive payment [INSERT IF Q28 = 5: "instead of the on-bill financing option"].

The cost of a standard programmable thermostat is about $40 and the cost of a smart thermostat is about $175, a difference of $135. Average energy savings for a smart thermostat are about $70 per year for a typical household. With the smart thermostat, you would also enroll in the demand response program and get a one-time $50 sign-up bonus.

How likely would you be to purchase a smart thermostat and sign up to participate in your utility's demand response program if you received…?

	1 – Not at all likely	2 – Slightly likely	3 - Somewhat likely	4 – Very likely	5 – Extremely likely
A. [ASK IF Q28 = 5] The **one-time $50 bonus** for signing up in the demand response program	○	○	○	○	○
B. [ASK IF Q36A<5 AND Q28 = 5] The $50 sign-up bonus and an **annual $25 payment** each summer you participate in high demand event days.	○	○	○	○	○
C. [ASK IF Q36B<5 AND Q28 = 5] The $50 sign-up bonus and an **annual $50 payment** each summer you participate in high demand event days.	○	○	○	○	○

D. [ASK IF Q28 < 5] The **one-time $50 bonus** for signing up in the demand response program and the on-bill financing option to pay some or all of the cost of the thermostat through your monthly energy bills.	○	○	○	○	○
E. [ASK IF Q36D<5 AND Q28 < 5] The $50 sign-up bonus, the on-bill financing option, and an **annual $25 payment** each summer you participate in high demand event days.	○	○	○	○	○
F. [ASK IF Q36E<5 AND Q28 < 5] The $50 sign-up bonus, the on-bill financing option, and an **annual $50 payment** each summer you participate in high demand event days.	○	○	○	○	○

LOW TOUCH EQUIPMENT [ASK IF EQUIPMENT = 1, 2, 3, OR 4]

[LEAST FILL RESPONDENTS INTO ONE OF FOUR GROUPS BASED ON THE FOLLOWING RULES]

EQUIPMENT:	Generate Variable:	Eligibility:
Furnace	EQUIPMENT= “furnace”	EQUIPMENT_FL=1
CAC	EQUIPMENT = “central air conditioner”	EQUIPMENT_FL=2
Water heater	EQUIPMENT= “water heater”	EQUIPMENT_FL=3
Insulation	EQUIPMENT= “insulation”	EQUIPMENT_FL=4

LOW TOUCH EQUIPMENT PURCHASE DECISIONS

Q37. Next, we would like to know what you would look for if you were to need to [INSERT IF EQUIPMENT=1, 2, 3: “purchase a new [EQUIPMENT] to replace a broken one in your home”; INSERT IF EQUIPMENT=4: “add or upgrade insulation in your home’s ceiling or attic”].

How important would each of the following factors be in your decision to [INSERT IF EQUIPMENT=1, 2, 3: “purchase a new [EQUIPMENT]”; INSERT IF EQUIPMENT=4: “add or upgrade insulation in your home’s ceiling or attic”]?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 -Not at all important	2 - Slightly important	3 - Moderately important	4 - Very important	5 – Extremely important

A. [DISPLAY IF EQUIPMENT=1, 2, 3] Look and feel	○	○	○	○	○
B. [DISPLAY IF EQUIPMENT=1, 2, 3] Ease of use	○	○	○	○	○
C. [DISPLAY IF EQUIPMENT=1, 2, 3] Advanced features or settings like Internet connectivity, remote control from a tablet or smartphone, etc.	○	○	○	○	○
D. [DISPLAY IF EQUIPMENT=1, 2, 3] Noise level	○	○	○	○	○
E. Potential comfort benefits [INSERT IF EQUIPMENT = 4: "like less drafts and noise from outside"]	○	○	○	○	○
F. Ease of installation in your home	○	○	○	○	○
G. Available information about different [INSERT IF EQUIPMENT=1, 2, 3: "models"; INSERT IF EQUIPMENT=4: "types"]	○	○	○	○	○
H. Amount of time required between making the purchase and installing it in your home	○	○	○	○	○
I. The amount or cost of energy it [INSERT IF EQUIPMENT=1, 2, 3: "uses"; INSERT IF EQUIPMENT=4: "can save"]	○	○	○	○	○

Q38. What about the factors you would consider when selecting the energy efficiency level of the new [EQUIPMENT]?

[DISPLAY IF EQUIPMENT=1 FOR THIS SECTION] *The cost of a standard efficiency furnace of average size is about $2,000 and the cost of a comparable high efficiency furnace is $3,000. These costs include the price of the installation. A typical household could save about $40 per year in energy costs with the energy efficient model.*

[DISPLAY IF EQUIPMENT=2 FOR THIS SECTION] *The cost of a standard efficiency central air conditioner (AC) of average size is about $2,500 and the cost of a comparable high efficiency central AC is about $3,500. These costs include the price of the installation. A typical household could save about $40 per year in energy costs with the energy efficient model.*

[DISPLAY IF EQUIPMENT=3 FOR THIS SECTION] *The cost of a standard efficiency storage water heater of average size is about $500 and the cost of a comparable high*

efficiency water heater is about $1,000. A typical household could save about $300 per year in energy costs with the energy efficient model.

[DISPLAY IF EQUIPMENT=4 FOR THIS SECTION] *The cost of installing high efficiency insulation in a typical house's ceiling or attic is about $2,000. A typical household could save about $15 per year in energy costs with the insulation.*

Given this information, how much would each factor below be a barrier for you to purchase the energy efficient [EQUIPMENT] for your home?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. [DISPLAY IF EQUIPMENT = 1, 2, 3] The higher price of the high efficiency [EQUIPMENT] over the standard efficiency model	○	○	○	○	○
B. Limited or no access to financing options like a credit card, store account, or loan for the new [EQUIPMENT]	○	○	○	○	○
C. Uncertainty about whether it will save as much energy as estimated	○	○	○	○	○
D. The potential disruption to your home to install the new [EQUIPMENT]	○	○	○	○	○
E. [DISPLAY IF EQUIPMENT = 4] The price of the high efficiency insulation	○	○	○	○	○

[ASK IF Q38A OR Q38B OR Q38E = 2-5]

Q39. Thinking back to January 2020, **before COVID-19**, how much of a barrier would the following cost-related factors have been for you to [INSERT IF EQUIPMENT = 1, 2, 3: "purchase an energy efficient [EQUIPMENT] to replace a broken one in your home"; INSERT IF EQUIPMENT = 4: "add or upgrade insulation in your home"]?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. [DISPLAY IF EQUIPMENT = 1, 2, 3] The higher price of the high efficiency [EQUIPMENT]	○	○	○	○	○
B. Limited or no access to financing options like a credit card, store account, or loan for the new [EQUIPMENT]	○	○	○	○	○
C. [DISPLAY IF EQUIPMENT = 4] The	○	○	○	○	○

price of the high efficiency insulation					

Low Touch Equipment Adoption Scenarios

Q40. [DISPLAY IF EQUIPMENT=1, 2, OR 3 FOR THIS SECTION] If you needed to purchase the new [EQUIPMENT] to replace a broken one, how likely would you be to purchase an energy efficient model or type?

[DISPLAY IF EQUIPMENT=4 FOR THIS SECTION] If you needed to add or upgrade [EQUIPMENT] to your ceiling or attic, how likely would you be to purchase it?

[DISPLAY IF EQUIPMENT=1 FOR THIS SECTION] *Again, the cost of a standard efficiency furnace of average size is about $2,000 and the cost of a comparable high efficiency furnace is $3,000, a difference of $1,000. A typical household could save about $40 per year in energy costs with the energy efficient model.*

[DISPLAY IF EQUIPMENT=2 FOR THIS SECTION] *Again, the cost of a standard efficiency central air conditioner (AC) of average size is about $2,500 and the cost of a comparable high efficiency central AC is about $3,500, a difference of $1,000. A typical household could save about $40 per year in energy costs with the energy efficient model.*

[DISPLAY IF EQUIPMENT=3 FOR THIS SECTION] *Again, the cost of a standard efficiency storage water heater of average size is about $500 and the cost of a comparable high efficiency water heater is about $1,000, a difference of $500. A typical household could save about $300 per year in energy costs with the energy efficient model.*

[DISPLAY IF EQUIPMENT=4 FOR THIS SECTION] *Again, the cost of installing high efficiency insulation in a typical home's ceiling or attic is $2,000. A typical household could save about $15 per year in energy costs.*

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

[IF Q40<5, LEAST FILL RESPONDENTS INTO Q41 AND Q42 SO THAT THERE IS AN EVEN SPLIT IN EACH GROUP BY EQUIPMENT]

Q41. What if a rebate was available to cover the additional cost of the new high efficiency [EQUIPMENT]? The rebate would be a one-time payment provided shortly after purchasing the [EQUIPMENT].

How likely would you be to purchase the high efficiency [EQUIPMENT] if you received…?

[SINGLE RESPONSE]

	1 – Not at	2 –	3 -	4 – Very	5 –

	all likely	Slightly likely	Somewhat likely	likely	Extremely likely
A. [ASK IF EQUIPMENT=1 OR 2] A $500 rebate for HALF the additional cost of the high efficiency [EQUIPMENT] over the standard efficiency model	○	○	○	○	○
B. [ASK IF 0A < 5 AND EQUIPMENT = 1 OR 2] A $1,000 rebate for ALL the additional cost of the high efficiency [EQUIPMENT]	○	○	○	○	○
C. [ASK IF EQUIPMENT=3] A $250 rebate for HALF the additional cost of the high efficiency [EQUIPMENT] over the standard efficiency model	○	○	○	○	○
D. [ASK IF 0C < 5 AND EQUIPMENT = 3] A $500 rebate for ALL the additional cost of the high efficiency [EQUIPMENT]	○	○	○	○	○
E. [ASK IF EQUIPMENT=4] A $500 rebate to cover a QUARTER of the cost of the high efficiency insulation	○	○	○	○	○
F. [ASK IF 0E < 5 AND EQUIPMENT = 4] A $1,000 rebate to cover HALF the cost of the high efficiency insulation	○	○	○	○	○

[ASK RANDOM HALF IN EACH EQUIPMENT GROUP IF Q40<5]

Q42. What if a financing option was available that would allow you to pay some or all of the cost of the [EQUIPMENT] over time through your monthly energy bills from your utility? With this on-bill financing option, you could choose how much to finance and for how long, and the monthly payments would be added to your energy bills.

How likely would you be to purchase the high efficiency [EQUIPMENT] [IF EQUIPMENT = 1, 2, OR 3, INSERT: “to replace a broken one”] if the on-bill financing option were available?

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

Fuel Substitution Scenarios [ASK IF FUEL_SUB = 1 OR 2]

[LEAST FILL RESPONDENTS INTO ONE OF TWO GROUPS BASED ON THE FOLLOWING RULES]

Group	Generate Equipment Variable	Eligibility:
Water heating	FUEL_EQUIP = "heat pump water heater"	FUEL_SUB=1
Space heating	FUEL_EQUIP = "air source heat pump"	FUEL_SUB=2

Water Heater Awareness and Motivators [ASK IF FUEL_EQUIP = 1]

Q43. We have one last set of questions about replacing equipment in your home. Let's say you need to replace your gas water heater because it breaks and you have the opportunity to switch to an electric energy efficient model.

*For a typical home, the cost of a standard efficiency **gas** storage water heater is about $500 while the cost of an energy efficient **electric** heat pump water heater is about $2,000. Average energy savings for a heat pump water heater are about $300 per year after switching from a standard efficiency water heater.*

How much would each of the following factors motivate you to purchase an electric heat pump water heater over a standard efficiency gas storage water heater? [RANDOMIZE LIST; SINGLE RESPONSE]

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not at all motivating	2 – Slightly motivating	3- Moderately motivating	4 – Very motivating	5 – Extremely motivating
A. Reduced environmental impacts like air and water pollution	○	○	○	○	○
B. Faster water heating	○	○	○	○	○
C. Improved efficiency and lower energy usage	○	○	○	○	○
D. Longer lasting equipment	○	○	○	○	○
E. Lower utility bills	○	○	○	○	○

HVAC Awareness and Fuel Substitution Motivators [ASK IF FUEL_EQUIP = 2]

Q44. We have one last set of questions about replacing equipment in your home. Let's say you need to replace your gas heating system because it breaks and you have the opportunity to switch to an electric energy efficient model.

For a typical home, the cost of a standard efficiency gas heating system is about $2,000 while the cost of an energy efficient electric air source heat pump is about $4,000. Typical energy savings for an electric air source heat pump are about $500 per year after switching from a standard gas heating system.

How much would each of the following factors motivate you to purchase an electric air source heat pump?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not at all motivating	2 – Slightly motivating	3- Moderately motivating	4 – Very motivating	5 – Extremely motivating
A. Reduced environmental impacts like air pollution	○	○	○	○	○
B. Improved comfort and performance	○	○	○	○	○
C. Reduced noise level	○	○	○	○	○
D. Improved efficiency and lower energy usage	○	○	○	○	○
E. Lower utility bills	○	○	○	○	○

WATER HEATER AND HVAC FUEL SUBSTITUTION BARRIERS AND ADOPTION SCENARIOS [ASK IF FUEL_EQUIP = 1 OR 2]

Q45. How much would each factor below be a barrier for you to switch from a gas [IF FUEL_EQUIP = 1, INSERT: “water heater”; IF FUEL_EQUIP = 2, INSERT: “heating equipment”] to a more energy efficient electric [FUEL_EQUIP]?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. Uncertainty about the estimated energy savings of an electric [FUEL_EQUIP]	○	○	○	○	○
B. The need for potential structural, electrical, and/or plumbing changes to install the new [FUEL_EQUIP] in your home	○	○	○	○	○
C. Limited or no access to financing options like a credit card, store account, or loan for the [FUEL_EQUIP]	○	○	○	○	○
D. Lack of experience or familiarity with an	○	○	○	○	○

electric [FUEL_EQUIP]					
E. [ASK IF FUEL_EQUIP=1] The slightly larger size of the heat pump water heater	○	○	○	○	○
F. The higher upfront cost of an electric [FUEL_EQUIP]	○	○	○	○	○
G. [ASK IF FUEL_EQUIP=2] The need for part of the air source heat pump system to be located outside the building (as opposed to the entire system being inside the building)	○	○	○	○	○

Q46. If you needed to replace your gas [IF FUEL_EQUIP = 1: "water heater"; IF FUEL_EQUIP = 2: "heating system"] because it breaks, how likely would you be to switch to an energy efficient electric [FUEL_EQUIP]?

[IF FUEL_EQUIP = 1] *Again, for a typical home, the cost of a standard efficiency gas water heater is about $500 while the cost of an energy efficient electric heat pump water heater is about $2,000, a difference of $1,500. Typical energy savings for an energy efficient electric heat pump water heater are about $300 per year after switching from a standard efficiency gas water heater.*

[IF FUEL_EQUIP = 2] *Again, for a typical home, the cost of a standard efficiency gas heating system is about $2,000 while the cost of an energy efficient electric air source heat pump is about $4,000, a difference of $2,000. Typical energy savings for an energy efficient electric heat pump water heater are about $500 per year after switching from a standard efficiency gas heating system.*

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

[ASK IF Q46<5]

Q47. What if a rebate was available to cover the additional cost to replace your gas [IF FUEL_EQUIP = 1, INSERT: "water heater"; IF FUEL_EQUIP = 2, INSERT: "heating system"] with an energy efficient electric [FUEL_EQUIP]? The rebate would come in the form of a one-time payment after you purchase the electric [FUEL_EQUIP].

How likely would you be to switch to the electric [FUEL_EQUIP] if you received…? [SINGLE RESPONSE]

	1 – Not at all likely	2 – Slightly likely	3 - Somewhat likely	4 – Very likely	5 – Extremely likely

A. A [IF FUEL_EQUIP = 1, INSERT "$750"; IF FUEL_EQUIP=2, INSERT "$1,000"] rebate for HALF the additional cost of the high efficiency electric [FUEL_EQUIP] compared to a standard gas model.	○	○	○	○	○
B. [DISPLAY IF Q47A<5] A [IF FUEL_EQUIP = 1, INSERT "$1,500"; IF FUEL_EQUIP=2, INSERT "$2,000"] rebate for ALL the additional cost of the high efficiency electric [FUEL_EQUIP].	○	○	○	○	○

COVID-19 Impacts [ASK ALL]

Q48. Thanks for your feedback so far. We have just a few more questions about your household before the end of the survey.

How much, if at all, has the COVID-19 pandemic impacted your everyday life in your household since the start of the pandemic in early March 2020?

[SINGLE RESPONSE]

1. It has had a *large negative* impact
2. It has had a *moderate negative* impact
3. It has had *little or no* impact
4. It has had a *moderate positive* impact
5. It has had a *large positive* impact

Q49. Compared to January 2020, has your household's financial situation gotten better, gotten worse, or stayed about the same?

[SINGLE RESPONSE]

1. Better
2. Worse
3. About the same

Q50. Thinking ahead 12 months from now, how do you think your household's financial situation will have changed? Do you think it will be better, worse, or about the same as now?

[SINGLE RESPONSE]

1. Better
2. Worse
3. About the same

Q51. Suppose you needed to replace or upgrade an appliance or equipment in your home during the next few weeks. How comfortable or uncomfortable would you be having a

contractor or technician come into your home to install it, assuming they followed the latest safety guidelines for your area?

1. Very comfortable
2. Somewhat comfortable
3. Somewhat uncomfortable
4. Very uncomfortable

Demographics [ASK ALL]

Q52. Approximately how many square feet is the residence at <ADDRESS> in <CITY>?

[SINGLE RESPONSE]

1. Less than 1,000 sq. ft.
2. Between 1,000 and 1,999 sq. ft.
3. Between 2,000 and 2,999 sq. ft.
4. Between 3,000 and 3,999 sq. ft.
5. Between 4,000 and 4,999 sq. ft.
6. Greater than 5,000 sq. ft.
98. Don't know

Q53. In what year were you born?

1. [NUMERIC OPEN END, 1910-2001]

Q54. What is the highest level of education that you have completed so far?

[SINGLE RESPONSE]

1. Less than high school
2. High school graduate or equivalent (e.g., GED)
3. Some college, no degree
4. Technical / trade school program or Associates degree
5. Bachelor's degree
6. Graduate or professional degree, e.g., J.D., MBA, MD, Ph.D.
0. Other, please specify: [OPEN-ENDED RESPONSE]

Q56A. Are you of Hispanic, Latino, or Spanish descent?

1. Yes
2. No

Q56B. Which of the following best describes your race?

1. American Indian or Alaskan Native
2. Asian
3. Black or African American
2. Pacific Islander
4. White or Caucasian
0. Other, please specify: [OPEN END]

Q56C. What is your gender?

1. Male
2. Female
3. Other

Q55. Which of the following categories best represents your 2019 household income, before taxes?

[SINGLE RESPONSE]

1. [DISPLAY IF Q3 = 1-3] $25,000 to under $50,000
2. [DISPLAY IF Q3 = 1-5] $50,000 to under $75,000
3. [DISPLAY IF Q3 = 1-8] $75,000 to under $100,000
4. [DISPLAY IF Q3 = 1-15] $100,000 to under $150,000
5. [DISPLAY IF Q3 = 1-20] $150,000 to under $200,000
6. [DISPLAY IF Q3 = 1-20] $200,000 or more
98. Don't know
99. Prefer not to say

Closing

Q56. As a thank you for your participation in this study, we are offering a $10 electronic gift card. Please provide your name and email address below. The gift card will be from Tango, which allows you to select from dozens of retailers and restaurants like Amazon, Starbucks, Walmart, and many more.

1. Name: [OPEN END]
2. Email: [OPEN END]
3. I do not have an email address to receive the gift card
4. I do not want the $10 gift card

Q57. [ASK IF Q56=3] What is your mailing address so we can send you a $10 gift card in the mail? [DO NOT FORCE RESPONSE]

1. Street Address: [OPEN END TEXT; ALLOW 750 CHARACTERS]
2. City: [OPEN END TEXT]
3. State: [OPEN END TEXT]
4. Zip code: [OPEN END NUMBER; REQUIRE 5 DIGITS]
5. Phone number (in case we have any questions about your address): [OPEN END NUMBER; REQUIRE 10 DIGITS]
6. I do not want the $10 gift card [EXCLUSIVE]

[SHOW IF Q56 <> 4 OR Q57 <> 6] You will receive your gift card within the next 4-6 weeks.

Please click the SUBMIT button to submit your responses.

Submit

[Redirect to https://www.cpuc.ca.gov/energyefficiency/]

B.2 Multifamily Residential Customer Survey

B.2.1 Outreach

Invitation Letter

STATE OF CALIFORNIA

PUBLIC UTILITIES COMMISSION

<APARTMENT>
<BUSINESS>
<ADDRESS>
<CITY> <STATE> <ZIP+4>

Dear <APARTMENT> Property Manager,

We need your help! The California Public Utilities Commission (CPUC) invites you to participate in its 2020 Multifamily Energy Survey. The <APARTMENT> has been selected to participate in this important research. **In these challenging times, your feedback is particularly appreciated.**

The questions in this survey are related to the energy-using equipment at this property and your decision-making around making energy efficiency upgrades at <APARTMENT>. The CPUC will use the results to help California meet its energy needs and help shape future programs so it is very important that we hear from you.

To show our appreciation for completing the survey, you will receive a **$25 gift card** that you can use with popular retailers such as Target, Amazon, Lowe's, or Walmart. Please be assured that the information you provide will remain confidential.

Please complete the survey by **August 28th** by typing the link below into the address field of your web browser and then entering your access code.

Survey Link: www.multifamilyCAsurvey.com

Access Code: <ODCID>

The CPUC has partnered with Opinion Dynamics, an independent research firm, to administer the survey. If you have any questions or technical difficulties, you may contact Taylor Williams at Opinion Dynamics at (888) 308-3845 or taylor.williams@opiniondynamics.com.

Thank you in advance for taking the time to complete this important survey!

Sincerely,

Peter Franzese
Regulatory Analyst
California Public Utilities Commission

Reminder Postcard

We need your help!
It is not too late to complete this important research study!

Dear <APARTMENT> Property Manager,

You should have recently received an invitation asking for your help with the California Public Utilities Commission (CPUC) 2020 Multifamily Energy Survey. Please take this opportunity to complete our survey about your energy use and energy efficiency decision-making at <APARTMENT>. The CPUC will use the results to help California meet its future energy needs, and we really need to hear from you. As a thank you for completing this survey, you will receive a **$25 gift card**. The deadline to complete the survey is **August 28th.**

If you have already completed the survey, thank you and please disregard this reminder!

To complete the survey, please visit www.multifamilyCAsurvey.com
Enter the following access code to access the survey: **<ODCID>**

Any information you provide will remain confidential. If you have any questions about this survey, please contact Taylor Williams at Taylor.Williams@opiniondynamics.com.

Thank you in advance for your support.

Peter Franzese
Regulatory Analyst
California Public Utilities Commission

B.2.2 Instrument

Landing Page

Welcome to the California Public Utilities Commission (CPUC) Multifamily Energy Survey!

Thank you for helping us with this important research study. Opinion Dynamics, an independent research firm, is administering this survey on behalf of the CPUC. If you have any questions or technical difficulties with the survey, email Taylor Williams at Opinion Dynamics at taylor.williams@opiniondynamics.com. Your responses to this survey will be kept strictly confidential.

As a thank you for completing this survey, we are offering a $25 electronic gift card that can be used at a wide variety of stores including Walmart, Home Depot, Amazon, and many more.

We understand that you may be experiencing hardships due to the situation surrounding COVID-19. The California Public Utilities Commission (CPUC) is here to support you during this difficult time. For information about consumer protections the CPUC has put in place as a result of COVID-19, please see: https://www.cpuc.ca.gov/covid19protections/.

To start the survey, please enter in the space below your 6-digit Survey Access Code that is provided in the survey invitation we sent you.

Introduction

This survey will ask about the energy-using equipment and your decision-making around energy efficiency upgrades in the units at <APARTMENT> in <CITY>. Your feedback will help the CPUC and energy utilities in California make key planning decisions for the future, which is particularly important during the current COVID-19 situation.

Screening [ASK ALL]

[ASK ALL]
S1. Are you the best person at your company to speak with about making decisions to replace or upgrade energy-using equipment at <APARTMENT>, like water heaters, refrigerators, and the like?

[SINGLE RESPONSE]

1. Yes
2. No

[ASK IF S1 = 2]
S2. Can you provide the survey website and access code we sent you to the person who is responsible for making decisions about energy-using equipment at <APARTMENT>?

[SINGLE RESPONSE]

1. Yes
2. No

[ASK IF S2 = 1]
S3. Thanks so much. Just simply close your browser and send them the survey website and the access code. When they access the survey, they will start on this screen and can proceed through the rest of the survey.

[ASK IF S2 = 2]
S4. Can you provide us with the contact information for the person responsible for making decisions about energy-using equipment at <APARTMENT> so that we can send them the survey invitation?

[MULTIPLE RESPONSE]

1. Name: [OPEN END TEXT]
2. Email: [OPEN END TEXT EMAIL]
3. Street Address: [OPEN END TEXT]
4. City: [OPEN END TEXT]
5. State: [OPEN END TEXT]
6. Zip code: [OPEN END TEXT]
7. No, I do not have or cannot provide their contact info [EXCLUSIVE]

[THANK AND TERMINATE, TERMINATE TEXT: “Thank you for your time. Unfortunately, you do not qualify for the survey, we need to hear from the person responsible for making decisions about energy-using equipment at the property.”]

[ASK ALL]

S5. We have a few general questions about <APARTMENT> in <CITY> to ensure we are hearing from a mix of multifamily properties across California.

What type of units are available at the property? *Please select all that apply.*

[MULTIPLE RESPONSE]

1. Affordable rate rental apartments (for low income residents)
2. Market rate rental apartments (for non-low income residents)
3. Condos
4. Townhomes or row houses
5. Duplexes, triplexes, or quadplexes
6. Units for special needs residents like seniors and people with disabilities or other medical needs
7. Dorms or student housing
0. Other, please specify: [OPEN-ENDED RESPONSE]

[THANK AND TERMINATE IF 2 IS NOT SELECTED]

[TERMINATE TEXT: "Thank you for your help. Unfortunately, you do not qualify for the survey, we need to hear from a different type of property at this time."]

[ASK ALL]
S6. How many <u>total</u> market rate units are at <APARTMENT>? *Your best estimate is fine.*

[SINGLE RESPONSE]
0. [NUMERIC OPEN-ENDED RESPONSE 1 - 9995]

[THANK AND TERMINATE IF S6 < 5: "Thank you for your help. Unfortunately, you do not qualify for the survey, we need to hear from larger market rate multifamily properties at this time."]

[ASK ALL]
S7. How many <u>buildings</u> with market rate units are at <APARTMENT>?

[SINGLE RESPONSE]
0. [NUMERIC OPEN-ENDED RESPONSE 1 - 500]

[ASK ALL]
S8. Does your company own, manage, or both own and manage <APARTMENT>?

[SINGLE RESPONSE]

1. Own only
2. Manage only
3. Both own and manage
0. Other, please specify: [OPEN-ENDED RESPONSE]

[ASK ALL]
S9. How would you describe <u>your role</u> at your company in relation to <APARTMENT>?

[SINGLE RESPONSE]

1. Property manager
2. Property owner

3. Both the property manager and owner
0. Other, please specify: [OPEN-ENDED RESPONSE]

General Property Characteristics [ASK ALL]

[ASK ALL]
Q1. Do the market-rate tenants at <APARTMENT> pay their own energy bills through their utility or do they pay for their energy as part of their monthly rent or other fee through the property owner or manager?

[SINGLE RESPONSE]

1. Pay their own energy bills through their utility
2. Pay for their energy as part of rent or fees through the property owner or manager
98. Don't know

[SHOW ON SEPARATE SCREEN IF S7>1] For the remainder of the survey, please think about one building of average size at <APARTMENT> that has market rate units.

[SHOW ON SEPARATE SCREEN IF S7=1 AND S5=1] For the remainder of the survey, please consider only the market rate units in the building.

[ASK ALL]
Q2. When was the building on the property built? [IF S7>1: *Again, please think about one building of average size with market rate units on the property. Your best estimate is fine.*

[SINGLE RESPONSE]

1. Before 1900
2. Between 1900 and 1949
3. Between 1950 and 1969
4. Between 1970 and 1989
5. Between 1990 and 2009
6. Between 2010 and 2019
7. In 2020
98. Don't know

[ASK IF S7 > 1]
Q3. How many market rate units are in the building? *Again, please think about an average size building at <APARTMENT> with market rate units.*

1. [NUMERIC OPEN-END, 0 – 9999]
9998. Don't know

[ASK ALL]
Q4. About how many square feet is the building? *Your best estimate is fine.*

1. [NUMERIC OPEN-END, 0 – 99,999,995]
99999998. Don't know

Energy Characteristics [ASK ALL]

[ASK ALL]
Q5. Next, please think about the water heating equipment used by the units in the building. Does each unit have its own dedicated water heater or is one water heater shared among multiple units? *Please select all that apply.*

[MULTIPLE RESPONSE]

1. Each unit has its own dedicated water heater
2. Multiple units use the same water heater

[ASK ALL]
Q6. What type of water heating equipment is used by units in the building? *If the building includes multiple types, please select the most common or most used type.*

[SINGLE RESPONSE]

1. Conventional storage tank water heater <u>up to 80 gallons</u>
   Typically consists of a storage tank with electric or gas heating elements inside.
   
2. Commercial-scale conventional tank water heater <u>80 gallons or more</u>
   A larger, higher-use version of the conventional storage model above that can be shared by multiple units.
   
3. Tankless water heater
   Water is heated as it is used without the need for a storage tank.
   
4. Heat pump water heater
   Uses heat from the air instead of generating its own heat to heat a tank of water.

0. Something else, please specify: [OPEN END]
98. Don’t know

[ASK IF Q6 = 1 OR 2]
Q7. What is used to power the water heating equipment in the building? *Please select all that apply.*

[MULTIPLE RESPONSE]

1. Electricity
2. Natural gas
3. Propane
0. Something else, please specify: [OPEN-ENDED RESPONSE]
98. Don't know [EXCLUSIVE]

[ASK IF Q7 = 2]
Q8. Which utility provides natural gas service to the building?

1. Pacific Gas and Electric Company (PG&E)
2. Southern California Gas (SoCalGas/SCG)
3. San Diego Gas & Electric (SDG&E)
0. Another provider, please specify: [OPEN-ENDED RESPONSE]
97. None, the building doesn’t have natural gas
98. Don't know

[ASK ALL]
Q9. Which type(s) of thermostat is in the individual tenant units to control the heating or cooling settings? *Please select all that apply.*

Thermostat Type [MULTIPLE RESPONSE]	

1. Manual Thermostat Allows the user to set the temperature and adjust it up or down as desired by manually turning a dial or moving a lever; the temperature setting only changes when the user adjusts the thermostat.	
2. Programmable Thermostat (Not Wi-Fi-Connected) Uses the built-in calendar and clock to adjust the temperature according to programmed settings by day and time.	
3. Wi-Fi-Connected Smart Thermostat In addition to doing everything a programmable thermostat does, these thermostats connect to the internet and allow the user to adjust the temperature through smartphones or tablets.	
4. Remote style Thermostat A portable version of the programmable thermostat that can be used like a remote control. Many models have just the basic temperature settings and are often in homes that also have another programmable or smart thermostat with more features and settings.	
5. Dials Typically located on or connected to the actual heating unit instead of mounted on the wall. They operate like a manual thermostat.	
6. Other, please specify: [OPEN END]	
97. Not applicable, individual tenant units do not have a thermostat to control heating or cooling equipment settings [EXCLUSIVE]	
98. Don't know [EXCLUSIVE]	

[ASK IF Q9 = <> 3 OR 97]

Q10. Before today, had you heard of a smart thermostat?

A smart thermostat, also called a Wi-Fi or connected thermostat, connects to the Internet and allows you to adjust the temperature remotely, using a smartphone, tablet, or computer. It can be programmed to adjust the temperature over the course of the day and week, and many models can "learn" your habits over time and adjust accordingly.

[SINGLE RESPONSE]

1. Yes
2. No

Q11. Are individual units stocked with a refrigerator or must tenants provide their own?

1. Individual units come stocked with a refrigerator
2. Tenants must provide their own refrigerator

Generate Variables

Minor Investment

GENERATE APPLIANCE_FL = 1 IF Q9 = 1, 2, 3, OR 4 (Has in-unit thermostat)

GENERATE APPLIANCE _FL = 2 IF Q11 = 1 (Has in-unit fridge owned by building owner/manager)

ELSE APPLIANCE _FL = 0 → THANK AND TERMINATE: Thank you for your time and feedback but we are needing to hear from multifamily buildings with other types of in-unit energy equipment.

Major Investment

GENERATE EQUIPMENT_FL = 1 IF Q6 = 1 OR 2 (Has storage water heater)

GENERATE EQUIPMENT_FL = 2 (Attic/wall insulation)

Fuel Substitution

GENERATE FUEL_SUB = 1 IF EQUIPMENT_FL = 1 AND Q7 = 2 OR 3 (Has gas storage water heater)

ELSE FUEL_SUB = 0

Program Awareness [ASK ALL]

Q12. Are you aware that your electric [IF Q7 = 2: and natural gas] company offers rebates and incentives for customers and businesses to save energy?

[SINGLE RESPONSE]

1. Yes

2. No

Q13. Have you ever received a rebate or incentive for energy efficient equipment at <APARTMENT>?

[SINGLE RESPONSE]

1. Yes
2. No
98. Don't know

Motivations & Barriers [ASK ALL]

Q14. To what extent do you agree or disagree with the following statements?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	5 – Strongly agree	4 – Somewhat agree	3 - Neither	2 – Somewhat disagree	1– Strongly disagree
A. It is important for our tenants and peers to see our company as environmentally conscious.	○	○	○	○	○
B. If it means my company can save energy costs in the long term, we will pay more upfront for energy efficient equipment or devices.	○	○	○	○	○
C. My company considers the environmental impacts of energy-related equipment or devices we purchase.	○	○	○	○	○
D. My company purchases energy efficient equipment only if it meets our financial criteria, such as payback or ROI.	○	○	○	○	○
E. It takes a lot of effort for my company to be energy efficient.	○	○	○	○	○
F. My company likes to be one of the first among its peers and competitors to purchase the latest high-tech products and equipment.	○	○	○	○	○
G. California businesses should do what they can to reduce their energy consumption.	○	○	○	○	○

Q15. Next, we have some questions about how your company makes financial decisions about investments in energy-related equipment like a water heater, heating and cooling equipment, insulation, and appliances at <APARTMENT>.

What minimum dollar amount does your organization use to determine whether an investment is a **major** investment (versus a minor one)? Your best estimate is fine.

Major investments are ones that require a more rigorous approval process, like a study of the costs and benefits, or are separated from minor investments by a minimum dollar amount.

1. $[NUMERIC OPEN END 0-999997] or more is typically a major investment for my organization

999998. Don't know

Q16. When deciding whether to approve a **major** energy-related investment, which of the following financial factors are considered by your company? *Please select all that apply.*

[MULTIPLE RESPONSE; RANDOMIZE 1-4]

1. Upfront cost (including equipment, delivery & installation)
2. Operating & maintenance cost (including energy cost to operate)
3. Payback period
4. Return on investment (ROI)
5. Depreciation
0. Other financial factors, please specify: [OPEN-ENDED RESPONSE]
98. Don't know [MAKE EXCLUSIVE]

[ASK IF Q16=3]

Q17. What is the typical **payback period** that your company uses to approve a major energy-related investment?

The typical payback period for a major investment at my company is less than…

1. [OPEN-END NUMERIC, 0.25 – 100] years

997. My organization doesn't have a payback period threshold for major investments
998. Don't know

Q18. Now, please think about **minor** energy-related investments. When deciding whether to approve a **minor** energy-related investment, which of the following are considered by your company? *Please select all that apply.*

[MULTIPLE RESPONSE UP TO 4] [ROTATE options 1-4]

1. Upfront cost (including equipment, delivery & installation)
2. Operating & maintenance cost (including energy cost to operate)
3. Payback period
4. Return on investment (ROI)
0. Other financial factors, please specify: [OPEN-ENDED RESPONSE]
98. Don't know [MAKE EXCLUSIVE]

[ASK IF Q18=3]

Q19. What is the typical **payback period** threshold your company uses to approve a minor energy-related investment? *If it is less than 1 year, please enter 0.5.*

The typical payback period for a minor investment at my organization is less than…

1. [OPEN-END NUMERIC, 0.5 – 100] years

997. My organization doesn't have a payback period threshold for minor investments
998. Don't know

High Touch Appliances (Minor Investment)

[*LEAST FILL* RESPONDENTS INTO ONE OF TWO GROUPS BASED ON THE FOLLOWING RULES AND SOFT QUOTAS]

Unit Thermostat	APPLIANCE = "thermostat"	APPLIANCE_FL = 1	50
Unit Refrigerator	APPLIANCE = "refrigerator"	APPLIANCE_FL = 2	50

Appliance Purchasing Decisions

Q20. For the next few questions, please think about needing to replace a broken [APPLIANCE] in a typical market rate unit at <APARTMENT>.

How important would each of the following factors be if you needed to purchase a new [APPLIANCE]?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 -Not at all important	2 - Slightly important	3 - Moderately important	4 - Very important	5 – Extremely important
A. Look and feel	○	○	○	○	○
B. Ease of use	○	○	○	○	○
C. Advanced features or settings like Internet connectivity, remote control from a tablet or smartphone, etc.	○	○	○	○	○
D. [DISPLAY IF APPLIANCE = 2] Noise level	○	○	○	○	○
E. [DISPLAY IF APPLIANCE = 1] Size of the thermostat	○	○	○	○	○
F. [DISPLAY IF APPLIANCE = 2] Capacity and/or size of the refrigerator	○	○	○	○	○
G. Ease of installation	○	○	○	○	○
H. Available information about different models	○	○	○	○	○
I. Amount of time required between making the purchase and installing it in	○	○	○	○	○

the unit					
J. The amount or cost of energy it [IF APPLIANCE = 2, INSERT: “uses”; IF APPLIANCE = 1, INSERT: “saves”]	○	○	○	○	○

Q21. What about the cost-related factors you would consider when selecting the energy efficiency level of the new [APPLIANCE]?

[IF APPLIANCE=1] *The upfront cost of a standard efficiency programmable thermostat that does not connect to Wi-Fi is about $40 and the cost of a high efficiency smart thermostat that can connect to Wi-Fi is about $175. A high efficiency smart thermostat can save about $70 a year in energy costs for heating a space about the size of an average three-bedroom apartment.*

[IF APPLIANCE=2] *The upfront cost of a typical standard efficiency refrigerator is about $950 and the cost of a comparable high efficiency refrigerator is about $1,100. The energy efficient refrigerator can save about $60 a year in energy costs.*

Given this information, how much would each factor below be a barrier for you to purchase a **high efficiency** [IF APPLIANCE=1, INSERT “**smart**”] [APPLIANCE] to replace a broken [APPLIANCE] in a market rate unit ?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 - Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. The higher price of the high efficiency model	○	○	○	○	○
B. Limited or no access to financing options like a credit card, store credit account, or loan to purchase the new [APPLIANCE]	○	○	○	○	○
C. Uncertainty about whether it will save as much energy as estimated	○	○	○	○	○
D. The potential disruption caused to install the new [APPLIANCE]	○	○	○	○	○

Q22. **Thinking back to January 2020, before COVID-19**, how much of a barrier would the following cost-related factors have been for you to purchase a high efficiency [IF APPLIANCE=1, INSERT “smart”] [APPLIANCE] to replace a broken one for a market rate unit?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 - Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. The higher price of the high efficiency model	○	○	○	○	○

B. Limited or no access to financing options like a credit card, store credit account, or loan to purchase the new [APPLIANCE]	○	○	○	○	○

Appliance Adoption Scenarios

Q23. If you had to replace a broken [APPLIANCE] for a market rate unit, how likely would you be to purchase a **high efficiency** model as a replacement?

[IF APPLIANCE=1] *The upfront cost of a standard efficiency programmable thermostat is about $40 and the cost of a high efficiency smart thermostat is about $175, a difference of $135. A high efficiency smart thermostat can save about $70 a year in energy costs for heating a space about the size of an average three-bedroom apartment, for an average payback period of about 2 years.*

[IF APPLIANCE=2] *The upfront cost of a typical standard efficiency refrigerator is about $950 and the cost of a comparable high efficiency refrigerator is about $1,100, a difference of $150. The energy efficient refrigerator can save about $60 a year in energy costs, for an average payback period of about 2.5 years.*

The payback period is the amount of time it would take for the annual energy savings to cover the additional cost of the high efficiency [APPLIANCE].

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

[ASK IF Q26<5; ELSE SKIP TO Q37]

Q24. What if a rebate was available to cover the additional cost to replace a broken [APPLIANCE] with a high efficiency model? The rebate would be a one-time payment provided shortly after purchasing the [APPLIANCE].

How likely would you be to replace the [APPLIANCE] with a high efficiency model if you received a…?

SINGLE RESPONSE	1 – Not at all likely	2 – Slightly likely	3 - Somewhat likely	4 – Very likely	5 – Extremely likely
A. [DISPLAY IF APPLIANCE = 1] $65 rebate for HALF the additional cost of an energy efficient smart thermostat, which would lower the average payback period to about 1 year	○	○	○	○	○
B. [DISPLAY IF APPLIANCE = 1 AND Q24A < 5] $135 rebate for ALL the	○	○	○	○	○

additional cost of a high efficiency smart thermostat, which would lower the average payback period to as low as 0 years					
C. [DISPLAY IF APPLIANCE = 2] $75 rebate for HALF the additional cost of a high efficiency model, which would lower the average payback period to about 1.25 years	○	○	○	○	○
D. [DISPLAY IF APPLIANCE = 2 AND Q24C < 5] $150 rebate for ALL the additional cost of a high efficiency model, which would lower the average payback period to as low as 0 years	○	○	○	○	○

Low Touch Equipment (Major Investment)

[*LEAST FILL* RESPONDENTS INTO ONE OF TWO GROUPS BASED ON THE FOLLOWING RULES AND QUOTAS]

Equipment Group	Generate Variable	Eligibility	Quota
Unit Water Heater	EQUIPMENT = "water heater"	EQUIPMENT_FL = 1	50
Unit Insulation	EQUIPMENT = "insulation"	EQUIPMENT_FL = 2	50

Low Touch Equipment Purchase Decisions

Q25. For these next few questions, please think about needing to [IF EQUIPMENT= 1, INSERT: "purchase a new water heater to replace a broken one for"; IF EQUIPMENT = 2, INSERT: "add or upgrade insulation in the walls or ceiling in"] a typical market rate unit(s) in the building at <APARTMENT>.

How important would each of the following factors be in your decision to [INSERT IF EQUIPMENT=1: "purchase a new water heater"; INSERT IF EQUIPMENT= 2: "add or upgrade insulation in the ceiling or walls"]?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 -Not at all important	2 - Slightly Important	3 - Moderately important	4 - Very important	5 – Extremely important
A. [DISPLAY IF EQUIPMENT=1] Look and feel	○	○	○	○	○
B. [DISPLAY IF EQUIPMENT = 1] Ease of use	○	○	○	○	○
C. [DISPLAY IF EQUIPMENT = 1]	○	○	○	○	○

Advanced features or settings like Internet connectivity, remote control from a tablet or smartphone, etc.					
D. [DISPLAY IF EQUIPMENT = 1] Noise level	○	○	○	○	○
E. Potential comfort benefits [INSERT IF EQUIPMENT = 2: "like less drafts and noise from outside"]	○	○	○	○	○
F. Available information about different models or types	○	○	○	○	○
G. Amount of time required between making the purchase and installing it in the unit	○	○	○	○	○
H. The amount or cost of energy it [INSERT IF EQUIPMENT=1: "uses"; INSERT IF EQUIPMENT =2: "can save"]	○	○	○	○	○
I. [DISPLAY IF EQUIPMENT = 1] Average life span or rate of depreciation	○	○	○	○	○

Q26. What about the cost-related factors you would consider when deciding [IF EQUIPMENT = 1, INSERT: "the energy efficiency level of the new water heater"; IF EQUIPMENT = 2, INSERT: "whether to purchase the new insulation"]? Please consider the following scenario:

[IF EQUIPMENT=1] *The upfront cost to purchase and install a* [IF Q6=2, INSERT: "*commercial-scale*"] *standard efficiency storage water heater of average size is about* [IF Q6=1, INSERT: "*$1,500";* IF Q6=2, INSERT: "*$3,100*"] *and the cost of a comparable high efficiency water heater is about* [IF Q6=1, INSERT: "*$2,100";* IF Q6=2, INSERT: "*$4,000*"]*. The high efficiency model could save up to* [IF Q6=1, INSERT: "*$150";* IF Q6=2, INSERT: "*$300*"] *per year in energy costs.*

[IF EQUIPMENT=2] *The upfront cost to purchase and install high efficiency insulation is about $1.60 per square foot, such that insulating the outside walls of a 1,000 square foot apartment would cost about $1,800. The insulation could save up to $0.13 per square foot of insulated wall area in annual energy costs.*

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. [DISPLAY IF EQUIPMENT = 1] The higher price of the high efficiency water	○	○	○	○	○

heater over the standard efficiency model					
B. [DISPLAY IF EQUIPMENT = 2] The price of the insulation	○	○	○	○	○
C. Limited or no access to financing options like a credit card, store credit account, or loan	○	○	○	○	○
D. Uncertainty about whether it will save as much energy as estimated	○	○	○	○	○
E. The possible disruption that installing it in the unit or building could cause	○	○	○	○	○

Q27. **Thinking back to January 2020, before COVID-19**, how much of a barrier would the following cost-related factors have been for you to purchase the high efficiency [EQUIPMENT] for a market rate unit(s)?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. [DISPLAY IF EQUIPMENT = 1] The higher price of the energy efficient water heater	○	○	○	○	○
B. [DISPLAY IF EQUIPMENT = 2] The price of the insulation	○	○	○	○	○
C. Limited or no access to financing options like a credit card, store credit account, or loan	○	○	○	○	○

Low Touch Equipment Adoption Scenarios

Q28. If you needed to [IF EQUIPMENT = 1, INSERT: "purchase a new water heater to replace a broken one for"; IF EQUIPMENT = 2, INSERT: "add or upgrade insulation in the walls or ceiling in"] a typical market rate unit(s), how likely would you be to purchase [IF EQUIPMENT = 1, INSERT: "the high efficiency model"; IF EQUIPMENT = 2, INSERT: "it"], given the following information?

[IF EQUIPMENT = 1] *The upfront cost to purchase and install a* [IF Q6=2, INSERT: "*commercial-scale*"] *standard efficiency storage water heater of average size is about* [IF Q6=1, INSERT: "*$1,500";* IF Q6=2, INSERT: "*$3,100*"] *and the cost of a comparable high efficiency water heater is about* [IF Q6=1, INSERT: "*$2,100";* IF Q6=2, INSERT: "*$4,000*"], *a difference of* [IF Q6=1, INSERT: "*$600";* IF Q6=2, INSERT: "*$900*"]. *The high efficiency model could save up to* [IF Q6=1, INSERT: "*$150";* IF Q6=2, INSERT:

"*$300*"] *per year in energy costs and the payback period could be as low as* [IF Q6=1, INSERT: "*4";* IF Q6=2, INSERT: "*3*"] *years.*

[IF EQUIPMENT = 2] *The upfront cost to purchase and install high efficiency insulation is $1.60 per square foot and can save about $0.13 per square foot of insulated wall area in annual energy costs compared to having no insulation. For example, insulating the outside walls of an apartment that is 1,000 square feet in size would cost about $1,800 and would result in the annual energy savings of up to $150 and a payback period as low as 12 years.*

*The payback period is the amount of time it would take for the annual energy savings to cover the [*IF EQUIPMENT = 1, INSERT: *"additional"] cost of the [*IF EQUIPMENT = 2, INSERT: *"high efficiency"] [EQUIPMENT].*

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

[ASK IF Q28 < 5; ELSE SKIP TO Q30]

Q29. What if a rebate was available to offset the cost and reduce the payback period? The rebate would be a one-time payment provided shortly after making the purchase.

How likely would you be [IF EQUIPMENT = 1, INSERT: "to purchase the high efficiency water heater to replace a broken one for"; IF EQUIPMENT = 2, INSERT: "to add or upgrade insulation in the walls in"] a unit in the building if there was a…?

SINGLE RESPONSE]	1 – Not at all likely	2 – Slightly likely	3 - Somewhat likely	4 – Very likely	5 – Extremely likely
A. [DISPLAY IF EQUIPMENT=1] [IF Q6=1, INSERT: "$300*";* IF Q6=2, INSERT: "$600"] rebate for HALF the additional cost of the high efficiency water heater, which could lower the payback period to as low as [IF Q6=1, INSERT: "2*";* IF Q6=2, INSERT: "1.5"] years.	○	○	○	○	○
B. [DISPLAY IF Q29A<5] [IF Q6=1, INSERT: "$600*";* IF Q6=2, INSERT: "$1,200"] rebate for ALL the additional cost of the high efficiency water heater, which could lower the payback period to as low as 0 years.	○	○	○	○	○
C. [DISPLAY IF EQUIPMENT=2] Rebate for a QUARTER of the square footage cost of the high efficiency	○	○	○	○	○

insulation, or $0.40 per square foot, which could lower the cost to $1.20 per square foot and the payback period to as low as 9 years. In the example of a 1,000 square foot apartment, the insulation cost for the outside walls would be around $1,350 after the rebate.					
D. [DISPLAY IF Q29C<5] Rebate for HALF of the square footage cost of the insulation, or $0.80 per square foot, which could lower the cost to $0.80 per square foot and the payback period to as low as 6 years. In the example of a 1,000 square foot apartment, the insulation cost for the outside walls would be around $800 after the rebate.	○	○	○	○	○

Fuel Substitution Water Heater Scenarios [ASK IF FUEL_SUB = 1, ELSE SKIP TO Q34]

Q30. We have one last set of questions about replacing or upgrading equipment for market rate units in the building at <APARTMENT>. Let's say a unit's gas water heater breaks and you have the opportunity to replace it by switching to an electric energy efficient model.

*The upfront cost to purchase and install a [IF Q6=2, INSERT: "commercial-scale"] standard efficiency **gas** storage water heater of average size is about* [IF Q6=1, INSERT: "*$1,500";* IF *Q6*=2, INSERT: "*$3,100*"]*. And, the cost of a comparable energy efficient **electric** heat pump water heater is about* [IF *Q6*=1, INSERT: "*$3,000";* IF *Q6*=2, INSERT: "*$6,700*"]*. The energy efficient electric model can save up to* [IF *Q6*=1, INSERT: "*$150";* IF *Q6*=2, INSERT: "*$300*"] *per year in energy costs.*

How much would each of the following factors motivate you to purchase an electric heat pump water heater over a standard efficiency gas storage water heater?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not at all motivating	2 – Slightly motivating	3- Moderately motivating	4 – Very motivating	5 – Extremely motivating
A. Reduced environmental impacts like air and water pollution	○	○	○	○	○
B. Faster water heating	○	○	○	○	○
C. Improved efficiency and lower energy usage	○	○	○	○	○
D. Longer lasting equipment	○	○	○	○	○

E. Lower utility bills	○	○	○	○	○

Q31. How much would each factor below be a barrier for you to switch from a gas storage water heater to an energy efficient electric heat pump water heater?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. Uncertainty about the estimated energy savings of an electric heat pump water heater	○	○	○	○	○
B. The need for potential structural, electrical, and/or plumbing changes to install the new heat pump water heater in the building	○	○	○	○	○
C. Limited or no access to financing options like credit card, store credit account, or loan	○	○	○	○	○
D. Lack of experience or familiarity with an electric heat pump water heater	○	○	○	○	○
E. The slightly larger size of the heat pump water heater	○	○	○	○	○
F. The higher upfront cost of an electric heat pump water heater	○	○	○	○	○

Q32. If your company needed to replace the gas storage water heater for a unit in the building, how likely would it be to switch to an energy efficient electric heat pump water heater?

The upfront cost to purchase and install a [IF Q6=2, INSERT: "commercial-scale"] standard efficiency ***gas*** *storage water heater of average size is about* [IF *Q6*=1, INSERT: "*$1,500";* IF *Q6*=2, INSERT: "*$3,100*"] *and the cost of a comparable energy efficient* ***electric*** *heat pump water heater is about* [IF *Q6*=1, INSERT: "*$3,000";* IF *Q6*=2, INSERT: "*$6,700*"], *a difference of* [IF *Q6*=1, INSERT: "*$1,500";* IF *Q6*=2, INSERT: "*$3,600*"]*. The energy efficient electric model can save up to* [IF *Q6*=1, INSERT: "*$150";* IF *Q6*=2, INSERT: "*$300*"] *per year and the payback period would be as low as* [IF *Q6*=1, INSERT: "*10";* IF *Q6*=2, INSERT: "*12*"] *years.*

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely

5. Extremely likely

[ASK IF Q46<5]

Q33. What if a rebate was available to cover the additional cost? The rebate would come in the form of a one-time payment after you purchase the electric heat pump water heater.

How likely would you be to switch to the energy efficient electric heat pump water heater if there was a rebate of…? [SINGLE RESPONSE]

	1 – Not at all likely	2 – Slightly likely	3 - Somewhat likely	4 – Very likely	5 – Extremely likely
A. [IF *Q6*=1, INSERT: "$750"; IF *Q6*=2, INSERT: "$1,800"] for HALF the additional cost over the standard gas model, which could lower the payback period to [IF *Q6*=1, INSERT: "5"; IF *Q6*=2, INSERT: "6"] years	○	○	○	○	○
B. [ASKF IF Q47A < 5] [IF *Q6*=1, INSERT: "$1,500"; IF *Q6*=2, INSERT: "$3,600"] for ALL the additional cost over the standard gas model, which could lower the payback period to 0 years	○	○	○	○	○

COVID-19 Impacts [ASK ALL]

Thanks for your feedback so far. We have just a few questions left related to COVID-19 before the end of the survey.

Q34. Overall, how much has the COVID-19 pandemic impacted your business in regard to the property at <APARTMENT> since the start of the pandemic in early March 2020?

1. It has had a *large negative* impact
2. It has had a *moderate negative* impact
3. It has had *little or no* impact
4. It has had *a moderate positive* impact
5. It has had a *large positive* impact
98. Don't know

Q35. How has the following aspects of your business's operations at the property been impacted by the COVID-19 pandemic or associated containment measures since March 2020? [1 = Decreased; 2 = No change; 3 = Increased; 97 = Not applicable] [RANDOMIZE ORDER]

1. Revenue or profits
2. Availability of needed materials, products, or equipment
3. Number of employees or staff
4. Number of tenants or rented units

5. Capital spending or investments
6. Upfront cost and/or payback period thresholds used to make investment decisions

Q36. Has your company fast-tracked, postponed, or cancelled any planned investment projects for the property due to COVID-19? *Please select all that apply.*

1. Fast-tracked or sped up planned project(s)
2. Postponed planned project(s)
3. Cancelled planned project(s)
97. Not applicable, the property did not have any planned projects
98. Don't know

[ASK IF Q36 = 2]

Q37. On average, how many weeks have your planned projects been postponed? *Your best estimate is fine, and please enter a 1 if your answer is 'one week' or 'less than one week.'*

1. [NUMERIC OPEN-END, 1 – 996]
998. Don't know

Q38. Suppose you needed to replace or upgrade an appliance or equipment at <APARTMENT> within the next few months. How comfortable or uncomfortable would you be having a contractor or technician come into the unit(s) in the building to install it, assuming they followed the latest safety guidelines for your area?

1. Very comfortable
2. Somewhat comfortable
3. Somewhat uncomfortable
4. Very uncomfortable
98. Don't know, I would not be involved in such a decision

Closing [ASK ALL]

Q39. As a thank you for your participation in this study, we are offering a $25 electronic gift card. Please provide your name and email address below. The gift card will be from Tango, which allows you to select from dozens of retailers and restaurants like Amazon, Starbucks, Walmart, and many more.

1. Name: [OPEN END]
2. Email: [OPEN END]
3. I do not have an email address to receive the gift card

Q40. [ASK IF Q56=3] What is your mailing address so we can send you a $25 gift card in the mail? [DO NOT FORCE RESPONSE]

1. Street Address: [OPEN END TEXT; ALLOW 750 CHARACTERS]
2. City: [OPEN END TEXT]
3. State: [OPEN END TEXT]
4. Zip code: [OPEN END NUMBER; REQUIRE 5 DIGITS]
5. Phone number (in case we have any questions about your address): [OPEN END NUMBER; REQUIRE 10 DIGITS]
6. I do not want the $25 gift card [EXCLUSIVE]

[SHOW IF Q57 <> 6] You will receive your gift card within the next 4-6 weeks.

Please click the SUBMIT button to submit your responses.

Submit

REDIRECT TO: https://www.cpuc.ca.gov/energyefficiency/

B.3 Commercial Customer Survey

B.3.1 Outreach

Invitation Letter and Email

STATE OF CALIFORNIA

PUBLIC UTILITIES COMMISSION

<NAME>
<SEND-TO ADDRESS>

Dear <NAME>,

We need your help! The California Public Utilities Commission (CPUC) invites you to participate in its 2020 Business Energy Survey. The company, business, or organization for <NAME> at the <READ-IN ADDRESS> location has been selected to participate in this important research. **In these challenging times, your feedback is particularly appreciated.**

The questions in this survey are related to the energy-using equipment and decision-making around making replacements and upgrades at this property. The CPUC will use the results to help California meet its energy needs and help shape future programs so it is very important that we hear from businesses like yours.

To show our appreciation for completing the survey, you will receive a **$25 gift card** that you can use with popular retailers such as Target, Amazon, Lowe's, or Walmart. Please be assured that the information you provide will remain confidential.

Please complete the survey by **September 4th** by typing the link below into the address field of your web browser and then entering your access code.

Survey Link: www.businessCAsurvey.com

Access Code: <ACCESS_CODE>

The CPUC has partnered with Opinion Dynamics, an independent research firm, to administer the survey. If you have any questions or technical difficulties with the survey, you may contact Taylor Williams at Opinion Dynamics at (888) 308-3845 or taylor.williams@opiniondynamics.com.

Thank you in advance for taking the time to complete this important survey!

Sincerely,

Peter Franzese
Regulatory Analyst
California Public Utilities Commission

Reminder Postcard and Email

We need your help!
It is not too late to complete this important research study!

Dear <NAME>,

You should have recently received an invitation asking for your help with the California Public Utilities Commission (CPUC) 2020 Business Energy Survey. Please take this opportunity to complete our survey about the energy use and energy efficiency decision-making at the company or organization for <NAME> at the <READ-IN ADDRESS> CA location. The CPUC will use the results to help California meet its future energy needs, and we really need to hear from businesses like yours. As a thank you for completing this survey, you will receive a **$25 gift card**. The deadline to complete the survey is **August 28th**.

If you already completed the survey, thanks and disregard this reminder!

To complete the survey, please visit **www.businessCAsurvey.com**
Enter the following access code to access the survey: **<ACCESS_CODE>**

Any information you provide will remain confidential. If you have any questions about this survey, please contact Taylor Williams at Taylor.Williams@opiniondynamics.com.

Thank you in advance for your support.

Peter Franzese
Regulatory Analyst, California Public Utilities Commission

B.3.2 Instrument

Landing Page

Welcome to the CPUC Commercial Energy Survey!

Thank you for helping us with this important research study. We understand that you may be experiencing hardships due to the situation surrounding COVID-19. The California Public Utilities Commission (CPUC) is here to support you during this difficult time. For information about consumer protections the CPUC has put in place as a result of COVID 19, please see: https://www.cpuc.ca.gov/covid19protections/.

Opinion Dynamics, an independent research firm, is administering this survey. If you have any questions or technical difficulties with the survey, you may contact Taylor Williams at Opinion Dynamics at taylor.williams@opiniondynamics.com. Your responses to this survey will be kept strictly confidential.

We are offering a $25 electronic gift card to those who are eligible and complete the survey. The gift card can be used at a wide variety of stores including Walmart, Home Depot, Amazon, and many more.

To start the survey, please enter in the space below your 6-digit Survey Access Code that is provided in the survey invitation we sent you.

Introduction

In this survey we will ask you about energy-using equipment and the decision-making that goes into replacing or upgrading equipment at the property [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: “in <CITY>”, ELSE INSERT: “at <ADDRESS> in <CITY>”], CA for <NAME>. Your feedback will help the CPUC and energy utilities in California make key planning decisions for the future, which is particularly important during the current COVID-19 situation.

Q1A. Are you the best person at your company or organization answer questions about making decisions to replace or upgrade energy-using equipment like a water heater, thermostat, or heating system at the property [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: “in <CITY>”, ELSE INSERT: “at <ADDRESS> in <CITY>”], CA for <NAME>?

[SINGLE RESPONSE]

1. Yes
2. No

[ASK IF Q1A = 2] Q1B. Can you provide the survey website and access code we sent you to the person who is responsible for making decisions about energy-using equipment at the property [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: “in <CITY>”, ELSE INSERT: “at <ADDRESS> in <CITY>”], CA for <NAME>?

[SINGLE RESPONSE]

1. Yes
2. No

[ASK IF Q1B = 1] Q1C. Thanks so much. Just simply close your browser and send them the survey website and the access code. When they access the survey, they will start on this screen and can proceed through the rest of the survey.

[ASK IF Q1B = 2] Q1D. Can you provide us with the contact information for the person responsible for making decisions about energy-using equipment at the property [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: “in <CITY>”, ELSE INSERT: “at <ADDRESS> in <CITY>”], CA so that we can send them the survey invitation?

[MULTIPLE RESPONSE]

1. Name: [OPEN END TEXT]
2. Email: [OPEN END TEXT EMAIL]
3. Street Address: [OPEN END TEXT]
4. City: [OPEN END TEXT]
5. State: [OPEN END TEXT]
6. Zip code: [OPEN END TEXT]
7. No, I do not have or cannot provide their contact info [EXCLUSIVE]

[THANK AND TERMINATE, TERMINATE TEXT: “Thank you for your time. Unfortunately, you do not qualify for the survey, we need to hear from the person responsible for making decisions about energy-using equipment at the property.”]

Occupancy Verification and Eligibility

These first questions are about the company, business, or organization for <NAME> located [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: “in <CITY>”, ELSE INSERT: “at <ADDRESS> in <CITY>”] to ensure we are hearing from those of all types and sizes in California.

[DISPLAY IF IOU = PG&E AND SIZE = Small-Medium: “If the company or organization has more than one location in <CITY>, please consider a location that uses the most energy and/or has the most energy using equipment when answering the questions.”] If there is more than one building for <NAME> on the property, please consider the building that uses the most energy and/or has the most energy-using equipment.

[ASK ALL]

Q1. Is the company or organization located [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: “in <CITY>”, ELSE INSERT: “at <ADDRESS> in <CITY>”] currently open or is it temporarily or permanently closed?

[SINGLE RESPONSE]

1. Open
2. Temporarily closed with a possibility to reopen after COVID-19 restrictions are lifted
3. Permanently closed with no possibility to reopen, even after COVID-19 restrictions are lifted [THANK AND TERMINATE]

98. Don't know

[TERMINATION TEXT: We are very sorry but, for this study, we need to hear from businesses and organizations that are not permanently closed. We truly appreciate the time you took to help us.]

[ASK ALL]

Q2. Does the company or organization for <NAME> occupy all, part, or none of the building(s) on the property [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: “in <CITY>”, ELSE INSERT: “at <ADDRESS> in <CITY>”]?

If you own or manage the building but do not occupy it – like vacation rentals, housing, or office space – answer “None” here.

[SINGLE RESPONSE]

1. All
2. Part
3. None

[ASK IF Q2 = 1 OR 2]

Q3. Does the <NAME> company or organization own or rent the [IF Q2 = 1, INSERT: building(s); IF Q2=2, INSERT: space it occupies in the building(s)]?

[SINGLE RESPONSE]

1. Own or partially own
2. Rent or lease

[ASK IF Q3 = 2]
Q3A. Does the <NAME> company or organization pay its energy bills directly to the utility or are energy costs included in rent or other fees paid to a property owner or manager?
[SINGLE RESPONSE]

1. Pays energy bills to utility(ies)
2. Pays energy costs through rent or fees to property owner or manager

[ASK IF Q2 = 1 OR 2]
Q4. Is your company or organization fully, partly, or not responsible for making decisions about the following types of energy-related equipment in the facility?

Please select 'Not Applicable' if the facility does not have the type of equipment.
[1=Fully responsible; 2=Partly responsible; 3=Not responsible; 97=Not applicable]

[SINGLE RESPONSE]

1. Lighting controls like light switches, dimmers, and sensors
2. Thermostat(s) or other heating/cooling controls
3. Water heating equipment
4. Power strips for plugging in multiple items
5. Commercial refrigeration display case(s) or storage unit(s) like those with glass doors typically found in grocery and convenient stores, restaurants, food service kitchens, and others that sell or store cooled or chilled products
6. Building envelope such as windows or insulation in the walls or ceiling
7. Desktop or laptop computers
8. Energy management system to automate settings for and remotely monitor and control energy-using devices and equipment like heating and cooling, lighting, and others

[IF (Q4_1, Q4_2, Q4_4, OR Q4_7 = 1 OR 2) AND (Q4_3, Q4_6, OR Q4_8 = 1 OR 2 OR 97, OR Q4_5 = 1 OR 2) ELSE THANK AND TERMINATE: For this study, we need to hear from someone who is responsible for making decisions about the energy-related equipment in the facility. We really appreciate you taking the time to help us.]

[ASK IF Q2 = 3]
Q5. Does your company own and/or manage the building(s) [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: "in <CITY>", ELSE INSERT: "at <ADDRESS> in <CITY>"]?

[SINGLE RESPONSE]

1. Own and manage
2. Own but do not manage
3. Manage but do not own
4. Neither own nor manage [THANK & TERMINATE]
98. Don't know [THANK & TERMINATE]

[TERMINATION TEXT: We're sorry, your company is not eligible for this study. We need to hear from the business or organization that occupies, owns, or manages the facility. We appreciate the time you took to help us.]

[ASK IF Q2=3]
Q5A. Does your company pay the energy bills for the property [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: "in <CITY>", ELSE INSERT: "at <ADDRESS> in <CITY>"] or is the company or organization at the property responsible for paying its own energy bills?
[SINGLE RESPONSE]

1. My company pays the energy bills for the property
2. The company at the property pays its own energy bills

[ASK IF Q5 = 1, 2, OR 3]

Q6. Is your company fully, partly, or not responsible for making decisions about the following types of energy-related equipment in the facility [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: "in <CITY>", ELSE INSERT: "at <ADDRESS> in <CITY>"]?

Please select 'Not Applicable' if the facility does not have the type of equipment.
[1=Fully responsible; 2=Partly responsible; 3=Not responsible; 97=Not applicable]

[SINGLE RESPONSE]

1. Lighting controls like light switches, dimmers, and sensors
2. Thermostats or other heating/cooling controls
3. Water heating equipment
4. Power strips for plugging in multiple items
5. Commercial refrigeration display case(s) or storage unit(s) like those with glass doors typically found in grocery and convenient stores, restaurants, food service kitchens, and others that sell or store cooled or chilled products
6. The building envelope such as windows or insulation in the walls or ceiling
7. Desktop or laptop computers
8. Energy management system to automate settings for and remotely monitor and control energy-using devices and equipment like heating and cooling, lighting, and others

[IF (Q6_1, Q6_2, Q6_4, OR Q6_7 = 1 OR 2) AND (Q6_3, Q6_6, OR Q6_8 = 1 OR 2 OR 97, OR Q6_5 = 1 OR 2) ELSE THANK AND TERMINATE ; For this study, we need to hear from someone who is responsible for making decisions about the energy-related equipment in the facility. We really appreciate you taking the time to help us.]

[ASK ALL]

Q7. Which of the following best describes your job function?

[SINGLE RESPONSE]

1. Business or property owner
2. Property or facilities manager
3. Executive or administrator
4. Operations, maintenance, or engineering manager
5. Energy manager
6. Office manager

0. Other, please specify: [OPEN-ENDED RESPONSE]

Business Characteristics

[ASK ALL]

Q8. Which of the following describes how the facility [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: "in <CITY>", ELSE INSERT: "at <ADDRESS> in <CITY>"] is used? *Please select all that apply.*

[MULTIPLE RESPONSE; RANDOMIZE 1 - 14]

1. **Retail** (department, hardware and specialty stores, pharmacies, etc.)
2. **Personal services** (salons, barbers, tattoo parlors, dry cleaners, pet groomers, etc.)
3. **Health services** (medical offices, dental offices, hospitals, medical laboratories, etc.)
4. **Offices** or **professional services** (real estate, auto, landscaping, tax, banking, legal services, etc. in the private sector)
5. **Government** or **public administration** (offices and departments in the public sector) [THANK AND TERMINATE]
6. **Restaurant** or **food service** (do not include industrial-scale food preparation)
7. **Housing** (rental housing, vacation rentals/condos, senior housing, assisted living, multifamily)
8. **Education or childcare** (colleges, trade schools, universities, K-12, childcare facilities, etc.)
9. **Warehousing**, **distribution or wholesale trade**
10. **Grocery, convenience store, or supermarket**
11. **Lodging** (hotel, motel, bed and breakfast)
12. **Recreation**, **entertainment, or arts** (movie theaters, concert venues, bowling alleys, gyms, art galleries, etc.)
13. **Agricultural** [THANK AND TERMINATE]
14. **Manufacturing** or **industrial** [THANK AND TERMINATE]
0. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know [THANK AND TERMINATE]

[TERMINATION TEXT: For this study, we need to hear from other types of organizations, but we truly appreciate the time you took to help us.]

[ASK IF Q8 = 8]

Q9. Is the educational facility a college, university, or trade school?

[SINGLE RESPONSE]

1. Yes
2. No

[ASK IF Q8 = 7]

Q10. Is the facility used for multifamily rental housing like apartments, duplexes, triplexes, and other rental units with longer term leases (like a month, six-month, or year)? *Please do not consider vacation rentals, dormitories, nursing homes, senior housing, and other special needs housing.*

[SINGLE RESPONSE]

1. Yes [THANK AND TERMINATE]
2. No
98. Don't know [THANK AND TERMINATE]

[TERMINATION TEXT: For this study, we need to hear from other types of organizations, but we truly appreciate the time you took to help us.]

[ASK ALL]
Q10A. How many full- and part-time employees work at the location [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: "in <CITY>", ELSE INSERT: "at <ADDRESS> in <CITY>"] currently and at this same time last year in 2019?

Your best estimates are fine, and please include yourself if you are part of the company or organization.

a. Current number of employees: [NUMERIC OPEN-END, 1-99995; 99998 = Don't know]

b. Number of employees at this same time last year in 2019: [NUMERIC OPEN-END, 1-99995; 99998 = Don't know]

[ASK IF Q10A_a AND Q10A_b = 99998]
Q10C. Are there 250 or more employees at the location?

3. Yes
4. No

[ASK ALL]
Q10B. In 2019, what was the annual revenue of the company or organization at the location [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: "in <CITY>", ELSE INSERT: "at <ADDRESS> in <CITY>"]? *Your best estimate is fine.*

5. Less than $250,000
6. $250,000 to less than $500,000
7. $500,000 to less than $1 million
8. $1 million to less than $5 million
9. $5 million to less than $10 million
10. $10 million to less than $20 million
11. $20 million or more
98. Don't know

[ASK IF Q10B = 98]

Q10D. Was the 2019 annual revenue $10 million or more?

12. Yes
13. No

Energy and Equipment Characteristics

[ASK IF Q4_3 OR Q6_3 = 1 OR 2]

Q11. The next few questions are about the types of energy-using equipment in the facility [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: "in <CITY>", ELSE INSERT: "at <ADDRESS> in <CITY>"].

Does the facility have an electric or gas water heater, or something else?

If the facility has multiple water heaters, please answer for the one that is used most.

[SINGLE RESPONSE]

1. Electric
2. Natural Gas
3. Propane
0. Some other type of fuel, please specify: [OPEN-ENDED RESPONSE]
97. Not applicable – my facility does not have hot water
98. Don't know

[ASK IF Q11 = 1, 2, OR 0]

Q12. What type of water heating equipment does the facility use? *If the facility has multiple water heaters, please answer for the one that is used most.* [SINGLE RESPONSE]

1. Conventional storage tank water heater (up to 80 gallons)
   Typically consists of a storage tank with electric or gas heating elements inside and used by businesses or organizations that do not require a large and/or constant supply hot water for their operations.

2. Commercial-scale conventional tank water heater (80 gallons or more)
   A larger, higher-use version of the conventional storage model above and used by businesses or organizations that need a large and/or constant supply of hot water for their operations.

3. Tankless water heater
   Water is heated as it is used without the need for a storage tank.

4. Heat pump water heater
Uses heat from the air instead of generating its own heat to heat a tank of water.

0. Something else, please specify: [OPEN END]
98. Don't know

[ASK IF Q12 = 1, 2, 0, OR 98]
Q13. Before today, had you heard of an electric heat pump water heater?

A heat pump water heater uses electricity to draw in heat in the air in the surrounding area instead of generating heat directly. Therefore, it can be two to three times more energy efficient than a conventional water heater. To draw in heat from the air, heat pumps work like a refrigerator in reverse.

[SINGLE RESPONSE]

1. Yes
2. No

[ASK IF Q11 = 2]
Q14. Who provides natural gas service to the facility?

[SINGLE RESPONSE]

1. Pacific Gas and Electric Company (PG&E)

2. Southern California Gas (SoCalGas/SCG)
3. San Diego Gas & Electric (SDG&E)
0. Another provider, please specify: [OPEN-ENDED RESPONSE]
97. Not applicable, my facility does have natural gas
98. Don't know

[ASK IF Q4_2 OR Q6_2 = 1 OR 2]

Q15. Which type(s) of thermostat does the facility have to control the heating or cooling system(s)? *Please select all that apply.*

[MULTIPLE RESPONSE]

Thermostat Type	
1. Manual Thermostat Allows the user to set the temperature and adjust it up or down as desired by manually turning a dial or moving a lever; the temperature setting only changes when the user adjusts the thermostat	
2. Programmable Thermostat (Not Wi-Fi-Connected) Uses the built-in calendar and clock to adjust the temperature according to programmed settings by day and time.	
3. Wi-Fi-Connected Smart Thermostat In addition to doing everything a programmable thermostat does, these thermostats connect to the internet and allow the user to adjust the temperature through smartphones or tablets.	
4. Remote style Thermostat A portable version of the programmable thermostat that can be used like a remote control.	
5. Dials Typically located on the actual heating or cooling unit instead of on the wall of the facility. They operate like a manual thermostat.	

97. None, my company does not have any thermostats [EXCLUSIVE]	
98. Don't know [EXCLUSIVE]	

[ASK IF Q15 = 1, 2, 4, 5, OR 98 AND <> 3]

Q16. Before today, had you heard of a smart thermostat?

A smart thermostat, also called a Wi-Fi or connected thermostat, connects to the Internet and allows you to adjust the temperature remotely, using a smartphone, tablet, or computer. It can be programmed to adjust the temperature over the course of the day and week, and many models can "learn" your habits over time and adjust accordingly.

[SINGLE RESPONSE]

1. Yes
2. No

[ASK IF Q4_8 OR Q6_8 = 1 OR 2]

Q17. Is the energy management system (EMS) at the facility connected to Wi-Fi for remote control capabilities?

[SINGLE RESPONSE]

1. Yes
2. No, but it can be connected and controlled remotely
3. No, and it cannot be connected and/or controlled remotely
97. Not applicable, the facility does not have an energy management system

[ASK IF Q4_8 OR Q6_8 = 97 OR Q17 = 97]

Q18. Before today, have you ever heard of an energy management system?

An energy management system, or EMS, monitors and automates the operating conditions, settings, and schedules for energy-using equipment in commercial buildings, like heating, cooling, ventilation, lighting, and other types of equipment. Many EMS's can also track and alert users of equipment performance issues and maintenance needs. Most EMS's connect to Wi-Fi to allow users to remotely monitor and adjust settings from their computer, tablet, or smartphone.

1. Yes
2. No

Generate Variables

Business Size

GENERATE:

LARGE = 1 IF Q10A_a OR Q10A_b > 249 OR Q10C = 1 OR Q10B > 5 OR Q10D = 1

ELSE LARGE = 0

Minor Upgrades

GENERATE:

MINOR_FL = 1 IF Q4_4 OR Q6_4 = 1 OR 2 (Power strip eligible: respondent makes decisions about power strip equipment)

MINOR_FL = 2 IF Q4_7 OR Q6_7 = 1 OR 2 (PC power management eligible: respondent makes decisions about computers and laptops)

MINOR_FL = 3 IF Q4_2 OR Q6_2 = 1 OR 2 (Thermostat eligible: respondent makes decisions about thermostats)

MINOR_FL = 4 IF Q4_1 OR Q6_1 = 1 OR 2 (Lighting control eligible: respondent makes decisions about lighting controls)

ELSE MINOR_FL = 0; THANK AND TERMINATE: Thank you for your time and feedback but we are needing to hear from businesses with other types of equipment.

Major Upgrades

GENERATE:

MAJOR_FL = 1 IF Q4_5 OR Q6_5 = 1 OR 2 (Refrigeration eligible: respondent makes decisions about refrigeration equipment and facility has commercial refrigeration)

MAJOR_FL = 2 IF (Q4_3 OR Q6_3 = 1 OR 2 AND Q12 = 1 OR 2) OR (Q4_3 OR Q6_3 = 97) (Water heater eligible: respondent makes decisions about and facility has or could have a storage WH)

MAJOR_FL = 3 IF Q4_6 OR Q6_6 = 1 OR 2 OR 97 (Insulation eligible: respondent makes decisions about building envelope)

MAJOR_FL = 4 IF (Q4_8 OR Q6_8 = 1 OR 2 AND Q17=1-3) OR (Q4_8 OR Q6_8 = 1 OR 2 AND Q17=97 AND Q18=1) OR (Q4_8 OR Q6_8 = 97 AND (SIZE=LARGE OR LARGE=1) AND Q18 = 1) (EMS eligible: respondent makes decisions about EMS system, is large commercial, or is aware of EMS systems)

ELSE MAJOR_FL = 0; THANK AND TERMINATE: Thank you for your time and feedback but we are needing to hear from businesses with other types of equipment.

Program Awareness [ASK ALL]

Q19. Are you aware that your electric [IF Q11=2: and natural gas] utility offers rebates and incentives for business and commercial customers to save energy?

[SINGLE RESPONSE]

1. Yes
2. No

Q20. Have <NAME> ever received a rebate or incentive for energy efficient equipment at the facility [IF IOU<> PG&E AND SIZE=LARGE, INSERT "at <ADDRESS>"] in <CITY>?

[SINGLE RESPONSE]

1. Yes
2. No
98. Don't know

Motivations & Barriers [ASK ALL]

Q21. To what extent do you agree or disagree with the following statements about your company or organization?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	5 – Strongly agree	4 – Somewhat agree	3 - Neither	2 – Somewhat disagree	1 – Strongly disagree
A. It is important for our customers and peers to see us as environmentally conscious.	○	○	○	○	○
B. If it means we can save energy costs in the long term, we will pay more upfront for energy efficient equipment or devices.	○	○	○	○	○
C. We rarely consider the environmental impacts of energy-related equipment or devices we purchase.	○	○	○	○	○
D. We purchase energy efficient equipment only if it meets our financial criteria, such as payback or ROI.	○	○	○	○	○
E. It takes a lot of effort for us to be energy efficient.	○	○	○	○	○
F. We like to be one of the first among our peers and competitors to purchase the latest high-tech products and equipment.	○	○	○	○	○
G. Other California businesses and organizations like mine should do what they can to reduce their energy consumption.	○	○	○	○	○

Q22. Next, we have some questions about how your company or organization makes financial decisions about investments in energy-related equipment like a water heater, heating and cooling equipment, insulation, lighting, and appliances [IF Q2 = 3, INSERT: "at the facility in <CITY>"].

What minimum dollar amount do you use to determine whether an investment is a **major** investment (versus a minor one)? Your best estimate is fine.

Major investments are ones that require a more rigorous approval process, like a study of the costs and benefits, or are separated from minor investments by a minimum dollar amount.

1. $[NUMERIC OPEN END 0-999997] or more is typically a major investment for my company

999998. Don't know

Q23. When deciding whether to approve a **major** energy-related investment, which of the following financial factors are considered? *Please select all that apply.*

[MULTIPLE RESPONSE; RANDOMIZE 1-5]

1. Upfront cost (including equipment, delivery & installation)
2. Operating & maintenance cost (including energy cost to operate)
3. Payback period
4. Return on investment (ROI)
5. Depreciation
1. Other financial factors, please specify: [OPEN-ENDED RESPONSE]
98. Don't know [MAKE EXCLUSIVE]

[ASK IF Q23=3]

Q24. What is the typical **payback period** needed to approve a major energy-related investment?

The typical payback period for a major investment is less than…

1. [OPEN-END NUMERIC, 0.25 – 100] years

997. My company doesn't have a payback period threshold for major investments

998. Don't know

Q25. Now, please think about **minor** energy-related investments [IF Q2 = 3, INSERT: "at the facility in <CITY>"]. When deciding whether to approve a **minor** energy-related investment, which of the following are considered? *Please select all that apply.*

[MULTIPLE RESPONSE UP TO 4] [ROTATE options 1-4]

1. Upfront cost (including equipment, delivery & installation)
2. Operating & maintenance cost (including energy cost to operate)
3. Payback period
4. Return on investment (ROI)
0. Other financial factors, please specify: [OPEN-ENDED RESPONSE]
98. Don't know [MAKE EXCLUSIVE]

[ASK IF Q25=3]

Q26. What is the typical **payback period** threshold used to approve a minor energy-related investment? *If it is less than 1 year, please enter 0.5.*

The typical payback period for a minor investment is less than…

1. [OPEN-END NUMERIC, 0.5 – 100] years

997. My company doesn't have a payback period threshold for minor investments
998. Don't know

Minor Investment Upgrades

Minor Investment Purchase Decisions

[RANDOMLY ASSIGN RESPONDENTS INTO ONE OF FOUR GROUPS BASED ON THE FOLLOWING RULES AND SOFT QUOTAS]

Minor Group:	Generate Variable:	Eligibility:	Quota:
Power strips	MINOR= "power strip"	MINOR_FL=1	100
PC power management	MINOR= "computer power management system"	MINOR_FL=2	100
Thermostat	MINOR= "thermostat"	MINOR_FL=3	300
Indoor lighting controls	MINOR = "lighting control"	MINOR_FL=4	100

Q27. Now, please think about what you would look for if you needed make a **minor** purchase of a new [MINOR] [IF MINOR=4, INSERT ", like a switch, dimmer, or sensor"] to replace a broken one or make an upgrade.

[IF MINOR=1] *Power strips plug into a single electrical outlet and have multiple outlets to provide power to multiple devices. A smart power strip with battery backup detects when an electronic device such as a computer is turned off and it will automatically turn off power to other devices that are plugged in, such as the computer monitor and printer, to conserve energy. It can also provide reserve power from a battery in the event of an electrical outage.*

[IF MINOR=2] *A computer power management system connects to one or more computers in a facility and manages the power settings, such as the auto shutdown, start up, and timing of sleep mode, to conserve energy.*

[IF MINOR=3] *A thermostat controls the temperature settings for a heating and/or cooling system in a facility or space. Manual thermostats must be adjusted manually, programmable thermostats can be programmed to change settings by day or time of day, and smart thermostats can be programmed to change settings by the hour or occupancy of the space and can connect to Wi-Fi and Internet to be adjusted remotely from a computer or smartphone.*

[IF MINOR=4] *Lighting controls are manual switches or occupancy sensors that turn lights on and off and/or adjust their brightness. Switches must be adjusted manually, and occupancy sensors automatically adjust the lighting based on whether a space or room is occupied.*

How important would each of the following factors be in the decision to purchase a [MINOR] if you needed one for the facility [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: "in <CITY>", ELSE INSERT: "at <ADDRESS> in <CITY>"]?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 -Not at all important	2 - Slightly important	3 - Moderately important	4 - Very important	5 – Extremely important
A. [DISPLAY IF MINOR=3 OR 4] Look and feel	○	○	○	○	○
B. Ease of use	○	○	○	○	○
C. [DISPLAY IF MINOR=2 OR 3] Advanced or smart features like Internet connectivity, remote control from a smartphone, etc.	○	○	○	○	○
D. [DISPLAY IF MINOR= 4] Advanced or smart features like sensors that automatically turn lights off and on or adjust brightness	○	○	○	○	○
E. [DISPLAY IF MINOR=1] Advanced or smart features like sensors that automatically turn devices off and on	○	○	○	○	○
G. [DISPLAY IF MINOR = 3 OR 4] Potential comfort benefits	○	○	○	○	○
H. Available information about different models	○	○	○	○	○
I. Amount of time required between making the purchase and installing it in the facility	○	○	○	○	○
J. The amount or cost of energy it can save	○	○	○	○	○

Q28. What about the cost-related factors you would consider when deciding [IF MINOR=2 INSERT: "whether to make a minor purchase for"; IF MINOR=1, 3, 4, INSERT: "the efficiency level of"] a new [MINOR]? Please consider the following:

[IF MINOR=1] *The cost of a standard efficiency power strip is about $10 and the cost of a high efficiency smart power strip with battery backup is about $100. A smart power strip can save up to $30 per year in energy costs.*

[IF MINOR=2] *The cost of a computer power management system is about $70, and it can save up to $17.50 per computer in annual energy costs.*

[IF MINOR=3] *The cost of a standard efficiency programmable thermostat that does not connect to Wi-Fi and the Internet is about $40, and the cost of a high efficiency smart thermostat that can connect to Wi-Fi and the Internet is about $175. A high efficiency smart thermostat can save up to $110 per year in energy costs.*

[IF MINOR=4] *The cost of a standard efficiency manual light switch is about $5 and the cost of a high efficiency occupancy sensor lighting control is about $65. Occupancy sensors can save up to $30 per year in energy costs.*

[IF MINOR=1, 3, OR 4] Given this information, how much would each factor below be a barrier to purchase the high efficiency model if you needed a new [MINOR] for the facility?

[IF MINOR = 2] Given this information, how much would each factor below be a barrier to purchase the [MINOR] if you needed one for the facility?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. [DISPLAY IF MINOR = 1, 3, OR 4] The higher price of the high efficiency [MINOR] over the standard efficiency model	○	○	○	○	○
B. [DISPLAY IF MINOR = 2] The price of the computer power management system	○	○	○	○	○
C. Limited or no access to financing options like a credit card, store credit account, or loan	○	○	○	○	○
D. Uncertainty about whether it will save as much energy as estimated	○	○	○	○	○
E. [DISPLAY IF MINOR = 2, 3, OR 4] The possible disruption that installing it in the facility could cause to the company's operations or productivity	○	○	○	○	○

[ASK ALL]

Q29. **Thinking back to January 2020, before COVID-19**, how much of a barrier would the following cost-related factors have been to purchase the [IF MINOR = 1, 3, 4, INSERT: "high efficiency"] [MINOR] if you needed one for the facility?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. [DISPLAY IF MINOR = 1, 3, OR 4] The higher price of the high efficiency [MINOR]	○	○	○	○	○

B. [DISPLAY IF MINOR = 2] The price of the computer power management system	○	○	○	○	○
C. Limited or no access to financing options like a credit card, store credit account, or loan	○	○	○	○	○

Minor Investment Adoption Scenarios

Q30. Suppose you needed to make a minor purchase of a new [MINOR] to replace a broken one or make an upgrade in the facility. How likely would you be to purchase [IF MINOR= 1 OR 3, INSERT "the high efficiency smart [MINOR]"; IF MINOR=4, INSERT "the high efficiency occupancy sensor [MINOR]"; IF MINOR=2, INSERT: "one"], given the following information?

[IF MINOR=1] *The cost of a standard efficiency power strip is about $10 and the cost of a high efficiency smart power strip with battery backup is about $100, a difference of $90. A smart power strip can save up to $30 per year in energy costs and the payback period would be as low as 3 years.*

[IF MINOR=2] *The cost of a computer power management system is about $70. It would save up to $17.50 per computer in annual energy costs and the payback period would be as low as 4 years for one computer (and would be shorter for multiple computers).*

[IF MINOR=3] *The cost of a standard efficiency programmable thermostat is about $40 and the cost of a high efficiency smart thermostat is about $175, a difference of $135. A high efficiency smart thermostat can save up to $110 per year in energy costs and the payback period would be as low as 1.5 years.*

[IF MINOR=4] *The cost of a standard efficiency manual light switch is about $5 and the cost of a high efficiency occupancy sensor lighting control is about $65, a difference of $60. The occupancy sensor can save up to $30 per year in energy costs and the payback period would be as low as 2 years.*

*The payback period is the amount of time it would take for the annual energy savings to cover the [*IF MINOR = 1, 3, OR 4, INSERT: *"additional cost of the high efficiency"; IF MINOR=2, INSERT: "cost of the"] [MINOR].*

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely → SKIP TO NEXT SECTION

[IF Q30<5 AND Q3A OR Q5A = 2, ASK Q31, ELSE IF Q30<5 RANDOMLY ASSIGN WITHIN EACH MINOR GROUP TO Q31 OR TO Q32 USING LEAST FILL]

Q31. What if a rebate was available to offset the cost and reduce the payback period? The rebate would be a one-time payment provided shortly after making the purchase.

How likely would you be to purchase the [IF MINOR= 1 OR 3, INSERT “high efficiency smart”; IF MINOR=4, INSERT “high efficiency occupancy sensor”] [MINOR] to replace a broken one or make an upgrade in the facility if there was a …?

[SINGLE RESPONSE]	1 – Not at all likely	2 – Slightly likely	3 - Somewhat likely	4 – Very likely	5 – Extremely likely
A. [DISPLAY IF MINOR=1] $45 rebate for HALF the additional cost of the smart power strip, which could lower the payback period to as low as 1.5 years.	○	○	○	○	○
B. [DISPLAY IF Q31A<5] $90 rebate for ALL the additional cost of the smart power strip, which could lower the payback period to as low as 0 years.	○	○	○	○	○
C. [DISPLAY IF MINOR=2] $17.50 rebate for a QUARTER of the cost of the computer power management system, which could lower the payback period to as low as 3 years.	○	○	○	○	○
D. [DISPLAY IF Q31C<5] $35 rebate for HALF the cost of the computer power management system, which could lower the payback period to as low as 2 years.	○	○	○	○	○
E. [DISPLAY IF MINOR=3] $68 rebate for HALF the additional cost of the smart thermostat, which could lower the payback period to as low as 0.75 years.	○	○	○	○	○
F. [DISPLAY IF Q31E<5] There was a $135 rebate for ALL the additional cost of the smart thermostat, which could lower the payback period to as low as 0 years.	○	○	○	○	○
G. [DISPLAY IF MINOR=4] $30 rebate for HALF the additional cost of the occupancy sensor, which could lower the payback period to as low as 1 year.	○	○	○	○	○
H. [DISPLAY IF Q31G<5] $60 rebate for ALL the additional cost of the occupancy sensor, which could lower	○	○	○	○	○

the payback period to as low as 0 years.					

Q32. What if a financing option were available that would allow your company or organization to pay some or all of the cost over time through the monthly bills from the energy utility? With this on-bill financing option, you could choose how much to finance and for how long, and the monthly payments would be added to the monthly energy bills.

How likely would you be to purchase a [IF MINOR= 1 OR 3, INSERT "smart"; IF MINOR=4, INSERT "occupancy sensor"] [MINOR] to replace a broken one or make an upgrade in the facility if the on-bill financing option was available?

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

Demand Response Participation Scenarios: Thermostats

For Respondents Who Have a Smart Thermostat and Don't Have an EMS [ASK IF Q15=3 AND Q2<>3 AND Q17<>1-3 AND MAJOR_FL<>4]

Q33. Next, we have a few questions about demand response programs many utilities have available for commercial customers.

Demand response programs offer financial incentives to customers who reduce their energy usage during times when demand is high, which is typically during some afternoons in the summer months. Participating customers agree to try to reduce their usage by a certain amount during high demand events. Before a high demand event, the utility will send a message to participants to adjust their thermostat or will send a signal to "smart" Wi-Fi-connected thermostats to automatically adjust the settings to save energy during the event. Participants can opt out of events at any time.

What best describes your level of familiarity with a demand response program?

1. Never heard of it
2. Heard of it but never participated
3. Participated in it before but not currently
4. Currently participating it [SKIP TO Q37]

[ASK IF Q29 < 4]

Q34. How much would each factor below be a barrier for your company to participate in a demand response program with your smart thermostat?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier

A. Allowing your utility to automatically adjust your smart thermostat(s) during high demand events	○	○	○	○	○
B. Making changes to the temperature settings in your facility during high demand events	○	○	○	○	○
C. Your level of familiarity or experience with a demand response program	○	○	○	○	○
D. Sharing smart thermostat data with your utility	○	○	○	○	○
E. Your level of familiarity or experience with your smart thermostat	○	○	○	○	○

[ASK IF Q29 < 4]

Q35. Next, consider that your utility offers a one-time incentive payment to sign up to participate in its demand response program with the smart thermostat.

The incentive payment will cover the cost of setting up the thermostat for the utility to remotely adjust its settings and is based on how much energy a customer agrees to try to save during high demand events. Utilities typically offer about $200/kilowatt saved, and the average amount small and medium companies and organizations save is about 5 kilowatts, which is a $1,000 payment.

How likely would your company be to participate in your utility's demand response program with the smart thermostat if there was a one-time incentive payment of around $1,000?

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

[ASK IF Q31<5]

Q36. *Utilities also offer an additional incentive payment each summer your company or organization agrees to try to reduce energy usage by a certain amount during the high demand events. So long as your company or organization remains ready to participate in high demand events, it would get the incentive payment even if no events occur.*

How likely would your company or organization be to participate in a demand response program with your smart thermostat if there was a sign-up bonus of around $1,000 and an additional incentive payment of …? [SINGLE RESPONSE]

	1 – Not at all likely	2 – Slightly	3 - Somewhat	4 – Very likely	5 – Extremely

		likely	likely		likely
A. **$100** each summer your company or organization remains ready to participate in any high demand events	○	○	○	○	○
B. [ASK IF Q32A<5] **$200** each summer your company or organization remains ready to participate in any high demand events	○	○	○	○	○

For Respondents Who Were Asked Smart T-Stat Adoption Questions and Would Not Adopt a Smart T-Stat Without a Rebate or OBF [ASK IF MINOR=3 FOR Q27-Q31 AND Q15<>3 AND Q2<>3 AND Q17<>1-3 AND MAJOR_FL<>4]

Q37. Next, we have a few questions about demand response programs many utilities have available as a potential incentive for commercial customers to save energy and purchase an energy efficient smart thermostat.

Demand response programs offer financial incentives to customers who reduce their energy usage during times when demand is high, which is typically during some afternoons in the summer months. Participating customers agree to try to reduce their usage by a certain amount during high demand events. Before a high demand event, the utility will send a message to participants to adjust their thermostat or will send a signal to "smart" Wi-Fi-connected thermostats to automatically adjust the settings to save energy during the event. Participants can opt-out of events at any time.

Have you heard of a demand response program like this before today?

1. Yes
2. No

Q38. How much would each factor below be a barrier for your company to purchase a smart thermostat and participate in a demand response program? [RANDOMIZE LIST]

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. Allowing your utility to automatically adjust the smart thermostat(s) during high demand events	○	○	○	○	○
B. Making changes to the temperature settings in your facility during high demand events	○	○	○	○	○
C. Your level of familiarity or experience with the demand response program	○	○	○	○	○

D. Sharing thermostat data with your utility	○	○	○	○	○
E. Your level of familiarity or experience with smart thermostats	○	○	○	○	○

Q39. Next, please consider the scenario we presented before but with a demand response program incentive payment [INSERT IF Q31E IS ASKED: in addition to the one-time rebate payment; INSERT IF Q32 IS ASKED: in addition to the on-bill financing option].

The cost of a standard programmable thermostat is about $40 and the cost of a smart thermostat is about $175, a difference of $135. A high efficiency smart thermostat can save up to $110 per year in energy costs and the payback period would be as low as 1.5 years.

Utilities offer customers a one-time incentive payment to sign up to participate in its demand response program and to cover the costs of a smart thermostat, installation, and set-up for the utility to remotely adjust settings. The incentive payment is based on how much energy a customer agrees to try to save during high demand events and utilities typically offer $200/kilowatt saved. The average amount small and medium companies or organizations save is about 5 kilowatts, which is a $1,000 payment.

How likely would your company or organization be to purchase a smart thermostat ([INSERT IF Q31E IS ASKED: with the one-time rebate payment; INSERT IF Q32 IS ASKED: with the on-bill financing option]) and sign up in your utility's demand response program if it received the one-time incentive payment of around $1,000?

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

[ASK IF Q39<5]

Q40. Utilities also offer an additional incentive payment each summer your company or organization agrees to try to reduce energy usage by a certain amount during the high demand events. So long as your company or organization remains ready to participate in high demand events, it would get the incentive payment even if no events occur.

How likely would your company or organization be to purchase a smart thermostat ([INSERT IF Q31E IS ASKED: with the one-time rebate payment; INSERT IF Q32 IS ASKED: with the on-bill financing option]) and participate in a demand response program if there was the one-time incentive payment of around $1,000 and an additional incentive payment of …? [SINGLE RESPONSE]

	1 – Not at all likely	2 – Slightly likely	3 - Somewhat likely	4 – Very likely	5 – Extremely likely
A. **$100** each summer your company or organization remains ready to participate in any high demand events	○	○	○	○	○

B. [ASK IF Q40A<5 = 5] **$200** each summer your company or organization remains ready to participate in any high demand events	○	○	○	○	○

Major Investment Upgrades

Major Investment Purchase Decisions

[RANDOMLY ASSIGN RESPONDENTS INTO ONE OF FOUR GROUPS BASED ON THE FOLLOWING RULES AND SOFT QUOTAS]

Major Group:	Generate Variable:	Eligibility:	Quota:
Refrigeration system	MAJOR = "refrigeration display case or storage unit"	MAJOR_FL=1	100
Water heater	MAJOR = "water heater"	MAJOR_FL=2	125
Insulation	MAJOR = "insulation"	MAJOR_FL=3	125
EMS	MAJOR = "energy management system"	MAJOR_FL=4	250

Q41. Next, please think about what you would look for if you needed to make a **major** purchase [IF MAJOR = 1, 2, 4, INSERT: "of a new [MAJOR] to replace a broken one or make an upgrade"; IF MAJOR = 3, INSERT: "to add or upgrade insulation in the walls or ceiling"] in the facility [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: "in <CITY>", ELSE INSERT: "at <ADDRESS> in <CITY>"].

How important would each of the following factors be in the decision to [INSERT IF MAJOR=1, 2, 4: "purchase a new [MAJOR]"; INSERT IF MAJOR= 3: "add or upgrade insulation in the ceiling or walls"]?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 -Not at all important	2 - Slightly important	3 - Moderately important	4 - Very important	5 – Extremely important
A. [DISPLAY IF MAJOR=1, 2, 4] Look and feel	○	○	○	○	○
B. [DISPLAY IF MAJOR = 1, 2, 4] Ease of use	○	○	○	○	○
C. [DISPLAY IF MAJOR = 1, 2, 4] Advanced features or settings like Internet connectivity, remote control from a tablet or smartphone, etc.	○	○	○	○	○

D. [DISPLAY IF MAJOR = 1 OR 2] Noise level	○	○	○	○	○
E. [DISPLAY IF MAJOR = 2 OR 3] Potential comfort benefits [INSERT IF MAJOR = 3: "like less drafts and noise from outside"]	○	○	○	○	○
F. [DISPLAY IF MAJOR = 1] Potential product spoilage improvements	○	○	○	○	○
G. Available information about different models	○	○	○	○	○
H. Amount of time required between making the purchase and installing it in the facility	○	○	○	○	○
I. The amount or cost of energy it [INSERT IF MAJOR=1 OR 2: "uses"; INSERT IF MAJOR=3 OR 4: "can save"]	○	○	○	○	○
J. [DISPLAY IF MAJOR = 1 OR 2] Average life span or rate of depreciation	○	○	○	○	○
K. [DISPLAY IF MAJOR = 4] Potential operating and maintenance benefits	○	○	○	○	○

Q42. What about the cost-related factors you would consider when deciding [IF MAJOR = 1, 2, INSERT: "the energy efficiency level of the"; IF MAJOR=3 OR 4, INSERT: "whether to make a major purchase for the"] new [MAJOR]? Please consider the following scenario:

[IF MAJOR=1] *The upfront cost to purchase and install a standard efficiency refrigeration display case or storage unit of average size is about $2,700 and the cost of a comparable high efficiency model is $3,100. The high efficiency model could save up to $100 per year in energy costs.*

[IF MAJOR=2] *The upfront cost to purchase and install a* [IF Q12=2, INSERT: "*commercial-scale*"] *standard efficiency storage water heater of average size is about* [IF Q12=1 OR Q4_3 OR Q6_3=97, INSERT: "*$1,500";* IF Q12=2, INSERT: "*$3,100*"] *and the cost of a comparable high efficiency water heater is about* [IF Q12=1 OR Q4_3 OR Q6_3=97, INSERT: "*$2,100";* IF Q12=2, INSERT: "*$4,000*"]*. The high efficiency model could save about* [IF Q12=1 OR Q4_3 OR Q6_3=97, INSERT: "*$150";* IF Q12=2, INSERT: "*$300*"] *per year in energy costs.*

[IF MAJOR=3] *The upfront cost to purchase and install high efficiency insulation is about $1.50 per square foot, such that insulating 1,000 square feet ceiling would cost*

about $1,500. The insulation could save up to $0.12 per square foot of insulated ceiling or wall area in annual energy costs.

[IF MAJOR=4] *The upfront cost to purchase and install an energy management system (EMS) varies based on the square footage of and the types of EMS-compatible equipment in a facility or building. The average cost of an EMS is about $4.00 per square foot and can save an average of $0.50 per square foot in annual energy costs.*

Given this information, how much would each factor below be a barrier to purchase the [IF MAJOR = 1 OR 2, INSERT: "high efficiency"] [MAJOR] for your facility?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. [DISPLAY IF MAJOR = 1 OR 2] The higher price of the high efficiency [MAJOR] over the standard efficiency model	○	○	○	○	○
B. [DISPLAY IF MAJOR = 3 OR 4] The price of the [MAJOR]	○	○	○	○	○
C. Limited or no access to financing options like a credit card, store credit account, or loan	○	○	○	○	○
D. Uncertainty about whether it will save as much energy as estimated	○	○	○	○	○
E. The possible disruption that installing it in the facility could cause to the company's operations or productivity	○	○	○	○	○

[ASK IF Q26A OR Q26B OR Q26C = 2-5]

Q43. **Thinking back to January 2020, before COVID-19,** how much of a barrier would the following cost-related factors have been to purchase the [IF MAJOR = 1 OR 2 INSERT: "high efficiency"] [MAJOR] for the facility?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. [DISPLAY IF Q26A = 2-5] The higher price of the energy efficient [MAJOR]	○	○	○	○	○
B. [DISPLAY IF Q26B = 2-5] The price of the [MAJOR]	○	○	○	○	○
C. [DISPLAY IF Q26C = 2-5] Limited or no access to financing options like a credit card, store credit account, or loan	○	○	○	○	○

Major Investment Adoption Scenarios

Q44. Suppose you needed to make a major purchase [IF MAJOR = 1, 2, OR 4, INSERT: "of a new [MAJOR] to replace a broken one or make an upgrade"; IF MAJOR = 3, INSERT: "to add or upgrade insulation in the walls or ceiling"] in the facility [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: "in <CITY>", ELSE INSERT: "at <ADDRESS> in <CITY>"]. How likely would you be to purchase [IF MAJOR = 1 OR 2, INSERT: "the high efficiency model"; IF MAJOR = 3 OR 4, INSERT: "it"], given the following information?

[IF MAJOR=1] *The upfront cost to purchase and install a standard efficiency refrigeration display case or storage unit of average size is about $2,700 and the cost of a comparable high efficiency model is about $3,100, a difference of $400. The high efficiency model could save up to $100 per year in energy costs and the payback period could be as low as 4 years.*

[IF MAJOR=2] *The upfront cost to purchase and install a* [IF Q12=2, INSERT: "*commercial-scale*"] *standard efficiency storage water heater of average size is about* [IF Q12=1 OR Q4_3 OR Q6_3=97, INSERT: "*$1,500";* IF Q12=2, INSERT: "*$3,100*"] *and the cost of a comparable high efficiency model is about* [IF Q12=1 OR Q4_3 OR Q6_3=97, INSERT: "*$2,100";* IF Q12=2, INSERT: "*$4,000*"], a difference of [IF Q12=1 OR Q4_3 OR Q6_3=97, INSERT: "*$600";* IF Q12=2, INSERT: "*$900*"]. *The high efficiency model could save up to* [IF Q12=1 OR Q4_3 OR Q6_3=97, INSERT: "*$150";* IF Q12=2, INSERT: "*$300*"] *per year in energy costs and the payback period could be as low as* [IF Q12=1 OR Q4_3 OR Q6_3=97, INSERT: "*4";* IF Q12=2, INSERT: "*3*"] *years.*

[IF MAJOR=3] *The upfront cost to purchase and install high efficiency insulation $1.50 per square foot and can save up to $0.12 per square foot of insulated ceiling area in annual energy costs compared to having no insulation. For example, insulation a 1,000 square feet area of ceiling would cost about $1,500, annual energy savings would be up to $120 and the payback period could be as low as 12 years.*

[IF MAJOR=4] *The upfront cost to purchase and install an energy management system (EMS) varies based on the square footage of and the types of EMS-compatible equipment in a facility or building. The average cost of an EMS is about $4.00 per square foot and can save an average of $0.50 per square foot in annual energy costs, such that the payback period could be as low as 8 years. For example, in a facility of 20,000 square feet with heating, cooling, and lighting equipment, an EMS would cost about $80,000 and could save up to $10,000 in annual energy costs.*

*The payback period is the amount of time it would take for the annual energy savings to cover the [*IF MAJOR = 1 OR 2, INSERT: *"additional"] cost of the [MAJOR].*

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely → SKIP TO NEXT SECTION

[IF Q28 < 5 AND Q3A OR Q5A = 2 ASK Q29, ELSE IF Q28<5 RANDOMLY ASSIGN WITHIN EACH MAJOR GROUP TO Q29 OR TO Q46 USING LEAST FILL]

Q45. What if a rebate was available to offset the cost and reduce the payback period? The rebate would be a one-time payment provided shortly after making the purchase.

How likely would you be [IF MAJOR = 1, 2, OR 4, INSERT: "to purchase the high efficiency [MAJOR] to replace a broken one or make an upgrade"; IF MAJOR = 3, INSERT: "to add or upgrade insulation in the walls or ceiling"] in the facility if there was a …?

[SINGLE RESPONSE]	1 – Not at all likely	2 – Slightly likely	3 - Somewhat likely	4 – Very likely	5 – Extremely likely
A. [DISPLAY IF MAJOR=1] $200 rebate for HALF the additional cost of the high efficiency model, which could lower the payback period to as low as 2 years.	○	○	○	○	○
B. [DISPLAY IF Q29A<5] $400 rebate for ALL the additional cost of the high efficiency model, which could lower the payback period to as low as 0 years.	○	○	○	○	○
C. [DISPLAY IF MAJOR=2] [IF Q12=1 OR Q4_3 OR Q6_3=97, INSERT: "$300"; IF Q12=2, INSERT: "$450"] rebate for HALF the additional cost of the high efficiency model, which could lower the payback period to as low as [IF Q12=1 OR Q4_3 OR Q6_3=97, INSERT: "2"; IF Q12=2, INSERT: "1.5"] years.	○	○	○	○	○
D. [DISPLAY IF Q29B<5] [IF Q12=1 OR Q4_3 OR Q6_3=97, INSERT: "$600"; IF Q12=2, INSERT: "$900"] rebate for ALL the additional cost of the high efficiency model, which could lower the payback period to as low as 0 years.	○	○	○	○	○
E. [DISPLAY IF MAJOR=3] Rebate for a QUARTER of the square footage cost of the high efficiency insulation, or about $0.35 per square foot, which could lower the cost to $1.15 per square foot and the payback period to as low as 9 years. In the example of the 1,000 square feet of ceiling	○	○	○	○	○

insulation, the cost would be around $1,150.					
F. [DISPLAY IF Q29E<5] Rebate for HALF of the square footage cost of the insulation, or about $0.75 per square foot, which could lower the cost to $0.75 per square foot and the payback period to as low as 6 years. In the example of the 1,000 square feet of ceiling insulation, the cost would be around $750.	○	○	○	○	○
G. [DISPLAY IF MAJOR=4] Rebate for a QUARTER of the cost of the EMS, or about $1.00 per square foot, which could lower the cost to $3.00 per square foot and the payback period to as low as 6 years.	○	○	○	○	○
H. [DISPLAY IF Q29G<5] Rebate for HALF the cost of the EMS, or about $2.00 per square foot, which could lower the cost to $2.00 per square foot and the payback period to as low as 4 years.	○	○	○	○	○

[ASK IF Q28<5]

Q46. What if a financing option were available that would allow your company or organization to pay some or all of the cost over time through the monthly bills from the energy utility? With this on-bill financing option, you could choose how much to finance and for how long, and the monthly payments would be added to the monthly energy bills.

How likely would you be to purchase the [IF MAJOR = 1 OR 2, INSERT: “high efficiency”] [MAJOR] [IF MAJOR = 1, 2, OR 3, INSERT: “to replace a broken one or make an upgrade”; IF MAJOR = 3, INSERT: “for the walls or ceiling”] in the facility if an on-bill financing option was available?

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

Demand Response Participation Scenarios: EMS

For Respondents Who Have an EMS [ASK IF Q17 = 1-3]

Q47. Next, we have a few questions about demand response programs many utilities have available for commercial customers .

Demand response programs offer financial incentives to customers who reduce their energy usage during times when demand is high, which is typically during some afternoons in the summer months. Participating customers agree to try to reduce their usage by a certain amount during high demand events. Before a high demand event, the utility will send a message to participants to adjust their equipment settings or will send a signal to the energy management system (EMS) to automatically adjust the settings to save energy during the event. Participants can choose which equipment settings will be adjusted and can opt-out of high demand events at any time.

What best describes your level of familiarity with a demand response program?

1. Never heard of it
2. Heard of it but never participated
3. Participated in it before but not currently
4. Currently participating it [SKIP TO Q55]

[ASK IF Q47 < 4]

Q48. How much would each factor below be a barrier for your company or organization to participate in a demand response program with its energy management system (EMS)?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. Allowing your utility to automatically adjust your EMS settings during high demand events	○	○	○	○	○
B. Making changes to the equipment settings in your facility during high demand events	○	○	○	○	○
C. Your level of familiarity or experience with a demand response program	○	○	○	○	○
D. Sharing EMS data with your utility	○	○	○	○	○
E. Your level of familiarity or experience with your EMS	○	○	○	○	○

[ASK IF Q47 < 4]

Q49. Next, consider that your utility offers you a one-time incentive payment to sign up to participate in its demand response program with the energy management system (EMS).

The incentive payment will cover the cost of setting up the EMS for the utility to remotely adjust its settings and is based on how much energy a customer agrees to try

to save during high demand events. Utilities typically offer about $200/kilowatt, and the average amount larger companies or organizations save is about 25 kilowatts, which is a $5,000 payment.

How likely would your company or organization be to participate in your utility's demand response program with the EMS if there was a sign-up bonus of around $5,000?

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

[ASK IF Q49 < 5]

Q50. Utilities also offer an additional incentive payment each summer your company or organization agrees to try to reduce energy usage by a certain amount during the high demand events. So long as your company or organization remains ready to participate in high demand events, it would get the incentive payment even if no events occur.

How likely would your company or organization be to participate in a demand response program with your smart thermostat if there was a sign-up bonus of around $5,000 and an additional incentive payment of …?

[SINGLE RESPONSE]	1 – Not at all likely	2 – Slightly likely	3 - Somewhat likely	4 – Very likely	5 – Extremely likely
A. **$500** each summer your company or organization remains ready to participate in any high demand events	○	○	○	○	○
B. [ASK IF Q50A<5] **$1,000** each summer your company or organization remains ready to participate in any high demand events	○	○	○	○	○

For Respondents Who Were Asked EMS Adoption Questions and Would Not Adopt an EMS Without a Rebate or OBF [ASK IF MAJOR=4 FOR Q37-Q46 AND Q2<>3 AND Q17<>1-3]

Q51. Next, we have a few questions about *demand response* programs many utilities have available as a potential incentive for commercial customers to save energy and purchase an energy management system (EMS).

Demand response programs offer financial incentives to customers who reduce their energy usage during times when demand is high, which is typically during some afternoons in the summer months. Participating customers agree to try to reduce their usage by a certain amount during high demand events. Before a high demand event, the

utility will send a message to participants to adjust their equipment settings or will send a signal to the energy management system (EMS) to automatically adjust the settings to save energy during the event. Participants can choose which equipment settings will be adjusted and can opt out of high demand events at any time.

Have you heard of a demand response program like this before today?

1. Yes
2. No

Q52. How much would each factor below be a barrier for your company to purchase an energy management system (EMS) and participate in a demand response program? [RANDOMIZE LIST]

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. Allowing your utility to automatically adjust the EMS settings during high demand events	○	○	○	○	○
B. Making changes to the equipment settings in your facility during high demand events	○	○	○	○	○
C. Your level of familiarity or experience with the demand response program	○	○	○	○	○
D. Sharing EMS data with your utility	○	○	○	○	○
E. Your level of familiarity or experience with the EMS	○	○	○	○	○

Q53. Next, please consider the scenario we presented before but with a demand response program incentive payment [INSERT IF Q29 IS ASKED: in addition to the one-time rebate payment; INSERT IF Q46 IS ASKED: in addition to the on-bill financing option].

The average cost of an EMS is about $4.00 per square foot and can save an average of $0.50 per square foot in annual energy costs, such that the payback period could be as low as 8 years.

Utilities offer customers a one-time incentive payment to participate in its demand response program and to cover some of the costs of an EMS, installation, and set-up for the utility to remotely adjust settings. The incentive payment is based on how much energy a customer agrees to try to save during high demand events and utilities typically offer about $200/kilowatt saved. The average amount larger companies and organizations save is about 25 kilowatts, which is a $5,000 payment.

How likely would your company or organization be to purchase an EMS [INSERT IF Q29 IS ASKED: with the one-time rebate payment; INSERT IF Q46 IS ASKED: with the on-

bill financing option] and sign up in your utility's demand response program if it received the one-time incentive payment of around $5,000?

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

[ASK IF Q53<5]

Q54. Utilities also offer an additional incentive payment each summer your company or organization agrees to try to reduce energy usage by a certain amount during the high demand events. So long as your company or organization continues to participate in high demand events, it would get the incentive payment even if no events occur.

How likely would your company or organization be to purchase an EMS [INSERT IF Q29 IS ASKED: with the one-time rebate payment; INSERT IF Q46 IS ASKED: with the on-bill financing option] and participate in a demand response program if there was a one-time incentive payment of around $5,000 and an additional incentive payment of …?

[SINGLE RESPONSE]	1 – Not at all likely	2 – Slightly likely	3 - Somewhat likely	4 – Very likely	5 – Extremely likely
A. **$500** each summer your company or organization remains ready to participate in any high demand events	○	○	○	○	○
B. [ASK IF Q54A<5 = 5] **$1,000** each summer your company or organization remains ready to participate in any high demand events	○	○	○	○	○

Fuel Substitution Water Heater Scenarios [ASK IF Q11=2 OR 3 AND Q12=1 OR 2, ELSE SKIP TO Q59]

Q55. We have one last set of questions about replacing or upgrading equipment in the facility [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: "in <CITY>", ELSE INSERT: "at <ADDRESS> in <CITY>"]. Let's say the facility's gas water heater breaks and you have the opportunity to replace it by switching to an electric energy efficient model.

*The upfront cost to purchase and install a standard efficiency **gas** storage water heater of average size is about* [IF Q12=1, INSERT: "*$1,500";* IF Q12=2, INSERT: "*$3,100*"]. *The cost of a comparable energy efficient **electric** heat pump water heater is about* [IF Q12=1, INSERT: "*$3,000";* IF Q12=2, INSERT: "*$6,700*"]*. The energy efficient electric model can save up to* [IF Q12=1, INSERT: "*$150";* IF Q12=2, INSERT: "*$300*"] *per year in energy costs.*

A heat pump water heater uses electricity to draw in heat in the air in the surrounding area instead of generating heat directly. Therefore, it can be two to three times more energy efficient than a conventional water heater. To draw in heat from the air, heat pumps work like a refrigerator in reverse. They are often larger than conventional water heaters and perform best in above freezing temperatures.

How much would each of the following factors motivate your company to purchase an electric heat pump water heater over a standard efficiency gas storage water heater?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not at all motivating	2 – Slightly motivating	3- Moderately motivating	4 – Very motivating	5 – Extremely motivating
A. Reduced environmental impacts like air and water pollution	○	○	○	○	○
B. Faster water heating	○	○	○	○	○
C. Improved efficiency and lower energy usage	○	○	○	○	○
D. Longer lasting equipment	○	○	○	○	○
E. Lower utility bills	○	○	○	○	○

Q56. How much would each factor below be a barrier for you to switch from a gas storage water heater to an energy efficient electric heat pump water heater?

[RANDOMIZE ALL ITEMS; SINGLE RESPONSE]	1 – Not a barrier	2 -Minor barrier	3 - Moderate barrier	4 - Considerable barrier	5 – Major barrier
A. Uncertainty about the estimated energy savings of an electric heat pump water heater	○	○	○	○	○
B. The need for potential structural, electrical, and/or plumbing changes to install the new electric heat pump water heater in the facility	○	○	○	○	○
C. Limited or no access to financing options like credit card, store credit account, or loan	○	○	○	○	○
D. Lack of experience or familiarity with an electric heat pump water heater	○	○	○	○	○
E. The slightly larger size of an electric heat pump water heater	○	○	○	○	○

F. The higher upfront cost of an electric heat pump water heater	○	○	○	○	○

Q57. If your company or organization needed to replace its gas storage water heater, how likely would it be to switch to an energy efficient electric heat pump water heater?

*The upfront cost to purchase and install a standard efficiency **gas** storage water heater of average size is about* [IF Q12=1, INSERT: "*$1,500";* IF Q12=2, INSERT: "*$3,100*"] *and the cost of a comparable energy efficient **electric** heat pump water heater is about* [IF Q12=1, INSERT: "*$3,000";* IF Q12=2, INSERT: "*$6,700*"]*, a difference of* [IF Q12=1, INSERT: "*$1,500";* IF Q12=2, INSERT: "*$3,600*"]*. The energy efficient electric model can save up to* [IF Q12=1, INSERT: "*$150";* IF Q12=2, INSERT: "*$300*"] *per year and the payback period would be as low as* [IF Q12=1, INSERT: "*10";* IF Q12=2, INSERT: "*12*"] *years.*

[SINGLE RESPONSE]

1. Not at all likely
2. Slightly likely
3. Somewhat likely
4. Very likely
5. Extremely likely

[ASK IF Q46<5]

Q58. What if a rebate was available to cover the additional cost? The rebate would come in the form of a one-time payment after you purchase the electric heat pump water heater.

How likely would you be to switch to the energy efficient electric heat pump water heater if there was a rebate of…?

[SINGLE RESPONSE]	1 – Not at all likely	2 – Slightly likely	3 - Somewhat likely	4 – Very likely	5 – Extremely likely
A. [IF Q12=1, INSERT: "$750"; IF Q12=2, INSERT: "$1,800"] for HALF the additional cost over the standard gas model, which could lower the payback period to [IF Q12=1, INSERT: "5"; IF Q12=2, INSERT: "6"] years	○	○	○	○	○
B. [ASKF IF Q47A < 5] [IF Q12=1, INSERT: "$1,500"; IF Q12=2, INSERT: "$3,600"] for ALL the additional cost over the standard gas model, which could lower the payback period to 0 years	○	○	○	○	○

COVID-19 Impacts [ASK ALL]

Q59. Thanks for your feedback so far. We have just a few questions related to COVID-19 and your company or organization before the end of the survey.

Overall, how much has the COVID-19 pandemic impacted the company or organization [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: "in <CITY>", ELSE INSERT: "at <ADDRESS> in <CITY>"] since the start of the pandemic in early March 2020?

1. It has had a *large negative* impact
2. It has had a *moderate negative* impact
3. It has had *little or no* impact
4. It has had *a moderate positive* impact
5. It has had a *large positive* impact
98. Don't know

Q60. How has the following aspects of the company or organization been impacted by the COVID-19 pandemic or associated containment measures since March 2020? [1 = Decreased; 2 = No change; 3 = Increased; 97 = Not applicable] [RANDOMIZE ORDER]

1. Revenue or profits
2. Availability of needed materials, products, or equipment
3. Number of employees or staff
4. Operating or working hours
5. Capital spending or investments
6. Upfront cost and/or payback period thresholds used to make investment decisions

Q61. Have any planned investment projects been fast-tracked, postponed, or cancelled due to COVID-19? *Please select all that apply.*

1. Fast-tracked or sped up planned project(s)
2. Postponed planned project(s)
3. Cancelled planned project(s)
97. Not applicable, the business did not have any planned projects
98. Don't know

[ASK IF Q61 = 2]
Q61A. On average, how many weeks have the planned project(s) been postponed? *Your best estimate is fine, and please enter a 1 if your answer is 'one week' or 'less than one week.'*

1. [NUMERIC OPEN-END, 1 – 996]
998. Don't know

Q62. Suppose you needed to replace or upgrade an appliance or equipment at the facility [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: "in <CITY>", ELSE INSERT: "at <ADDRESS> in <CITY>"] within the next few weeks. How comfortable or uncomfortable would you be having a contractor or technician come into the facility to install it, assuming they followed the latest safety guidelines for your area?

1. Very comfortable
2. Somewhat comfortable
3. Somewhat uncomfortable
4. Very uncomfortable

98. Don't know, I would not be involved in such a decision

Firmographics

[ASK ALL]

Q63. When was the building occupied by <NAME> on the property [IF IOU=PG&E AND SIZE=Small-Medium, INSERT: "in <CITY>", ELSE INSERT: "at <ADDRESS> in <CITY>"] built?

Your best estimate is fine and if there is more than one building on the property, please consider the building that uses the most energy and/or has the most energy-using equipment.

[SINGLE RESPONSE]

1. Before 1900
2. Between 1900 and 1949
3. Between 1950 and 1969
4. Between 1970 and 1989
5. Between 1990 and 2009
6. Between 2010 and 2019
7. In 2020
98. Don't know

[ASK ALL]

Q64. When did the <NAME> company begin occupying the building? Was it when the building was first built or after that?

Your best estimate is fine and if it is less than one year, please enter a '0'.

1. The year the building was built
2. After the building was built (please specify year): [NUMERIC OPEN-END, 1800-2020]

9998. Don't know

[ASK ALL]

Q65. About how many square feet is the building? *Your best estimate is fine.*

1. [NUMERIC OPEN-END, 0 – 9,999,995]

9999998. Don't know

Closing

Q66. As a thank you for your participation in this study, we are offering a $25 electronic gift card. Please provide your name and email address below. The gift card will be from Tango, which allows you to select from dozens of retailers and restaurants like Amazon, Starbucks, Walmart, and many more.

1. Name: [OPEN END]
2. Email: [OPEN END]
3. I do not have an email address to receive the gift card

Q67. [ASK IF Q66=3] What is your mailing address so we can send you a $25 gift card in the mail? [DO NOT FORCE RESPONSE]

1. Street Address: [OPEN END TEXT; ALLOW 750 CHARACTERS]
2. City: [OPEN END TEXT]
3. State: [OPEN END TEXT]
4. Zip code: [OPEN END NUMBER; REQUIRE 5 DIGITS]
5. Phone number (in case we have any questions about your address): [OPEN END NUMBER; REQUIRE 10 DIGITS]
6. I do not want the $25 gift card [EXCLUSIVE]

[SHOW IF Q67<> 6] You will receive your gift card within the next 4-6 weeks.

Please click the SUBMIT button to submit your responses.

Submit

REDIRECT TO https://www.cpuc.ca.gov/energyefficiency/

Appendix C. Detailed Results Tables and Figures

C.1 Residential Single-Family

The 598 surveyed residential single-family customers live in a dwelling with fewer than five units and make decisions about the energy-using technologies in their home. Respondents reported earning more than 200% of federal poverty guidelines and are not low income households.

Respondents were asked about their awareness of energy efficiency (EE) programs and technologies, their related attitudes and behaviors, their technology adoption factors and barriers, their willingness to adopt EE technologies and participate in a demand response (DR) program, and the impacts of the COVID-19 pandemic on their lives and decision-making. Respondents were asked about one of three high touch technologies that they see and touch frequently in their home (e.g., thermostat), one of four low touch technologies they do not see or touch frequently (e.g., water heater), and one of two fuel switching technologies from a natural gas to an EE electric model.

The survey results are displayed in the tables and figures below. Results are for all survey respondents combined. For more granular results by cluster, please see the datasets referenced in Section 3.3. For the final willingness to adopt results, please see Guidehouse's 2021 Potential and Goals report (to be published in Q3 2021).

C.1.1 Energy Efficiency (EE) Program and Technology Awareness

Surveyed customers were asked about their awareness of and participation in IOU EE programs and their awareness of select EE technologies.

Table C-1. Single-Family Residential Customers' Reported Awareness and Participation in California IOU Energy Efficiency (EE) Programs

Awareness/Participation	Percent (n=598)
Aware that electric utility offers rebates and incentives to save energy	75%
Received a rebate or incentive for energy efficient technology from utility	28%

Source: Opinion Dynamics Analysis

Table C-2. Single-Family Residential Customers' Reported Awareness of Select Energy Efficient (EE) Technologies

EE Technologies	Percent Aware
Smart Thermostat (n=598)	81%
Heat Pump Water Heater (n=598)	23%
Air Source Heat Pump (n=549)	21%

Source: Opinion Dynamics Analysis

C.1.2 Energy, Environmental, and Financial Attitudes and Behaviors

Surveyed customers were asked about their attitudes and behaviors important to energy efficient technology adoption, such as those regarding energy, environment, and finances.

Table C-3. Single-Family Residential Customers' Reported Attitudes and Behaviors Regarding Energy, Environment, and Finances

Attitudes/Behaviors	Average Response (n=598)
Frequency of making effort to reduce energy usage [a]	3.1
Frequency of considering energy usage when purchasing technologies [a]	2.9
Level of concern about managing daily energy usage [b]	2.5
Agree or disagree that… [c]	
I am proud when I figure out ways to save a few dollars on my energy bill	4.3
Californians should change their lifestyles to reduce energy consumption	4.2
I have money left over at the end of the month	3.7
I am concerned that the money I have will not last	3.4
It is important for others to see me as environmentally conscious	3.4
It takes a lot of effort to be energy efficient	3.3
I like being one of the first in my community to purchase the latest high-tech products	2.7
I will **not** pay more for energy efficient equipment even if it means I can save energy costs in the long term	2.5
Environmental challenges like climate change, pollution, and waste are **not** important issues	1.9

[a] Average frequency measured on a 1 to 5 scale where 1 means 'never,' 2 means 'rarely,' 3 means 'sometimes,' 4 means 'often,' and 5 means 'all or most the time.'

[b] Average concern measured on a 1 to 5 scale where 1 means 'not at all concerned' and 5 means 'extremely concerned.'

[c] Average agreement measured on a 1 to 5 scale where 1 means 'strongly disagree,' 3 means 'neither agree nor disagree,' and 5 means 'strongly agree.'

Source: Opinion Dynamics Analysis

C.1.3 Technology Adoption Factors, Barriers, and Willingness

Surveyed customers were asked about what factors and barriers they consider important to adopting a technology. Respondents were also asked about their willingness to adopt an energy efficient model of a technology, in comparison to a standard efficiency model, in the event they needed to replace what they have in their home. Respondents were randomly assigned one high touch, one low touch, and one fuel switching technology to consider in the survey.

Respondents were first presented with a baseline scenario that did not include a rebate or on-bill financing (OBF) option. Then, for most of the technologies, respondents were asked about two follow-up rebate scenarios that reduced the payback period to half and to zero, respectively, or they were asked about a follow-up OBF scenario to finance the technology on their electricity bills. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could

not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario.

High efficiency insulation is an exception in which respondents were asked about reducing the payback period by one-fourth and by one-half, respectively, since they were not comparing it to a lower efficiency insulation option. In addition, for the fuel switching technologies, respondents were not asked an OBF scenario.

High Touch Technologies

Table C-4. Single-Family Residential Customers' Reported Average Importance of Factors They Consider About Adopting Energy Efficient (EE) High Touch Technologies [a, b]

Adoption Factors	Refrigerator (n=150)	Clothes Dryer (n=149)	Smart Thermostat (n=299)	Total (n=598)
Ease of use	4.0	4.0	4.0	4.0
The amount or cost of energy it uses	3.9	3.7	N/A	3.8
Noise level	3.9	3.6	N/A	3.8
Ease of installation	3.7	3.3	3.5	3.5
Available information about different models	3.6	3.3	3.4	3.4
Capacity and/or size of the unit; size of thermostat	3.9	3.4	2.6	3.2
Look and feel	3.7	3.0	2.9	3.1
Amount of time required between making the purchase and installing it in your home	3.5	2.8	2.9	3.0
Advanced features or settings like Internet connectivity, remote control from a tablet or smartphone, etc.	2.3	2.0	2.8	2.5

[a] Average importance of factors measured on a 1 to 5 scale where 1 means 'not at all important,' 2 means 'slightly important,' 3 means 'moderately important,' 4 means 'very important,' and 5 means 'extremely important.'

[b] 'High touch' technologies are those a customer sees and uses or 'touches' frequently in their home.

Source: Opinion Dynamics Analysis

Table C-5. Single-Family Residential Customers' Reported Average Importance of Barriers to Adopting Energy Efficient (EE) High Touch Technologies [a, b]

Adoption Barriers	Refrigerator (n=150)	Clothes Dryer (n=149)	Smart Thermostat (n=299)	Total (n=598)
Uncertainty about energy savings	2.7	2.8	2.8	2.8
Higher upfront cost of EE model (during COVID-19 pandemic) [c]	2.3	3.1	2.6	2.6
Higher costs before pandemic	2.4	2.9	2.2	2.4
Potential for disruption in home to install the technology	2.5	2.2	2.1	2.2
Limited or no access to financing options (during COVID-19 pandemic) [c]	2.0	1.9	1.8	1.9

Adoption Barriers	Refrigerator (n=150)	Clothes Dryer (n=149)	Smart Thermostat (n=299)	Total (n=598)
Financing before pandemic	2.1	2.2	1.7	1.9

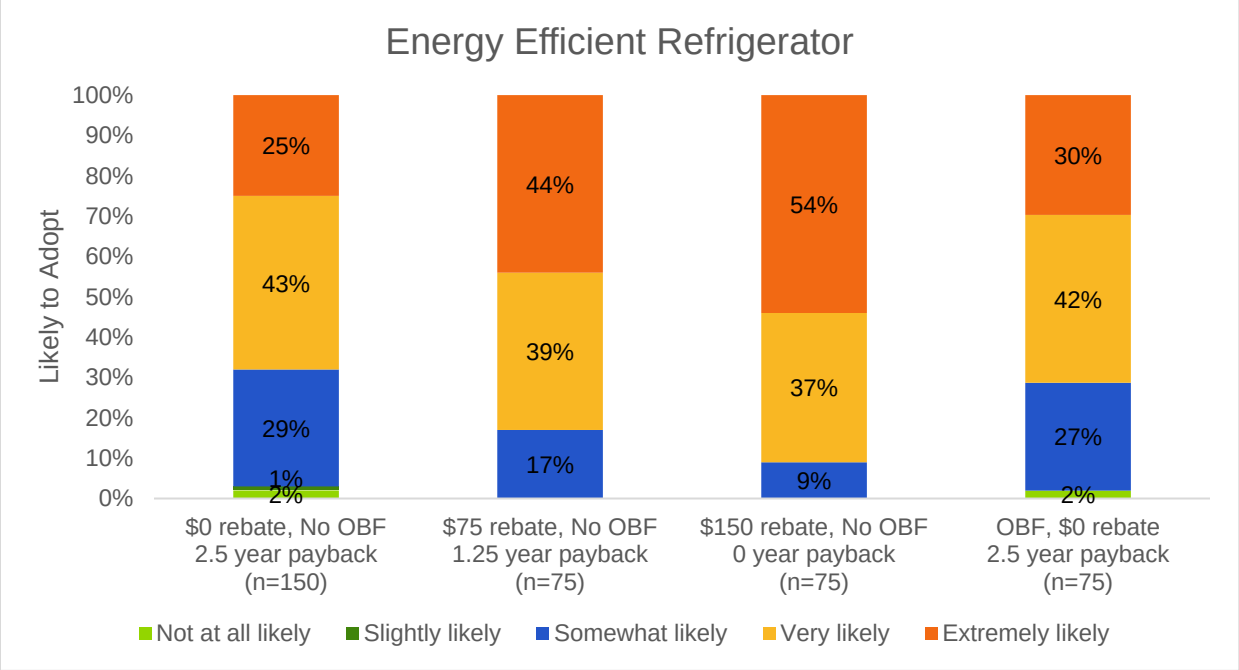
[a] Average importance of barriers measured on a 1 to 5 scale where 1 means 'not at a barrier,' 2 means 'minor barrier,' 3 means 'moderate barrier,' 4 means 'considerable barrier,' and 5 means 'major barrier.'

[b] 'High touch' technologies are those a customer sees and touches frequently in their home.

[c] Surveyed customers were asked how much of a barrier costs and financing would have been during and before the COVID-19 pandemic.

Source: Opinion Dynamics Analysis

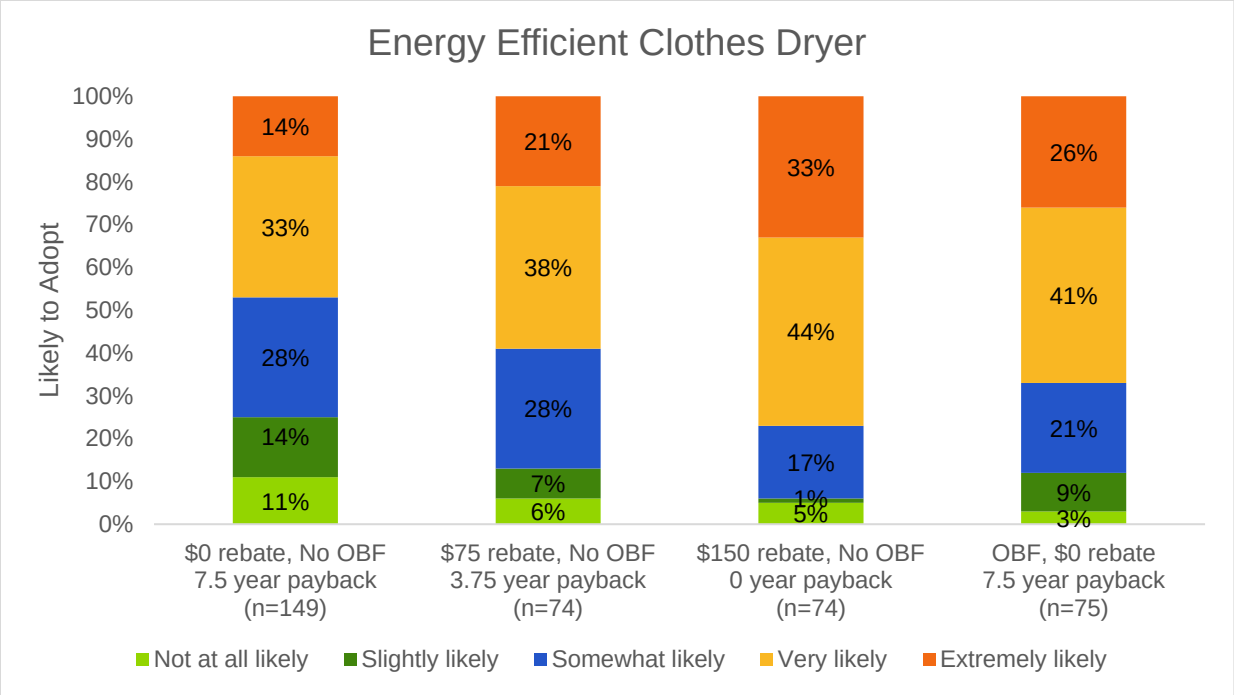
Figure C-1. Single-Family Residential Customers' Reported Willingness to Adopt an Energy Efficient (EE) Refrigerator Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider needing to replace their refrigerator and their willingness to adopt the EE model (vs. a standard efficiency model) under different payback scenarios. All respondents were asked the first, baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for average sized refrigerators in California. A payback period is the amount of time for the average energy savings from the EE technology to equal the difference in cost between the EE and standard efficiency models.

Source: Opinion Dynamics Analysis

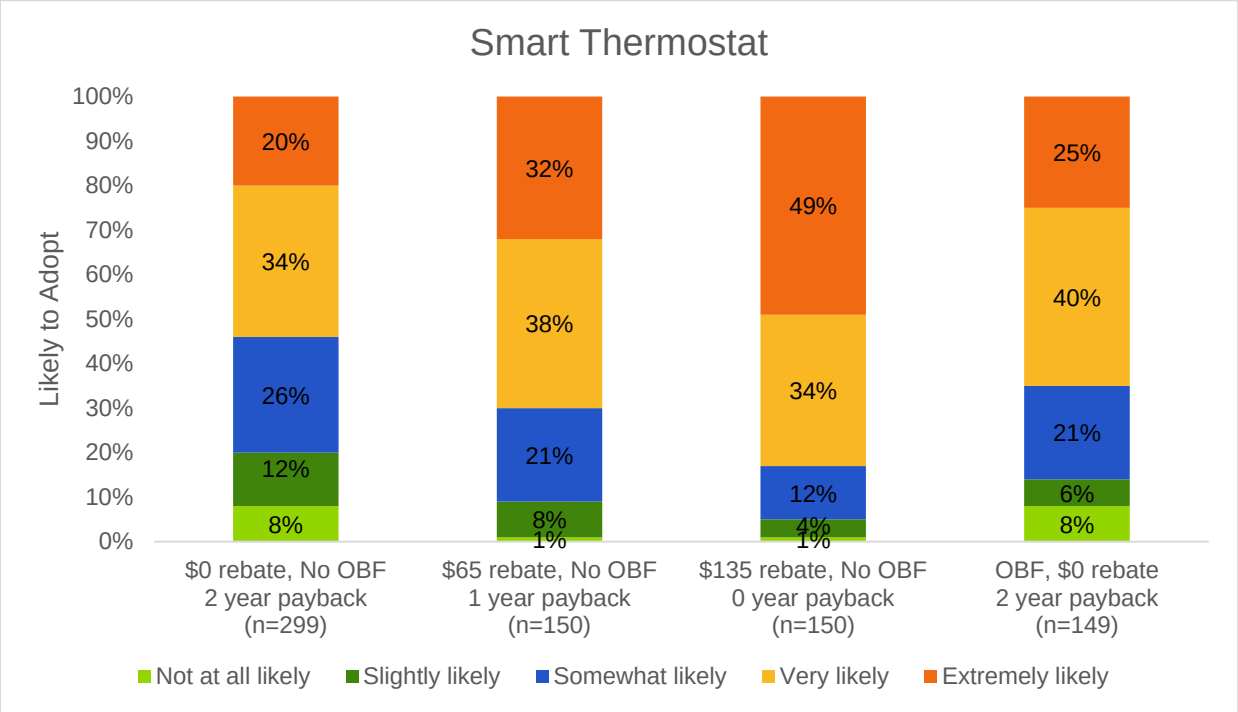
Figure C-2. Single-Family Residential Customers' Reported Willingness to Adopt an Energy Efficient (EE) Clothes Dryer Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider needing to replace their clothes dryer and their willingness to adopt the EE model (vs. a standard efficiency model) under different payback scenarios. All respondents were asked the first baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for average sized clothes dryers in California. A payback period is the amount of time for the average energy savings from the EE technology to equal the difference in cost between the EE and standard efficiency models.

Source: Opinion Dynamics Analysis

Figure C-3. Single-Family Residential Customers' Reported Willingness to Adopt a Smart Thermostat Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider needing to replace their thermostat and their willingness to adopt smart thermostat (vs. a standard programmable model) under different payback scenarios. All respondents were asked the first baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for smart thermostats in California. A payback period is the amount of time for the average energy savings from the smart technology to equal the difference in cost between the smart and standard models.

Source: Opinion Dynamics Analysis

Low Touch Technologies

Table C-6. Single-Family Residential Customers' Reported Average Importance of Factors They Consider About Adopting Energy Efficient (EE) Low Touch Technologies [a, b]

Adoption Factors	Furnace (n=148)	Central Air Conditioner (n=148)	Water Heater (n=150)	Insulation (n=152)	Total (n=598)
The amount or cost of energy it uses or saves	3.9	4.1	4.1	3.4	3.8
Ease of use	3.7	3.9	3.7	N/A	3.8
Noise level	3.9	3.9	3.3	N/A	3.7
Potential comfort benefits	3.8	4.0	3.5	3.3	3.6
Available information about different models	3.7	3.8	3.6	3.1	3.5

Adoption Factors	Furnace (n=148)	Central Air Conditioner (n=148)	Water Heater (n=150)	Insulation (n=152)	Total (n=598)
Ease of installation	3.5	3.4	3.5	3.3	3.4
Amount of time required between making the purchase and installing it in your home	3.1	3.1	3.5	2.9	3.1
Look and feel	2.9	3.0	2.2	N/A	2.7
Advanced features or settings like Internet connectivity, remote control from a tablet or smartphone, etc.	2.3	3.0	2.5	N/A	2.6

[a] Average importance of factors measured on a 1 to 5 scale where 1 means 'not at all important,' 2 means 'slightly important,' 3 means 'moderately important,' 4 means 'very important,' and 5 means 'extremely important.'

[b] 'Low touch' technologies are those a customer does not see or touch frequently in their home.

Source: Opinion Dynamics Analysis

Table C-7. Single-Family Residential Customers' Reported Average Importance of Barriers to Adopting Energy Efficient (EE) Low Touch Technologies

Adoption Barriers	Furnace (n=148)	Central Air Conditioner (n=148)	Water Heater (n=150)	Insulation (n=152)	Total (n=598)
Uncertainty about energy savings	3.0	3.2	3.1	3.1	3.1
Higher upfront cost of EE model (during COVID-19 pandemic)	2.9	3.1	3.1	3.3	3.0
Cost before pandemic	2.6	2.7	2.6	3.1	2.7
Potential for disruption in home to install the technology	2.6	2.7	2.7	2.8	2.7
Limited or no access to financing options (during COVID-19 pandemic)	2.1	2.4	2.4	2.4	2.4
Financing before pandemic	1.9	2.3	2.2	2.5	2.3

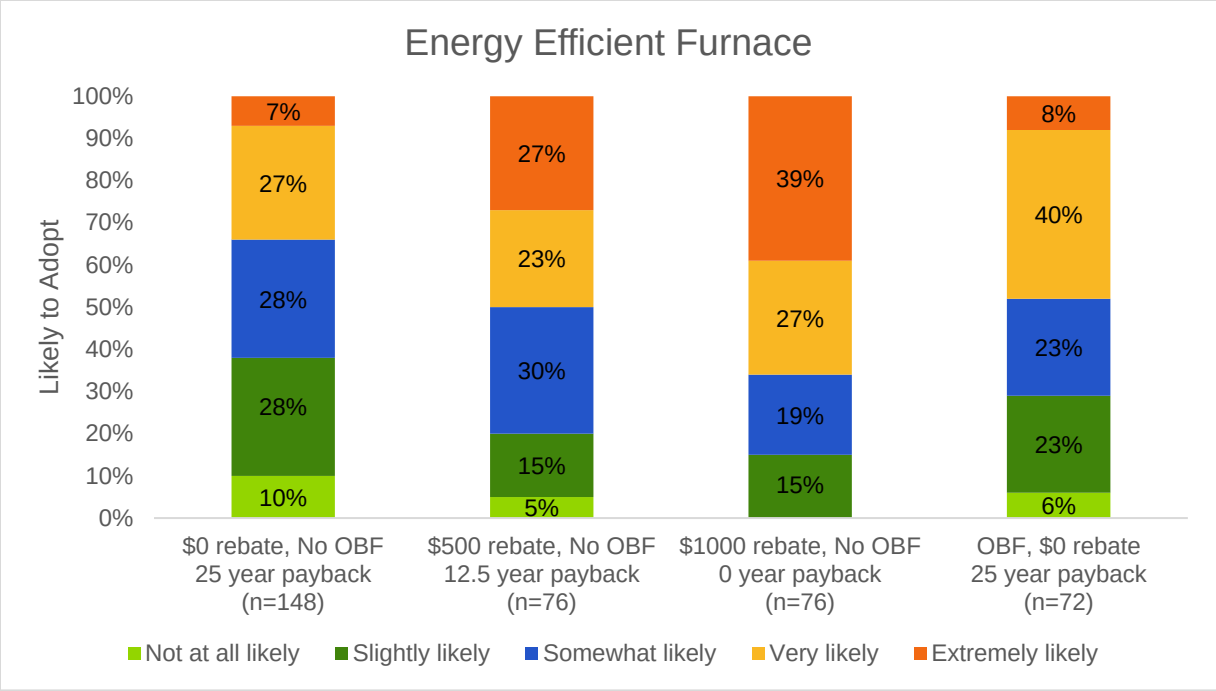
[a] Average importance of barriers measured on a 1 to 5 scale where 1 means 'not at a barrier,' 2 means 'minor barrier,' 3 means 'moderate barrier,' 4 means 'considerable barrier,' and 5 means 'major barrier.'

[b] 'Low touch' technologies are those a customer does not see or touch frequently in their home.

[c] Surveyed customers were asked how much of a barrier costs and financing would have been during and before the COVID-19 pandemic.

Source: Opinion Dynamics Analysis

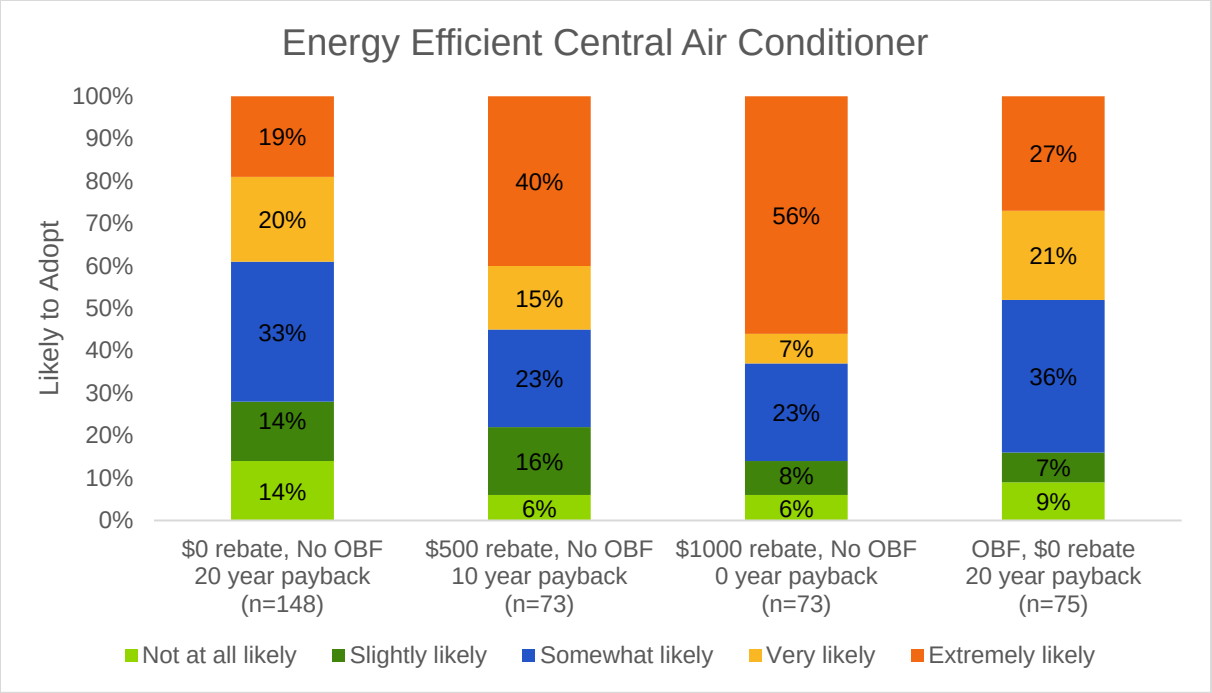
Figure C-4. Single-Family Residential Customers' Reported Willingness to Adopt an Energy Efficient (EE) Furnace Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider needing to replace their furnace and their willingness to adopt the EE model (vs. a standard efficiency model) under different payback scenarios. All respondents were asked the first baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for average sized furnaces in California. A payback period is the amount of time for the average energy savings from the EE technology to equal the difference in cost between the EE and standard efficiency models.

Source: Opinion Dynamics Analysis

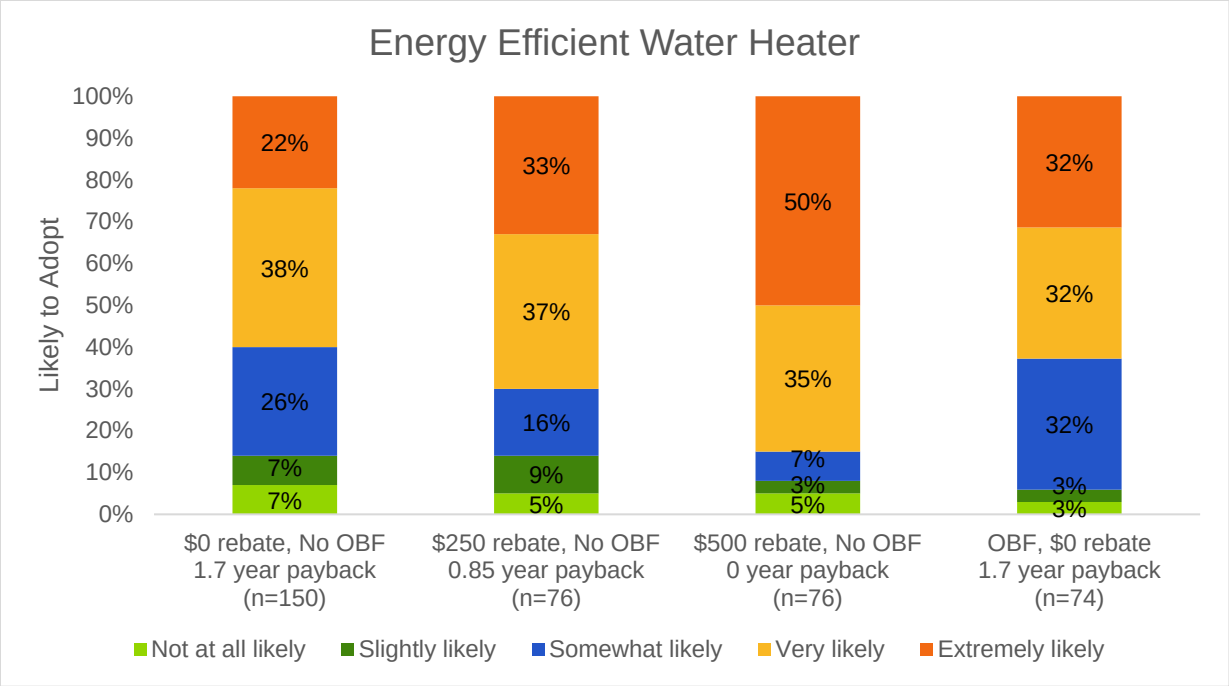
Figure C-5. Single-Family Residential Customers' Reported Willingness to Adopt an Energy Efficient (EE) Central Air Conditioner (CAC) Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider needing to replace their CAC and their willingness to adopt the EE model (vs. a standard efficiency model) under different payback scenarios. All respondents were asked the first baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for average sized CACs in California. A payback period is the amount of time for the average energy savings from the EE technology to equal the difference in cost between the EE and standard efficiency models.

Source: Opinion Dynamics Analysis

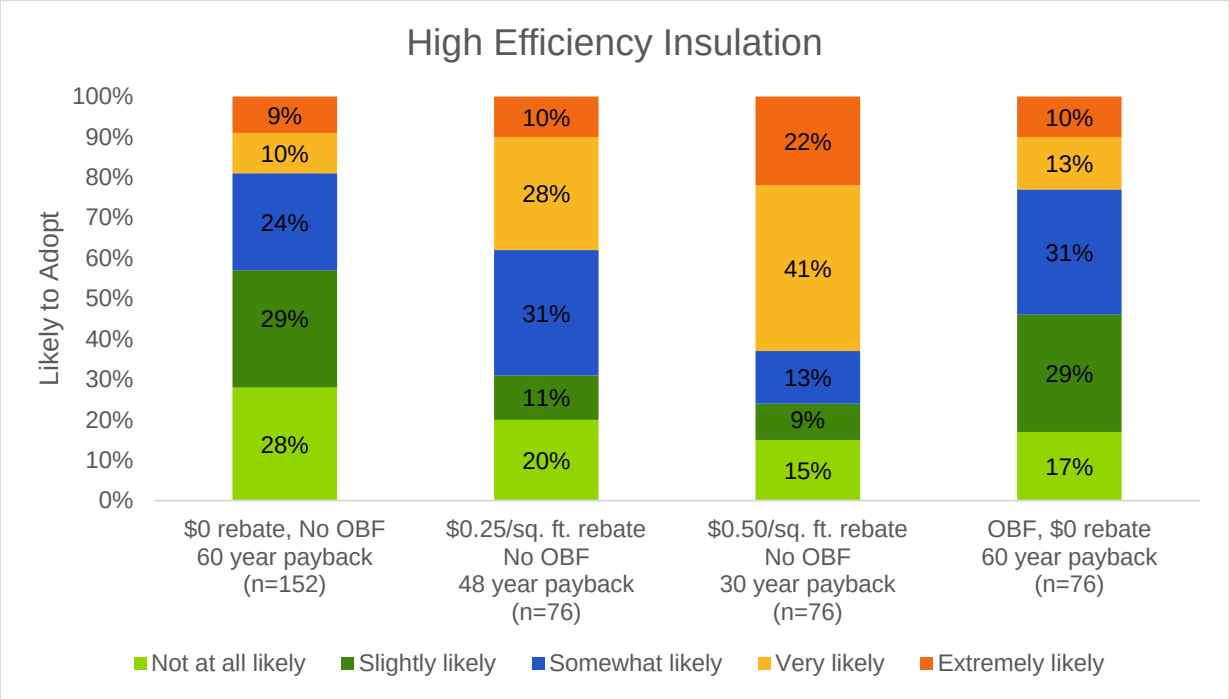
Figure C-6. Single-Family Residential Customers' Reported Willingness to Adopt an Energy Efficient (EE) Water Heater Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider needing to replace their water heater and their willingness to adopt the EE model (vs. a standard efficiency model) under different payback scenarios. All respondents were asked the first baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for average sized residential water heaters in California. A payback period is the amount of time for the average energy savings from the EE technology to equal the difference in cost between the EE and standard efficiency models.

Source: Opinion Dynamics Analysis

Figure C-7. Single-Family Residential Customers' Reported Willingness to Adopt High Efficiency Insulation Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider adding or upgrading insulation in their attic or ceiling and their willingness to do so under different payback scenarios. All respondents were asked the first baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for high efficiency attic insulation in California. The payback period is the amount of time for the average energy savings from the high efficiency insulation to equal the difference in cost between adopting and not adopting the insulation.

Source: Opinion Dynamics Analysis

Fuel Switching Technologies

Table C-8. Single-Family Residential Customers' Reported Average Importance of Factors They Consider About Switching from Gas to Energy Efficient (EE) Electric Fuel Technologies [a]

Fuel Switching Factors	Air Source Heat Pump (n=260) [b]	Heat Pump Water Heater (n=263) [c]	Total (n=523)
Improved efficiency and lower energy usage	3.5	3.5	3.5
Lower utility bills	3.5	3.6	3.5
Reduced environmental impacts	3.2	3.3	3.3
Improved comfort and performance	3.5	N/A	N/A

Fuel Switching Factors	Air Source Heat Pump (n=260) [b]	Heat Pump Water Heater (n=263) [c]	Total (n=523)
Reduced noise level	3.2	N/A	N/A
Longer lasting equipment	N/A	3.6	N/A
Faster water heating	N/A	3.4	N/A

[a] Average importance of factors measured on a 1 to 5 scale where 1 means 'not at all important,' 2 means 'slightly important,' 3 means 'moderately important,' 4 means 'very important,' and 5 means 'extremely important.'

[b] Asked only to respondents who reported having a gas furnace.

[c] Asked only to respondents who reported having a gas storage water heater.

Source: Opinion Dynamics Analysis

Table C-9. Single-Family Residential Customers' Reported Average Importance of Barriers to Switching from Gas to Energy Efficient (EE) Electric Fuel Technologies [a]

Fuel Switching Barriers	Air Source Heat Pump (n=260) [b]	Heat Pump Water Heater (n=263) [c]	Total (n=523)
The need for potential structural, electrical, and/or plumbing changes to install the technology	3.6	3.7	3.6
The higher upfront cost of the electric EE model	3.2	3.3	3.2
Uncertainty about energy savings	3.1	3.2	3.2
Lack of experience or familiarity with the technology	3.1	3.0	3.0
Limited or no access to financing options	2.4	2.5	2.5
The slightly larger size of the heat pump water heater (vs. standard gas water heater of similar storage capacity)	N/A	2.7	N/A
The need for part of the air source heat pump system to be located outside the building (vs. the entire system being inside the building)	2.6	N/A	N/A

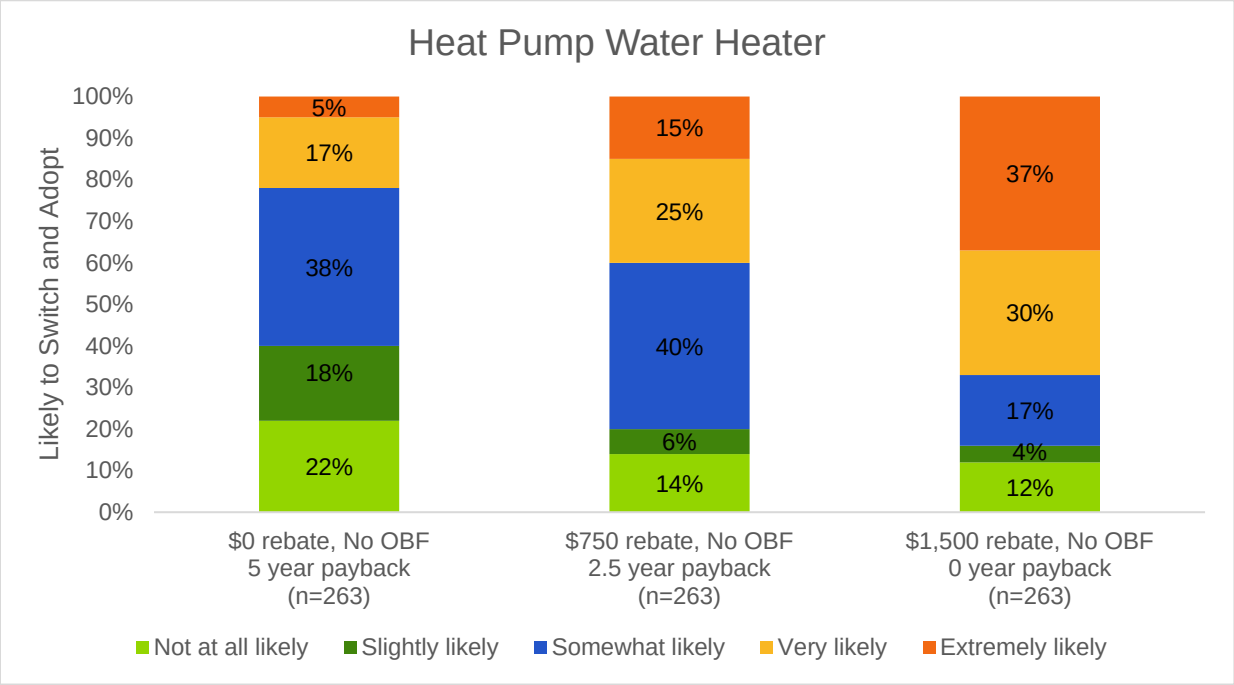
[a] Average importance of barriers measured on a 1 to 5 scale where 1 means 'not at a barrier,' 2 means 'minor barrier,' 3 means 'moderate barrier,' 4 means 'considerable barrier,' and 5 means 'major barrier.'

[b] Asked only to respondents who reported having a gas furnace.

[c] Asked only to respondents who reported having a gas storage water heater.

Source: Opinion Dynamics Analysis

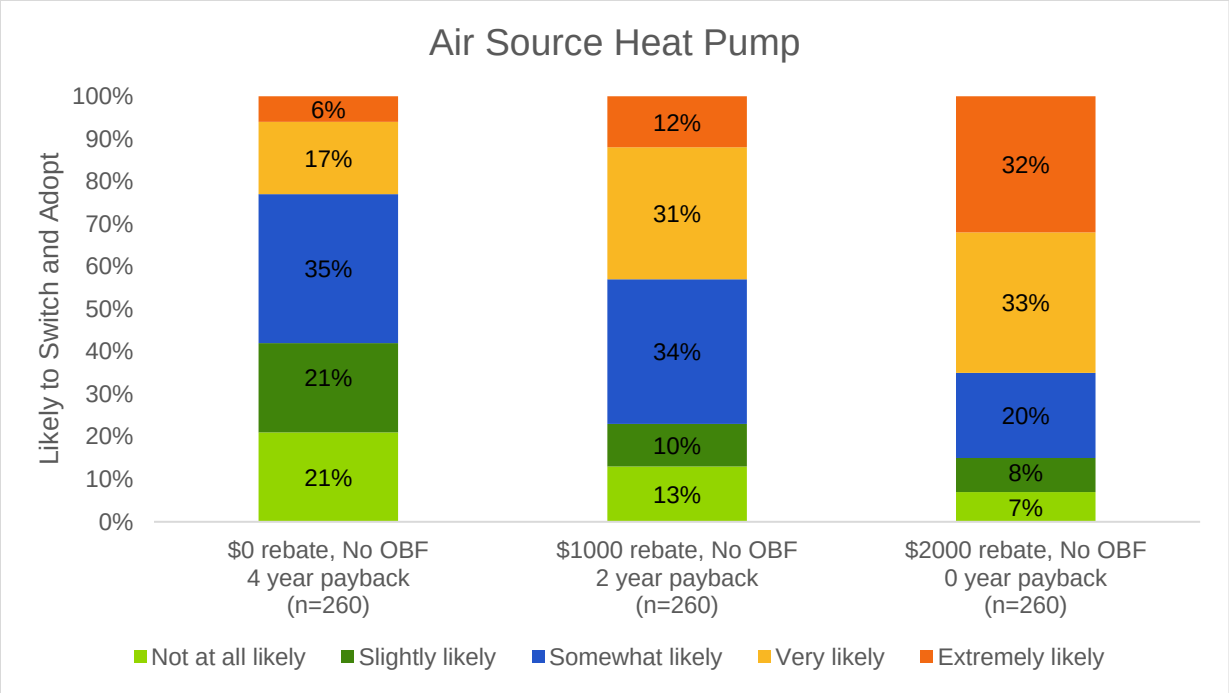
Figure C-8. Single-Family Residential Customers' Reported Willingness Switch to Electric Water Heating and Adopt a Heat Pump Water Heater Under Different Payback Scenarios [a]



[a] Surveyed customers with a gas water heater were asked to consider needing to replace it and their willingness to switch to electricity and adopt the electric EE heat pump model (vs. a gas standard efficiency water heater) under different payback scenarios. Respondents were asked the baseline first scenario without a rebate and were then asked the two follow-up rebate scenarios (and no OBF scenario). Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for average sized residential heat pump water heaters in California. A payback period is the amount of time for the average energy savings from the electric EE technology to equal the difference in cost between the electric EE and gas standard efficiency models.

Source: Opinion Dynamics Analysis

Figure C-9. Single-Family Residential Customers' Reported Willingness to Switch to Electric Heating/Cooling and Adopt an Air Source Heat Pump Under Different Payback Scenarios [a]



[a] Surveyed customers with a gas furnace were asked to consider needing to replace it and their willingness to switch to electricity and adopt the electric EE air source heat pump (vs. a gas standard efficiency furnace) under different payback scenarios. Respondents were asked the first baseline scenario without a rebate and were then asked the two follow-up rebate scenarios (and no OBF scenario). Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for average sized residential heat pump water heaters in California. A payback period is the amount of time for the average energy savings from the electric EE technology to equal the difference in cost between the electric EE and gas standard efficiency models.

Source: Opinion Dynamics Analysis

C.1.4 Demand Response Program Awareness, Barriers, and Willingness to Participate

Surveyed customers were presented with a brief description of demand response (DR) programs. Respondents who already have a smart thermostat in their home were asked about their awareness of DR programs and their willingness to participate in a DR program with their smart thermostat. Respondents were presented with three scenarios that included a one-time sign-up bonus and two levels of summer participation incentives.

Respondents who did not already have a smart thermostat were asked about their awareness of DR programs and their willingness to adopt a smart thermostat and participate in a DR program. Respondents were randomly assigned to one of two sets of scenarios. The first set of scenarios presented respondents with a technology rebate, one-time sign-up bonus, and summer

participation incentives. The second set of scenarios was the same as the first except it substituted on-bill financing in place of the technology rebate.

Table C-10. Single-Family Residential Customers' Reported Awareness and Participation in Demand Response (DR) Programs for Smart Thermostats [a]

Awareness/Participation	Percent
Owns a smart thermostat (n=154)	
Never heard of a DR program	36%
Heard of a DR program but never participated	34%
Currently participating in a DR program	17%
Participated in a DR program before but not currently	13%
Does not own a smart thermostat (n=182)	
Aware of a DR program	27%
Unaware of DR program	73%

[a] Surveyed customers with a smart thermostat were asked about their awareness and participation in DR programs while surveyed customers without a smart thermostat were only asked about their DR program awareness.

Source: Opinion Dynamics Analysis

Table C-11. Single-Family Residential Customers' Reported Average Importance of Barriers to Participating in Demand Response (DR) Smart Thermostat Programs [a]

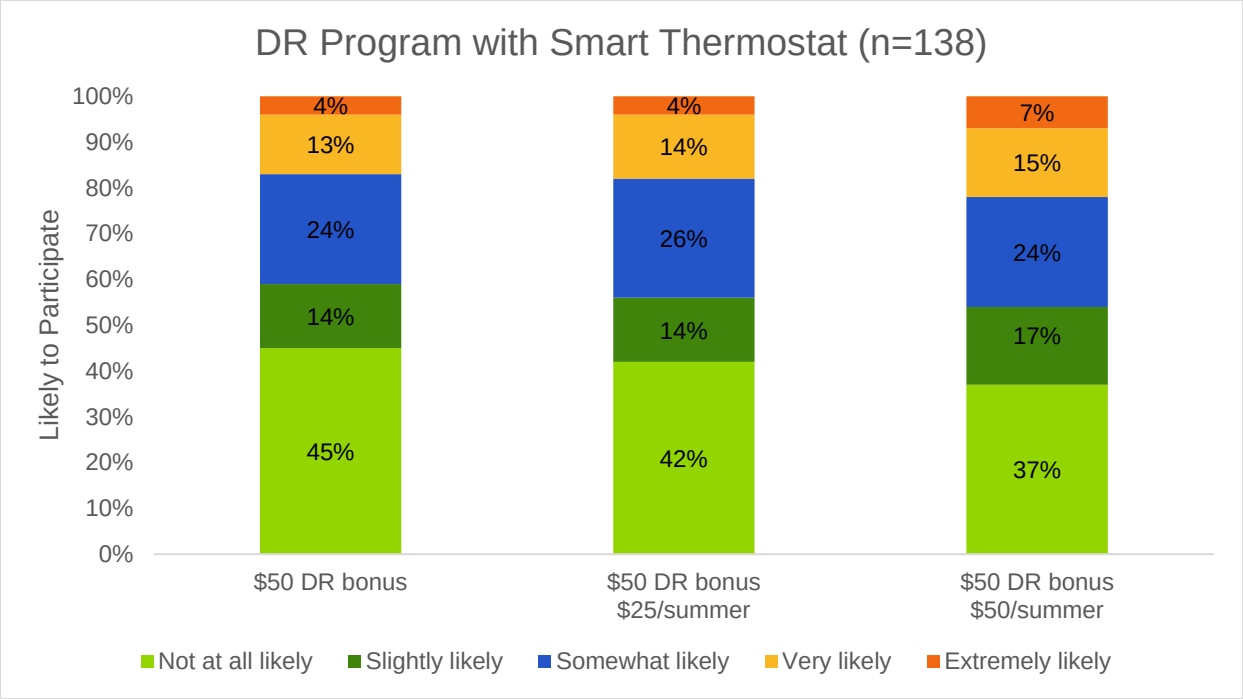
Participation Barriers	Owns a Smart Thermostat (n=138) [b]	Does Not Own a Smart Thermostat (n=182)	Total (n=320)
Allowing your utility to adjust the thermostat(s) during high demand events	3.6	3.6	3.6
Making changes to the temperature settings in your home during high demand events	3.1	3.2	3.1
Sharing thermostat data with your utility	3.0	3.2	3.1
Your level of familiarity or experience with a DR program	2.2	2.8	2.6
Your level of familiarity or experience with a smart thermostat	2.0	2.7	2.4

[a] Average importance of barriers measured on a 1 to 5 scale where 1 means 'not at a barrier,' 2 means 'minor barrier,' 3 means 'moderate barrier,' 4 means 'considerable barrier,' and 5 means 'major barrier.'

[b] Surveyed customers who reported currently participating in the DR program at the time of the survey were excluded from this analysis.

Source: Opinion Dynamics Analysis

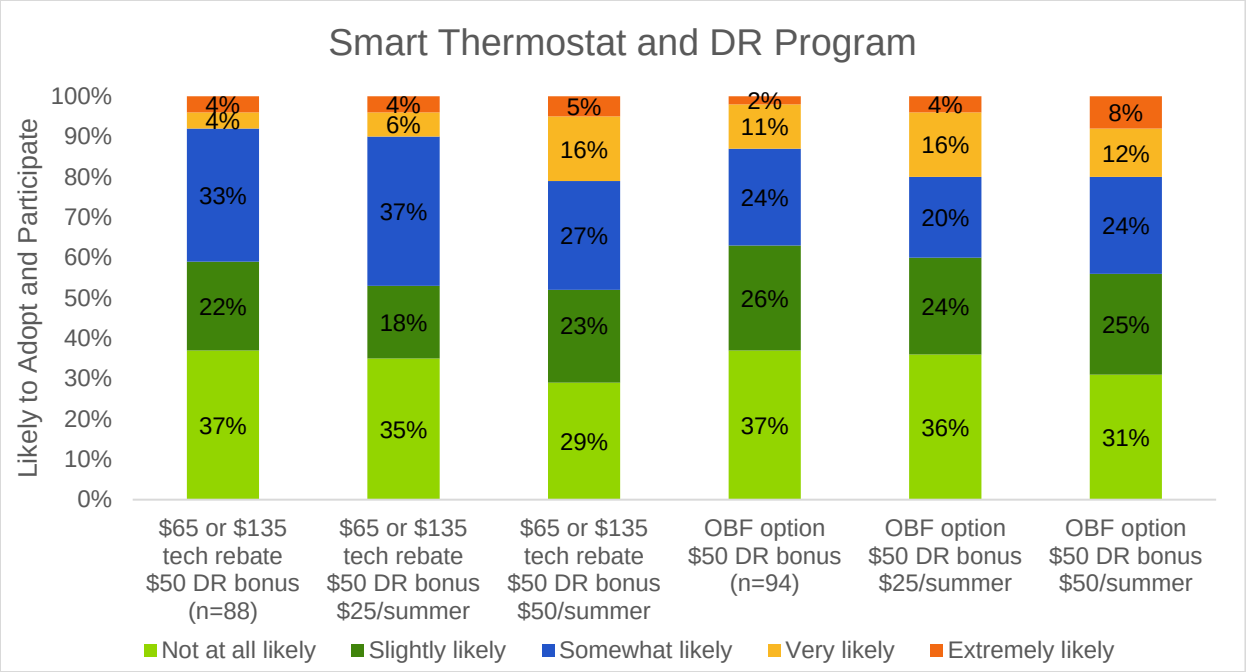
Figure C-10. Single-Family Residential Customers' Reported Willingness to Participate in a Demand Response (DR) Program with Their Smart Thermostat Under Different Incentive Scenarios [a]



[a] Surveyed customers with a smart thermostat and who are not currently participating in a DR program were asked about their willingness participate in a DR program with their smart thermostat under different incentive scenarios. Respondents were asked the first baseline scenario with just a DR sign-up bonus and were then asked about two follow-up scenarios that also included different amounts of a summer DR participation incentive. Respondents who reported they were 'extremely likely' to participate in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to participate in a follow-up scenario than they reported in a previous scenario.

Source: Opinion Dynamics Analysis

Figure C-11. Single-Family Residential Customers' Reported Willingness to Adopt a Smart Thermostat and Participate in a Demand Response (DR) Program Under Different Incentive and OBF Scenarios [a, b]



[a] Surveyed customers without a smart thermostat were asked about their willingness to adopt a smart thermostat and participate in a smart thermostat DR program under different incentive scenarios. Some respondents were asked about a first baseline scenario with a technology rebate and a DR sign-up bonus, and were then asked about two follow-up scenarios that also included different amounts of a summer DR participation incentive. Other respondents were asked about the first baseline scenario with an OBF option for the thermostat and a DR sign-up bonus, and were then asked about two follow-up scenarios that also included the summer DR participation incentives. Respondents who reported they were 'extremely likely' to adopt and participate in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt and participate in a follow-up scenario than they reported in a previous scenario.

[b] All the respondents in this analysis also answered questions about their willingness to purchase a smart thermostat with a rebate (and no DR program) earlier in the survey. Some respondents reported they were "extremely likely" to adopt a smart thermostat with a $65 rebate (that reduced payback period by half) and others did so with a $135 rebate (that reduced payback period to zero). When presented with the DR program scenario, respondents were reminded of the tech rebate amount they preferred earlier in the survey. The respondents with different tech rebate preferences are combined in this analysis because separating them produces smaller counts with less statistical confidence/precision, and their reported willingness to participate in the DR program did not differ significantly by the rebate amount. This is the reason for '$65 or $135 tech rebate' criteria in the figure.

Source: Opinion Dynamics Analysis

C.1.5 COVID-19 Pandemic Impacts

Surveyed customers were asked about how the COVID-19 pandemic has impacted their lives and their comfort level with having contractors in their home. See Table C-5 and Table C-7 for the reported COVID-19 impacts on specific cost barriers.

Table C-12. Single-Family Residential Customers' Reported Impacts of COVID-19 Pandemic on their Lives

Impacts	Percent (n=598)
Impact on everyday life:	
Large negative impact	19%
Moderate negative impact	43%
Little or no impact	28%
Moderate positive impact	7%
Large positive impact	2%
Changes to financial situation since January 2020 (before start of pandemic):	
Worsened	29%
No change	63%
Improved	8%
Expected changes to financial situation in 12 months (from time of survey):	
Will worsen	19%
Will not change	60%
Will improve	21%

Source: Opinion Dynamics Analysis

Table C-13. Single-Family Residential Customers' Reported Comfort Level with Contractors Working Inside Their Home During the COVID-19 Pandemic

Comfort Level	Percent (n=598)
Very comfortable	26%
Somewhat comfortable	36%
Somewhat uncomfortable	23%
Very uncomfortable	14%

Source: Opinion Dynamics Analysis

C.2 Multifamily Residential

The 104 surveyed residential multi-family customers are owners or managers of buildings with five or more units who make decisions about the energy-using technologies in the tenant units. Respondents reported at least one tenant unit at their multi-family property is rented at market rate and not an affordable, low income rate.

Respondents were asked about their awareness of energy efficiency (EE) programs and technologies, their related attitudes and behaviors, their technology adoption factors and barriers, their willingness to adopt EE technologies, and the impacts of the COVID-19 pandemic on their business and decision-making. Respondents were asked about one of two minor investment technologies that is lower in cost and installation difficulty (e.g., thermostat), one of two major investment technologies that is higher in cost and installation difficulty (e.g., water heater), and a fuel switching technology from a natural gas model to an EE electric model.

The survey results are displayed in the tables and figures below. Results are for all survey respondents combined. For more granular results, please see the datasets referenced in

Section 3.3. For the final willingness to adopt results, please see Guidehouse's 2021 Potential and Goals report (to be published in Q3 2021).

C.2.1 Energy Efficiency (EE) Program and Technology Awareness

Surveyed customers were asked about their awareness of and participation in IOU EE programs and their awareness of select EE technologies.

Table C-14. Multifamily Building Owners' & Managers' Reported Awareness and Participation in California IOU Energy Efficiency Programs

Awareness/Participation	Percent (n=104)
Aware that electric utility offers rebates and incentives to save energy	71%
Received a rebate or incentive for energy efficient technology from utility	18%

Source: Opinion Dynamics Analysis

Table C-15. Multifamily Building Owners' & Managers' Reported Awareness of Select Energy Efficiency (EE) Technologies

EE Technologies	Percent Aware (n=104)
Smart Thermostat	80%
Heat Pump Water Heater	26%

Source: Opinion Dynamics Analysis

C.2.2 Energy, Environmental, and Financial Attitudes and Behaviors

Surveyed customers were asked about their attitudes and behaviors important to energy efficient technology adoption, such as those regarding energy, environment, and finances.

Table C-16. Multifamily Building Owners' & Managers' Reported Attitudes and Behaviors Regarding Energy, Environment, and Finances [a]

Attitudes/Behaviors	Average Agreement (n=104)
California businesses should do what they can to reduce their energy consumption.	4.4
It is important for our tenants and peers to see our company as environmentally conscious.	4.1
My company considers the environmental impacts of energy-related equipment or devices we purchase.	4.0
If it means my company can save energy costs in the long term, we will pay more upfront for energy efficient equipment or devices.	3.8
My company purchases energy efficient equipment only if it meets our financial criteria, such as payback or ROI.	3.6
My company likes to be one of the first among its peers and competitors to purchase the latest high-tech products and equipment.	3.1
It takes a lot of effort for my company to be energy efficient.	3.0

[a] Average agreement measured on a 1 to 5 scale where 1 means 'strongly disagree,' 3 means 'neither agree nor disagree,' and 5 means 'strongly agree.'

Source: Opinion Dynamics Analysis

C.2.3 Technology Adoption Factors, Barriers, and Willingness

Surveyed customers were asked about what factors and barriers they consider important to adopting a technology. Respondents were asked their willingness to adopt an energy efficient model of a technology, in comparison to a standard efficiency model, in the event they needed to replace what they have in their tenant units. Respondents were randomly assigned one of two minor investment technologies and one of two major investment technologies to consider in the survey. The survey included only one fuel switching technology for respondents to consider.

Respondents were first presented with a baseline scenario that did not include a rebate. Then, for most of the technologies, respondents were asked about two follow-up rebate scenarios that reduced the payback period to half and to zero. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario.

High efficiency insulation is an exception in which respondents were asked about reducing the payback period by one-fourth and by one-half, respectively, since they were not comparing it to a lower efficiency insulation option. In addition, the respondents were not presented with an on-bill financing (OBF) scenario since the technologies they were answering questions about are in tenant units; most the respondents do not pay tenants' energy bills and thus would not be eligible for OBF.

Financial Factors

Table C-17. Multifamily Building Owners' & Managers' Reported Financial Factors They Consider When Deciding to Purchase a Minor and Major Investment Technology [a]

Financial Factors Considered in Decisions to Make an Investment [b]	Minor Investment (n=104)	Major Investment (n=104)
Operating & maintenance cost (including energy cost to operate)	61%	67%
Upfront cost (including equipment, delivery & installation)	59%	67%
Return on investment (ROI)	26%	46%
Payback period	22%	35%
Depreciation	N/A	22%

[a] Minor investment technologies have lower costs and installation difficulty and major investment technologies have higher cost and installation difficulty. Respondents could select more than one factor.

[b] Percent of respondents who consider each factor when making a minor and major investment.

Source: Opinion Dynamics Analysis

Minor Investment Technologies

Table C-18. Multifamily Building Owners' & Managers' Reported Average Importance of Factors They Consider About Adopting Energy Efficient (EE) Minor Investment Technologies [a]

Adoption Factors	Refrigerator (n=54)	Smart Thermostat (n=50)	Total (n=104)
Ease of use	3.8	3.9	3.8
Amount of time required between making the purchase and installing it in your units	3.9	3.3	3.6
Ease of installation	3.7	3.4	3.5
The amount or cost of energy it uses or saves	3.2	3.3	3.3
Capacity or size of the technology; size of thermostat	3.7	2.3	3.1
Look and feel	3.2	3.0	3.1
Available information about different models	2.9	2.6	2.7
Advanced features or settings like Internet connectivity, remote control from a tablet or smartphone, etc.	1.3	2.4	1.9
Noise level	3.5	N/A	N/A

[a] Average importance of factors measured on a 1 to 5 scale where 1 means 'not at all important,' 2 means 'slightly important,' 3 means 'moderately important,' 4 means 'very important,' and 5 means 'extremely important.'

Source: Opinion Dynamics Analysis

Table C-19. Multifamily Building Owners' & Managers' Reported Average Barriers to Adopting Energy Efficient (EE) Minor Investment Technologies [a]

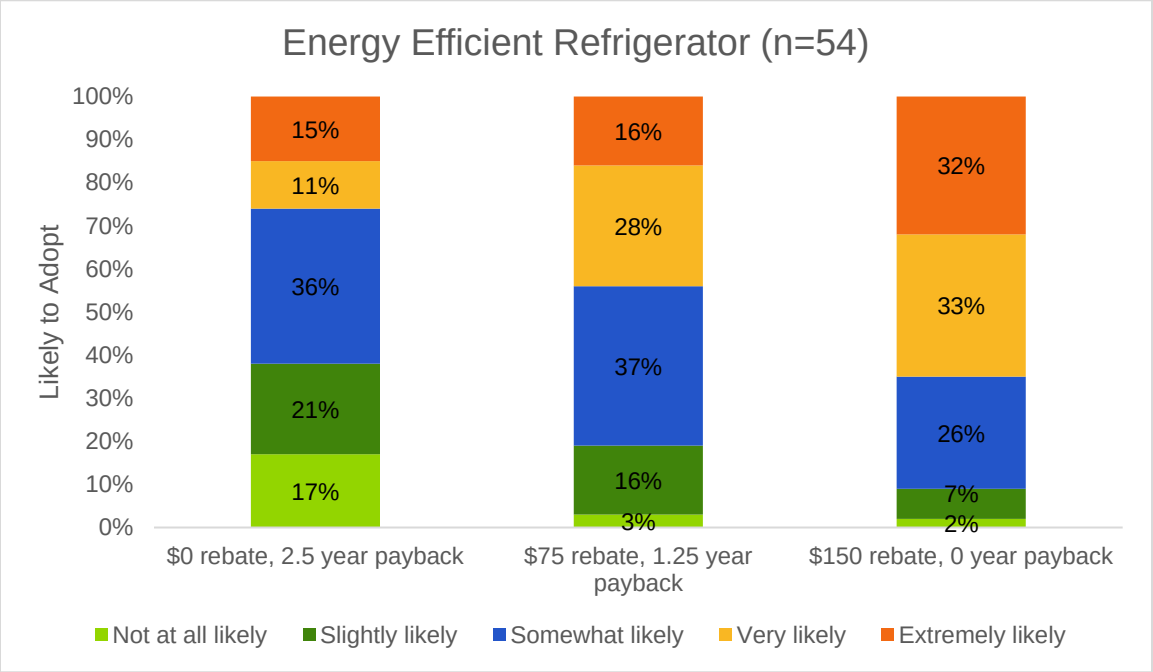
Adoption Barriers	Refrigerator (n=54)	Smart Thermostat (n=50)	Total (n=104)
The higher upfront cost of the EE model (during COVID-19 pandemic) [b]	3.2	3.0	3.1
Cost before pandemic	3.1	3.0	3.1
Uncertainty about whether it will save as much energy as estimated	2.7	2.9	2.8
The potential disruption caused to install it in the units	2.7	2.8	2.7
Limited or no access to financing options (during COVID-19 pandemic) [b]	2.1	2.3	2.2
Financing before pandemic	2.1	2.2	2.1

[a] Average importance of barriers measured on a 1 to 5 scale where 1 means 'not at a barrier,' 2 means 'minor barrier,' 3 means 'moderate barrier,' 4 means 'considerable barrier,' and 5 means 'major barrier.'

[b] Surveyed customers were asked how much of a barrier costs and financing would have been during and before the COVID-19 pandemic.

Source: Opinion Dynamics Analysis

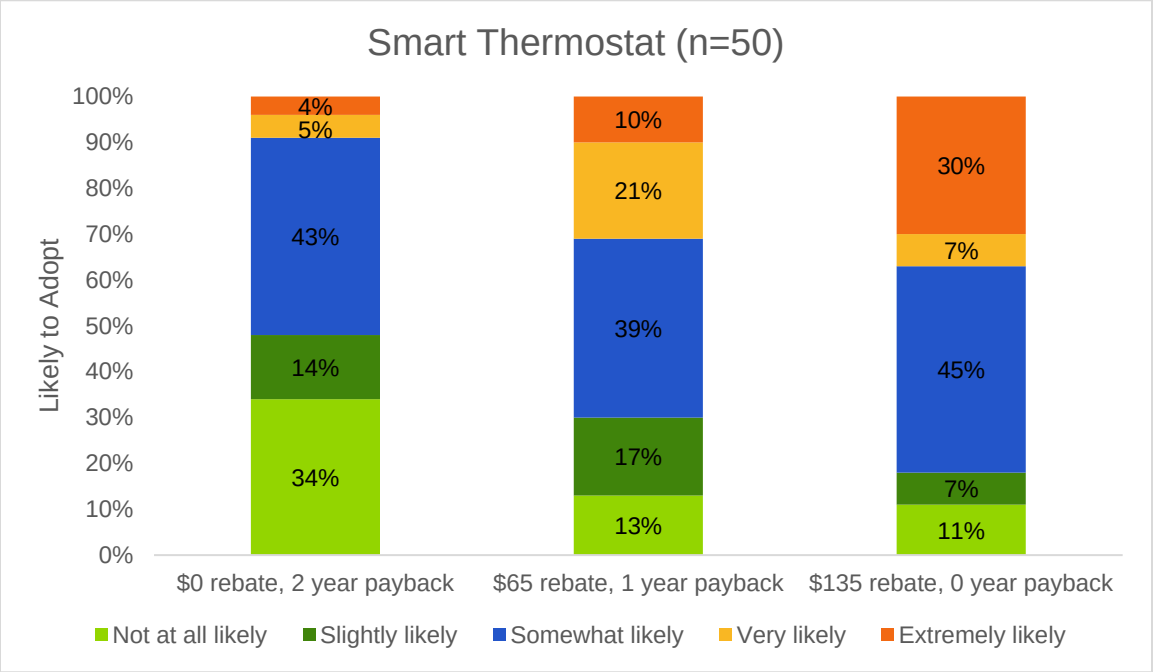
Figure C-12. Multifamily Building Owners' & Managers' Reported Willingness to Adopt an Energy Efficient (EE) Refrigerator Under Different Payback Scenarios [a]



[a] Surveyed customers were asked to consider needing to replace a refrigerator in a tenant unit and their willingness to adopt the EE model (vs. a standard efficiency model) under different payback scenarios. All respondents were asked the first baseline scenario without a rebate and were then asked the two follow-up rebate scenarios. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for average sized refrigerators in California. A payback period is the amount of time for the average energy savings from the EE technology to equal the difference in cost between the EE and standard efficiency models.

Source: Opinion Dynamics Analysis

Figure C-13. Multifamily Building Owners' & Managers' Reported Willingness to Adopt a Smart Thermostat Under Different Payback Scenarios [a]



[a] Surveyed customers were asked to consider needing to replace a thermostat in a tenant unit and their willingness to adopt the smart thermostat (vs. a standard programmable model) under different payback scenarios. All respondents were asked the first baseline scenario without a rebate and were then asked the two follow-up rebate scenarios. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for smart thermostats in California. A payback period is the amount of time for the average energy savings from the smart technology to equal the difference in cost between the smart and standard models.

Source: Opinion Dynamics Analysis

Major Investment Technologies

Table C-20. Multifamily Building Owners' & Managers' Reported Average Importance of Factors They Consider About Adopting Energy Efficient (EE) Major Investment Technologies [a]

Adoption Factors	Water Heater (n=52)	Insulation (n=52)	Total (n=104)
Amount of time required between making the purchase and installing it in your units	3.7	3.4	3.5
Potential comfort benefits	3.1	3.3	3.2
The amount or cost of energy it uses or saves	3.2	3.3	3.3
Available information about different models	2.9	3.2	3.1
Average life span or rate of depreciation	4.1	N/A	N/A
Ease of use	3.5	N/A	N/A
Noise level	3.2	N/A	N/A

Adoption Factors	Water Heater (n=52)	Insulation (n=52)	Total (n=104)
Look and feel	2.3	N/A	N/A
Advanced features or settings like Internet connectivity, remote control from a tablet or smartphone, etc.	1.9	N/A	N/A

[a] Average importance of factors measured on a 1 to 5 scale where 1 means 'not at all important,' 2 means 'slightly important,' 3 means 'moderately important,' 4 means 'very important,' and 5 means 'extremely important.'

Source: Opinion Dynamics Analysis

Table C-21. Multifamily Building Owners' & Managers' Reported Average Importance of Barriers to Adopting Energy Efficient (EE) Major Investment Technologies [a]

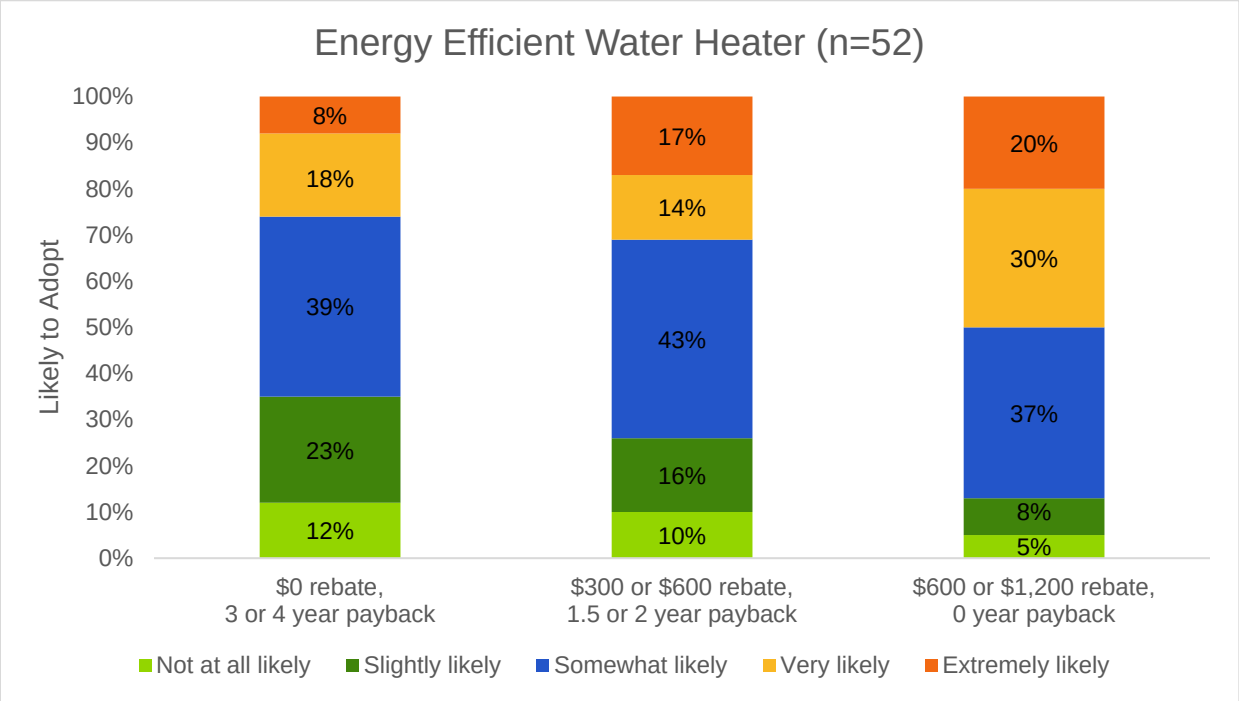
Adoption Barriers	Water Heater (n=52)	Insulation (n=52)	Total (n=104)
The potential disruption caused to install it in the units	3.1	3.7	3.4
The higher upfront cost of the EE model (during COVID-19 pandemic) [b]	2.9	3.7	3.2
Cost before pandemic	3.0	3.5	3.2
Uncertainty about energy savings	2.7	3.3	3.0
Limited or no access to financing options (during COVID-19 pandemic) [b]	2.1	2.6	2.4
Financing before pandemic	2.0	2.5	2.3

[a] Average importance of barriers measured on a 1 to 5 scale where 1 means 'not at a barrier,' 2 means 'minor barrier,' 3 means 'moderate barrier,' 4 means 'considerable barrier,' and 5 means 'major barrier.'

[b] Surveyed customers were asked how much of a barrier costs and financing would have been during and before the COVID-19 pandemic.

Source: Opinion Dynamics Analysis

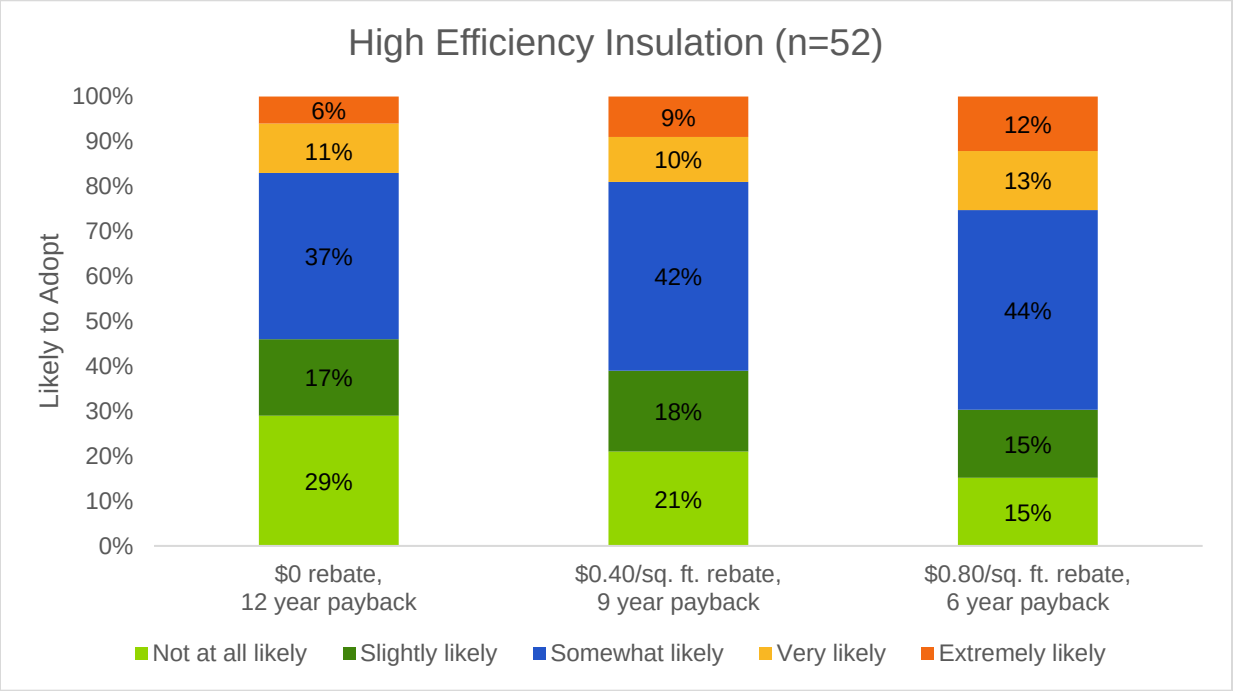
Figure C-14. Multifamily Building Owners' & Managers' Reported Willingness to Adopt an Energy Efficient (EE) Water Heater Under Different Payback Scenarios [a]



[a] Surveyed customers were asked to consider needing to replace a water heater for a tenant unit(s) and their willingness to adopt the EE model (vs. a standard efficiency model) under different payback scenarios. Respondents who had a less expensive, residential-sized water heater were presented with the lower rebate amounts and payback periods than those with a more expensive, commercial-sized water heater. All respondents were asked the first baseline scenario without a rebate and were then asked the two follow-up rebate scenarios. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for average sized residential and commercial water heaters in California. A payback period is the amount of time for the average energy savings from the EE technology to equal the difference in cost between the EE and standard efficiency models.

Source: Opinion Dynamics Analysis

Figure C-15. Multifamily Building Owners' & Managers' Reported Willingness to Adopt High Efficiency Insulation Under Different Payback Scenarios [a]



[a] Surveyed customers were asked to consider adding or upgrading insulation in the exterior walls of a tenant unit and their willingness to do so under different payback scenarios. All respondents were asked the first baseline scenario without a rebate and were then asked the two follow-up rebate scenarios. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for high efficiency wall insulation in California. The payback period is the amount of time for the average energy savings from the high efficiency insulation to equal the difference in cost between adopting and not adopting the insulation.

Source: Opinion Dynamics Analysis

Fuel Switching Technologies

Table C-22. Multifamily Building Owners' & Managers' Reported Average Importance of Factors They Consider About Switching from Gas to Energy Efficient (EE) Electric Fuel Technologies [a]

Fuel Switching Factors	Heat Pump Water Heater (n=68)
Longer lasting equipment	3.5
Lower utility bills	3.3
Improved efficiency and lower energy usage	3.1
Faster water heating	3.1
Reduced environmental impacts like air and water pollution	3.0

[a] Average importance of factors measured on a 1 to 5 scale where 1 means 'not at all important,' 2 means 'slightly important,' 3 means 'moderately important,' 4 means 'very important,' and 5 means 'extremely important.' Asked only to respondents who reported having a gas storage water heater.

Source: Opinion Dynamics Analysis

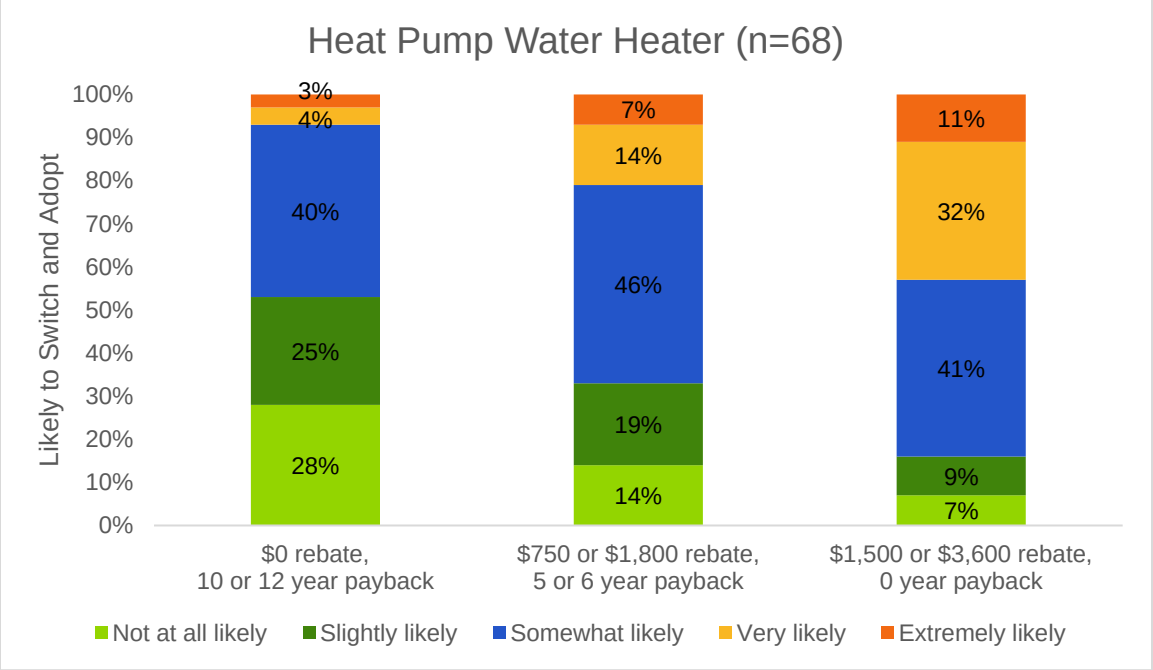
Table C-23. Multifamily Building Owners' & Managers' Reported Average Importance of Barriers to Switching from Gas to Energy Efficient (EE) Electric Fuel Technologies

Fuel Switching Barriers	Heat Pump Water Heater (n=68)
The need for potential structural, electrical, and/or plumbing changes to install the technology in the facility	3.6
The higher upfront cost of an electric EE model	3.5
Uncertainty about energy savings	3.1
The slightly larger size of an electric heat pump water heater (vs. standard gas water heater of similar storage capacity)	3.0
Lack of experience or familiarity with the technology	2.9
Limited or no access to financing options	2.2

[a] Average importance of barriers measured on a 1 to 5 scale where 1 means 'not at a barrier,' 2 means 'minor barrier,' 3 means 'moderate barrier,' 4 means 'considerable barrier,' and 5 means 'major barrier.' Asked only to respondents who reported having a gas storage water heater.

Source: Opinion Dynamics Analysis

Table C-24. Multifamily Building Owners' & Managers' Reported Willingness Switch to Electric Water Heating and Adopt a Heat Pump Water Heater Under Different Payback Scenarios [a]



[a] Surveyed customers with a gas water heater for tenant units were asked to consider needing to replace it and their willingness to switch to electricity and adopt the electric EE heat pump model (vs. a gas standard efficiency water heater) under different payback scenarios. Respondents who had a less expensive, residential-sized water heater were presented with the lower rebate amounts and payback periods than those with a more expensive, commercial-sized water heater. Respondents were asked the first baseline scenario without a rebate and were then asked the two follow-up rebate scenarios (and no OBF scenario). Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for average sized residential and commercial

heat pump water heaters in California. A payback period is the amount of time for the average energy savings from the electric EE technology to equal the difference in cost between the electric EE and gas standard efficiency models.

Source: Opinion Dynamics Analysis

C.2.4 COVID-19 Pandemic Impacts

Surveyed customers were asked about how the COVID-19 pandemic has impacted their business and their comfort level with having contractors in their tenants' units. See Table C-19 and Table C-21 for the reported COVID-19 impacts on specific cost barriers.

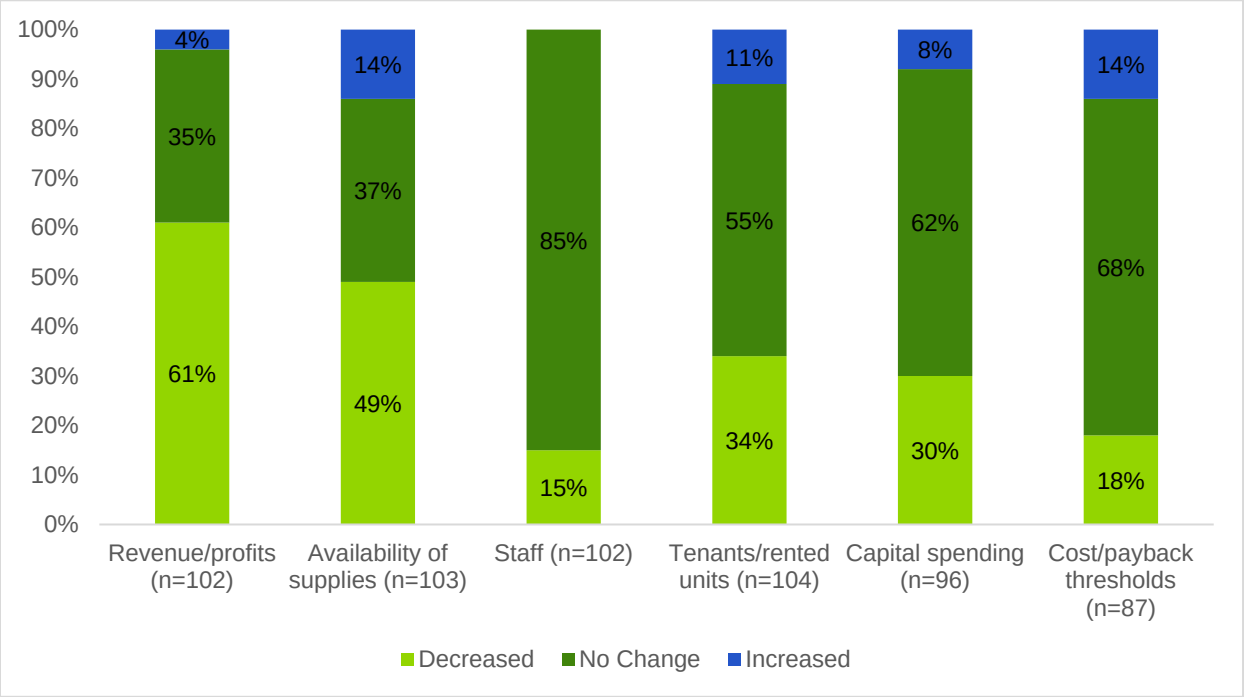
Table C-25. Multifamily Building Owners' & Managers' Reported Impacts of the COVID-19 Pandemic on their Business

Impacts	Percent
Impact on business overall (n=104)	
Large negative impact	13%
Moderate negative impact	55%
Little or no impact	31%
Moderate positive impact	2%
Large positive impact	0%
Changes to planned investment projects (n=97) [a]	
Postponed project(s)	50%
No planned projects during pandemic	37%
Canceled project(s)	8%
Fast-tracked or sped up planned project(s)	5%
Number of projects postponed (n=40)	
1 to 10	40%
11 to 20	30%
More than 20	30%
Average	19
Range	1 to 60

[a] Excludes 'Don't know' responses.

Source: Opinion Dynamics Analysis

Figure C-16. Multifamily Building Owners' & Managers' Reported Change in Aspects of Their Business Due to the COVID-19 Pandemic [a]



[a] Excludes 'Don't know' and 'Not applicable' responses.

Source: Opinion Dynamics Analysis

Table C-26. Multifamily Building Owners' & Managers' Reported Comfort Level With Contractors Working Inside Tenant Units During the COVID-19 Pandemic

Comfort Level	Percent (n=104)
Very comfortable	41%
Somewhat comfortable	30%
Somewhat uncomfortable	9%
Very uncomfortable	10%
Don't know	10%

Source: Opinion Dynamics Analysis

C.3 Commercial

The 757 surveyed commercial customers are owners or employees of their business who make decisions about the energy-using technologies in their facility. The surveyed commercial customers exclude those from the industrial, agricultural, or government sectors.

Respondents were asked about their awareness of energy efficiency (EE) programs and technologies, their related attitudes and behaviors, their technology adoption factors and barriers, their willingness to adopt EE technologies and participate in demand response (DR)

programs, and the impacts of the COVID-19 pandemic on their business and decision-making. Respondents were asked about one of four minor investment technologies that is lower in cost and installation difficulty (e.g., thermostat), one of four major investment technologies that is higher in cost and installation difficulty (e.g., water heater), and a fuel switching technology from a natural gas model to an EE electric model.

The survey results are displayed in the tables and figures below. Results are for all survey respondents combined. For more granular results by business size or segment, please see the datasets referenced in Section 3.3. For the final willingness to adopt results, please see Guidehouse's 2021 Potential and Goals report (to be published in Q3 2021).

C.3.1 Energy Efficiency (EE) Program and Technology Awareness

Surveyed customers were asked about their awareness of and participation in IOU EE programs and their awareness of select EE technologies.

Table C-27. Commercial Customers' Reported Awareness and Participation in California IOU Energy Efficiency Programs

Awareness/Participation	Percent (n=757)
Aware that electric utility offers rebates and incentives to save energy	59%
Received a rebate or incentive for energy efficient technology from utility	12%

Source: Opinion Dynamics Analysis

Table C-28. Commercial Customers' Reported Awareness of Select Energy Efficiency (EE) Technologies

EE Technologies	Percent Aware
Smart Thermostat (n=757)	83%
Energy Management System (n=335)	21%
Heat Pump Water Heater (n=445)	18%

Source: Opinion Dynamics Analysis

C.3.2 Energy, Environmental, and Financial Attitudes and Behaviors

Surveyed customers were asked about their attitudes and behaviors important to energy efficient technology adoption, such as those regarding energy, environment, and finances.

Table C-29. Commercial Customers' Reported Attitudes and Behaviors Regarding Energy, Environment, and Finances [a]

Attitudes/Behaviors	Average Agreement (n=757)
California businesses should do what they can to reduce their energy consumption.	4.4
It is important for our customers and peers to see us as environmentally conscious.	4.1

Attitudes/Behaviors	Average Agreement (n=757)
If it means we can save energy costs in the long term, we will pay more upfront for energy efficient equipment or devices.	3.9
We purchase energy efficient equipment *only* if it meets our financial criteria, such as payback or ROI.	3.7
It takes a lot of effort for my company to be energy efficient.	3.4
We like to be one of the first among our peers and competitors to purchase the latest high-tech products and equipment.	3.1
We *rarely* consider the environmental impacts of energy-related equipment or devices we purchase.	2.3

[a] Average agreement measured on a 1 to 5 scale where 1 means 'strongly disagree,' 3 means 'neither agree nor disagree,' and 5 means 'strongly agree.'

Source: Opinion Dynamics Analysis

C.3.3 Technology Adoption Factors, Barriers, and Willingness

Surveyed customers were asked about what factors and barriers they consider important to adopting a technology. Respondents were asked their willingness to adopt an energy efficient model of a technology, in comparison to a standard efficiency model, in the event they needed to replace what they have in their facility. Respondents were randomly assigned one of four minor investment technologies and one of four major investment technologies to consider in the survey. The survey included only one fuel switching technology for respondents to consider.

Respondents were first presented with a baseline scenario that did not include a rebate or on-bill financing (OBF) option. Then, for most of the technologies, respondents were asked about two follow-up rebate scenarios that reduced the payback period to half and to zero, respectively, or they were asked about a follow-up OBF scenario to finance the technology on their electricity bills. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario.

The computer power management, high efficiency insulation, and energy management system are exceptions in which respondents were asked about reducing the payback period by one-fourth and by one-half, respectively, since they were not comparing them to lower efficiency models. In addition, for the fuel switching technologies, respondents were not asked an OBF scenario.

Financial Factors

Table C-30. Commercial Customers' Reported Financial Factors They Consider When Deciding to Purchase a Minor and Major Investment Technology [a]

Financial Factors Considered in Decisions about Making an Investment [b]	Minor Investment (n=104)	Major Investment (n=104)
Operating & maintenance cost (including energy cost to operate)	64%	70%

Financial Factors Considered in Decisions about Making an Investment [b]	Minor Investment (n=104)	Major Investment (n=104)
Upfront cost (including equipment, delivery & installation)	74%	81%
Return on investment (ROI)	30%	52%
Payback period	24%	44%
Depreciation	N/A	23%

[a] Minor investment technologies have lower costs and installation difficulty and major investment technologies have higher cost and installation difficulty. Respondents could select more than one factor.

[b] Percent of respondents who consider each factor when making a minor and major investment.

Source: Opinion Dynamics Analysis

Minor Investment Technologies

Table C-31. Commercial Customers' Reported Average Importance of Factors They Consider About Adopting Energy Efficient (EE) Minor Investment Technologies [a]

Adoption Factors	Smart Power Strip (n=132)	Computer Power Management (n=131)	Smart Thermostat (n=357)	Occupancy Sensor (n=137)	Total (n=757)
Ease of use	3.6	3.7	3.8	3.6	3.7
The amount or cost of energy can save	3.3	3.4	3.8	3.6	3.6
Potential comfort benefits	N/A	N/A	3.3	3.1	3.2
Available information about different models	2.9	3.1	3.2	3.2	3.1
Amount of time required between making the purchase and installing it in your facility	2.7	3.0	3.1	3.0	3.0
Advanced features or settings	2.9	3.1	2.7	3.0	3.0
Look and feel	N/A	N/A	2.5	2.8	2.6

[a] Average importance of factors measured on a 1 to 5 scale where 1 means 'not at all important,' 2 means 'slightly important,' 3 means 'moderately important,' 4 means 'very important,' and 5 means 'extremely important.'

Source: Opinion Dynamics Analysis

Table C-32. Commercial Customers' Reported Average Importance of Barriers to Adopting Energy Efficient (EE) Minor Investment Technologies [a]

Adoption Barriers	Smart Power Strip (n=132)	Computer Power Management (n=131)	Smart Thermostat (n=357)	Occupancy Sensor (n=137)	Total (n=757)
Uncertainty about energy savings	2.8	2.9	2.9	3.1	2.9
Higher upfront cost of EE model (during COVID-19 pandemic) [b]	2.9	2.8	2.5	2.8	2.8
Cost before pandemic	2.6	2.6	2.4	2.6	2.5

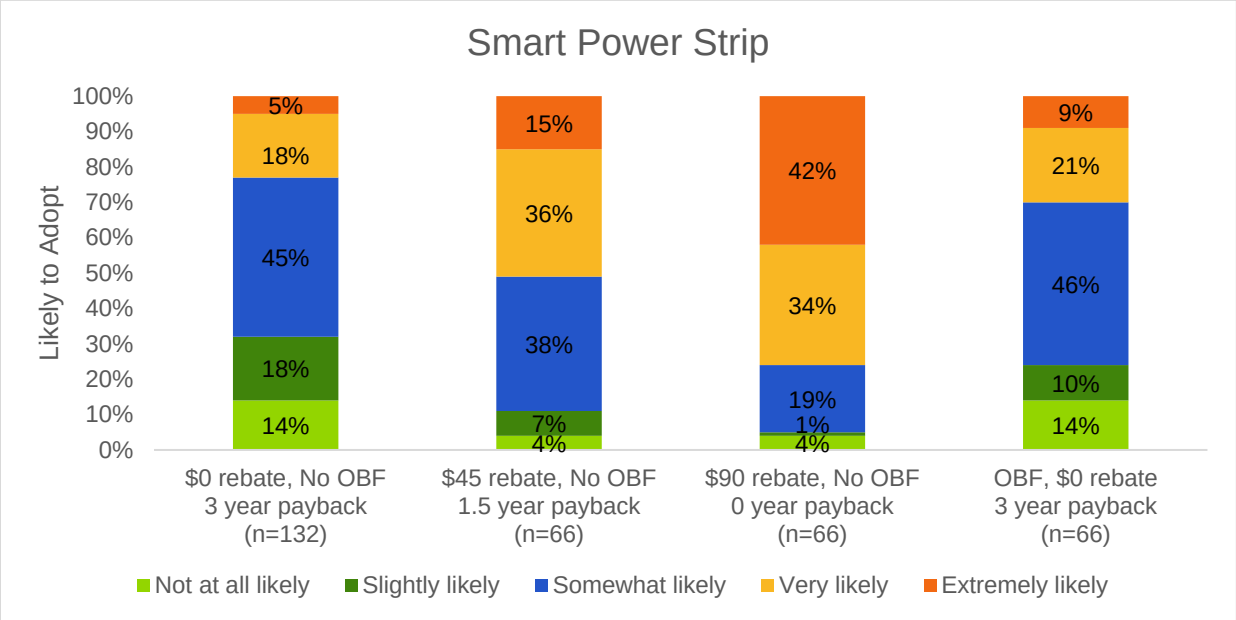
Adoption Barriers	Smart Power Strip (n=132)	Computer Power Management (n=131)	Smart Thermostat (n=357)	Occupancy Sensor (n=137)	Total (n=757)
Potential for disruption in facility to install the technology	N/A	3.0	2.5	2.8	2.7
Limited or no access to financing options (during COVID-19 pandemic) [b]	2.0	2.2	1.9	2.1	2.0
Financing before pandemic	1.8	2.2	1.8	2.1	1.9

[a] Average importance of barriers measured on a 1 to 5 scale where 1 means 'not at a barrier,' 2 means 'minor barrier,' 3 means 'moderate barrier,' 4 means 'considerable barrier,' and 5 means 'major barrier.'

[b] Surveyed customers were asked how much of a barrier costs and financing would have been during and before the COVID-19 pandemic.

Source: Opinion Dynamics Analysis

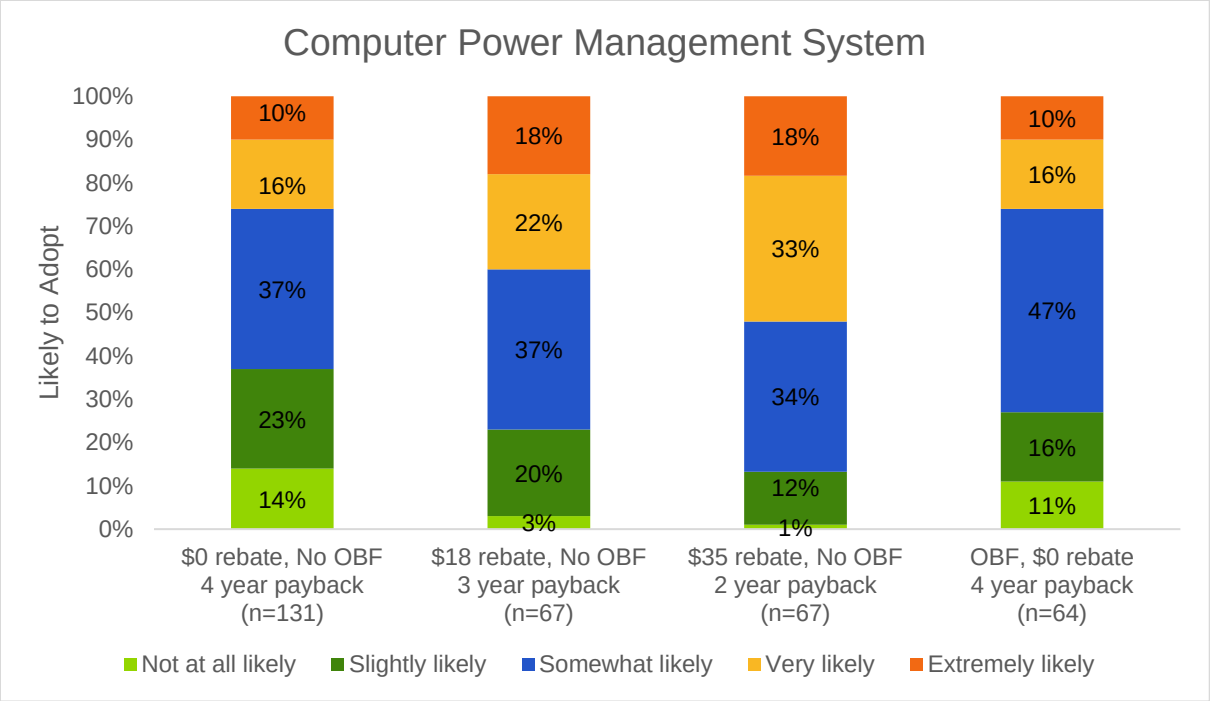
Figure C-17. Commercial Customers' Reported Willingness to Adopt a Smart Power Strip Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider needing to replace or upgrade their power strip and their willingness to adopt the smart model (vs. a standard model) under different payback scenarios. All respondents were asked the first baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for smart power strips in California. A payback period is the amount of time for the average energy savings from the smart technology to equal the difference in cost between the smart and standard models.

Source: Opinion Dynamics Analysis

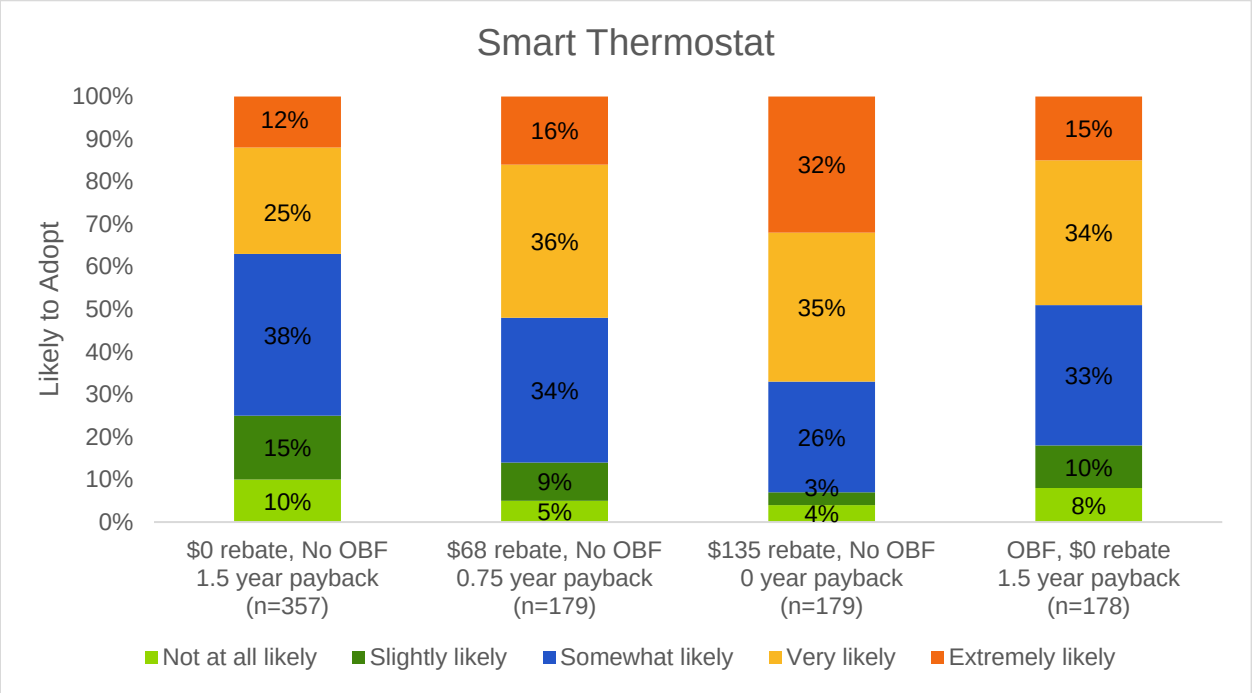
Figure C-18. Commercial Customers' Reported Willingness to Adopt a Computer Power Management System (CPMS) Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider adding a CPMS for one of their computers and their willingness to do so under different payback scenarios. All respondents were asked the first baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for CPMSs in California. The payback period is the amount of time for the average energy savings from the CMPS to equal the difference in cost between adopting and not adopting the CPMS.

Source: Opinion Dynamics Analysis

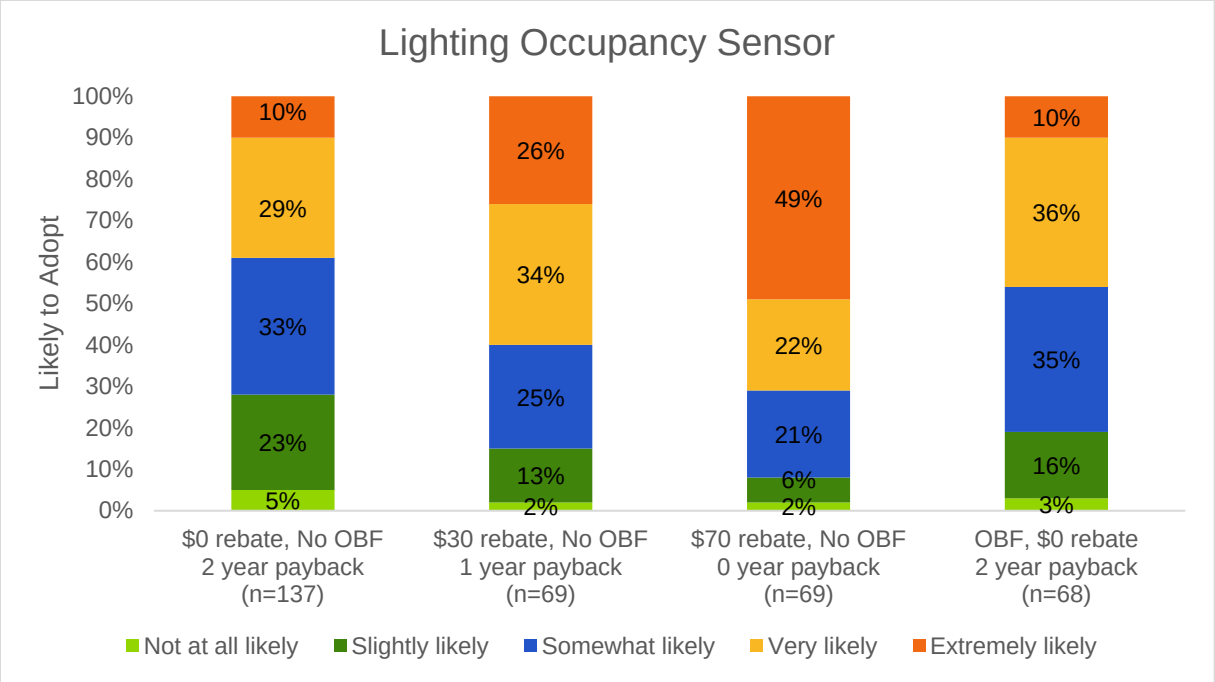
Figure C-19. Commercial Customers' Reported Willingness to Adopt a Smart Thermostat Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider needing to replace their thermostat and their willingness to adopt smart thermostat (vs. a standard programmable model) under different payback scenarios. All respondents were asked the first baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for smart thermostats in California. A payback period is the amount of time for the average energy savings from the smart technology to equal the difference in cost between the smart and standard models.

Source: Opinion Dynamics Analysis

Figure C-20. Commercial Customers' Reported Willingness to Adopt an Energy Efficient (EE) Lighting Occupancy Sensor Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider needing to add or replace their manual light switch and their willingness to adopt an EE occupancy sensor (vs. a manual switch) under different payback scenarios. All respondents were asked the first baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for occupancy sensors in California. A payback period is the amount of time for the average energy savings from the EE technology to equal the difference in cost between the EE and manual technologies.

Source: Opinion Dynamics Analysis

Major Investment Technologies

Table C-33. Commercial Customers' Reported Average Importance of Factors They Consider About Adopting Energy Efficient (EE) Major Investment Technologies [a]

Adoption Factors	Refrigerated Storage Case (n=129)	Water Heater (n=159)	Insulation (n=155)	Energy Management System (n=314)	Total (n=757)
The amount or cost of energy it uses or saves	3.7	3.5	3.5	3.9	3.7
Ease of use	3.9	3.4	N/A	3.8	3.7
Noise level	3.5	3.1	N/A	N/A	3.3
Available information about different models	3.3	3.0	3.1	3.3	3.2

Adoption Factors	Refrigerated Storage Case (n=129)	Water Heater (n=159)	Insulation (n=155)	Energy Management System (n=314)	Total (n=757)
Amount of time required between making the purchase and installing it in your facility	3.1	3.0	2.8	3.1	3.0
Potential comfort benefits	N/A	3.0	3.1	N/A	3.0
Advanced features or settings	2.7	2.4	N/A	3.1	2.8
Look and feel	2.9	2.1	N/A	2.8	2.6

[a] Average importance of factors measured on a 1 to 5 scale where 1 means 'not at all important,' 2 means 'slightly important,' 3 means 'moderately important,' 4 means 'very important,' and 5 means 'extremely important.'

Source: Opinion Dynamics Analysis

Table C-34. Commercial Customers' Reported Average Importance of Barriers to Adopting Energy Efficient (EE) Major Investment Technologies [a]

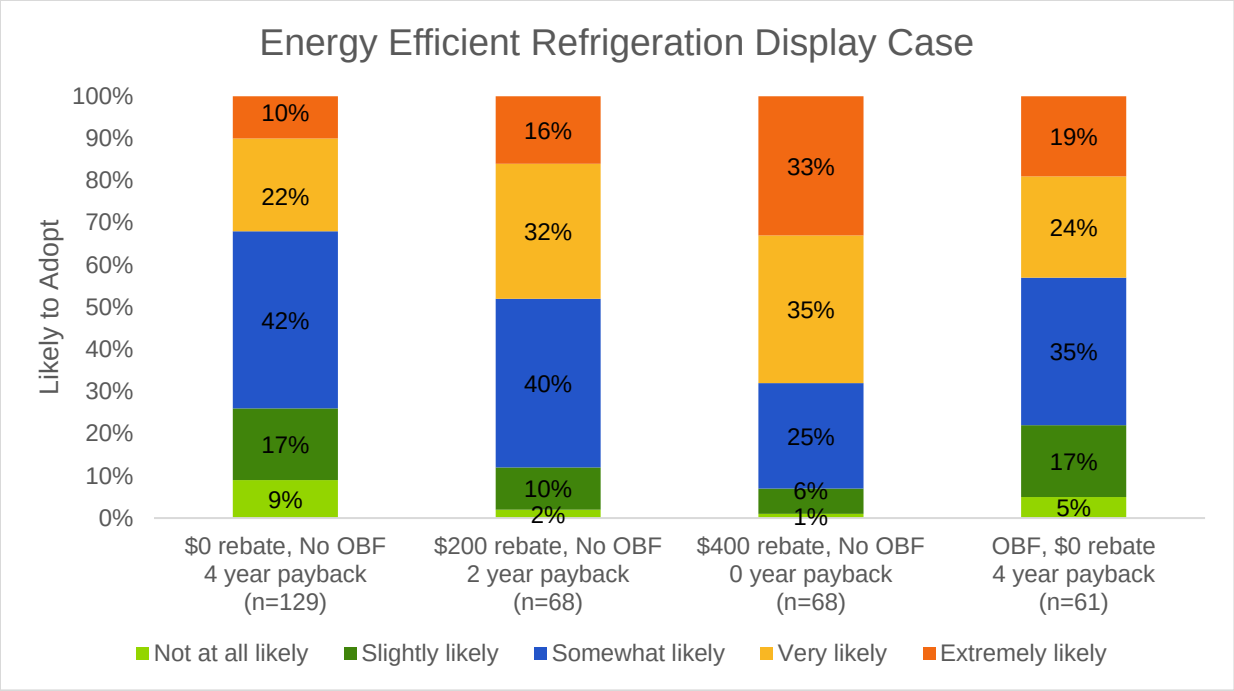
Adoption Barriers	Refrigerated Storage Case (n=129)	Water Heater (n=159)	Insulation (n=155)	Energy Management System (n=314)	Total (n=757)
Uncertainty about energy savings	3.1	3.0	3.1	3.2	3.1
Higher upfront cost of EE model (during COVID-19 pandemic) [b]	2.9	2.8	3.3	3.4	3.2
Cost before pandemic	2.9	2.6	3.0	3.1	3.1
Potential for disruption in facility to install the technology	2.9	2.7	3.3	3.0	3.0
Limited or no access to financing options (during COVID-19 pandemic) [b]	2.7	2.1	2.4	2.4	2.4
Financing before pandemic	2.6	2.1	2.2	2.4	2.3

[a] Average importance of barriers measured on a 1 to 5 scale where 1 means 'not at a barrier,' 2 means 'minor barrier,' 3 means 'moderate barrier,' 4 means 'considerable barrier,' and 5 means 'major barrier.'

[b] Surveyed customers were asked how much of a barrier costs and financing would have been during and before the COVID-19 pandemic.

Source: Opinion Dynamics Analysis

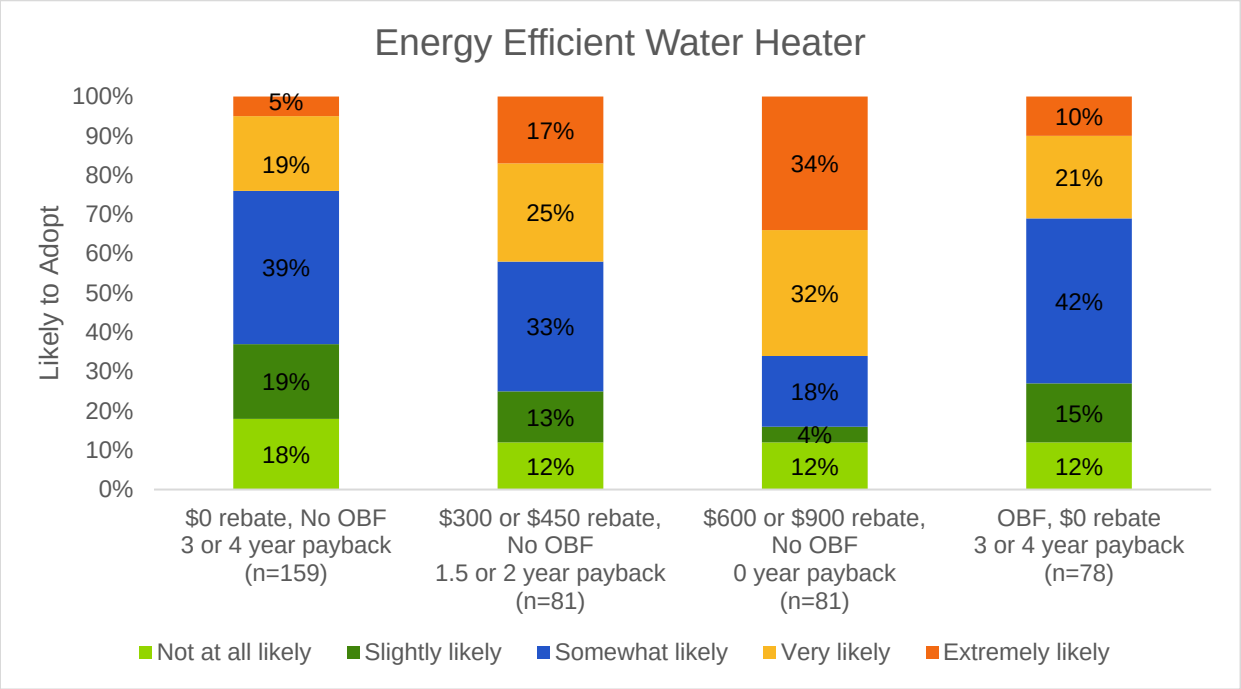
Figure C-21. Commercial Customers' Reported Willingness to Adopt an Energy Efficient (EE) Refrigeration Display Case Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider needing to replace their refrigeration display case and their willingness to adopt the EE model (vs. a standard efficiency model) under different payback scenarios. All respondents were asked the first baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for average sized refrigeration display cases in California. A payback period is the amount of time for the average energy savings from the EE technology to equal the difference in cost between the EE and standard efficiency models.

Source: Opinion Dynamics Analysis

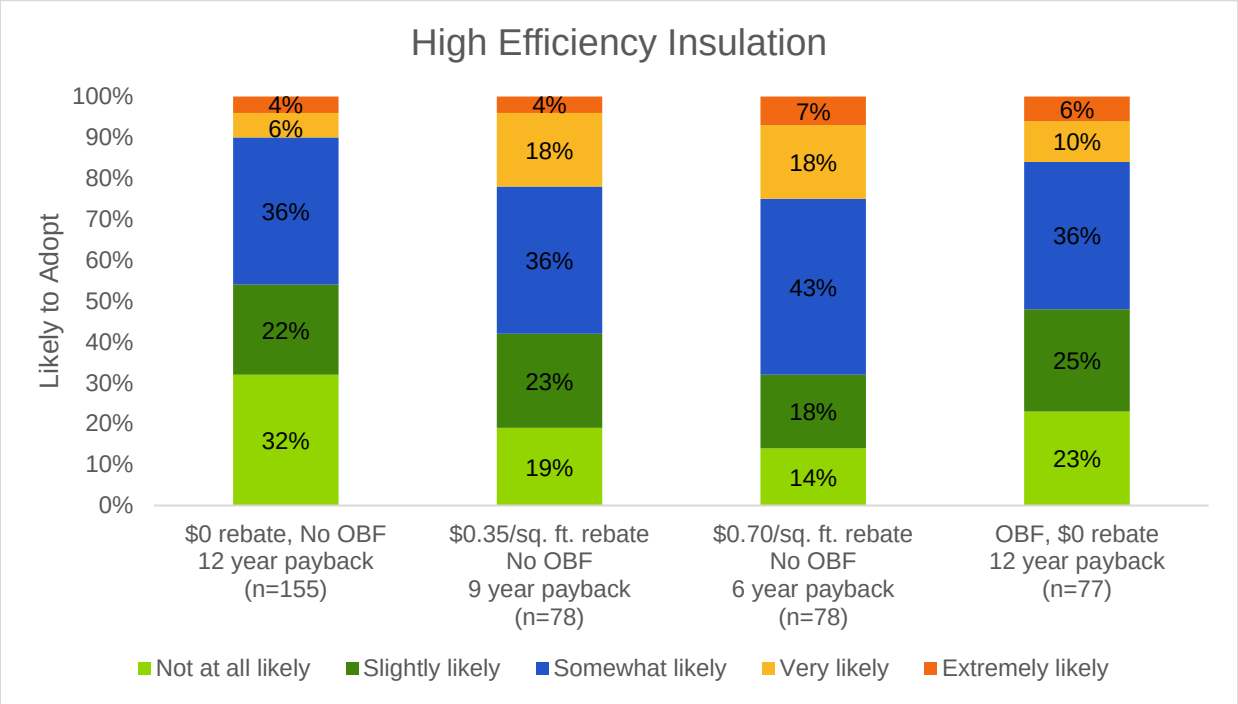
Figure C-22. Commercial Customers' Reported Willingness to Adopt an Energy Efficient (EE) Water Heater Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider needing to replace their water heater and their willingness to adopt the EE model (vs. a standard efficiency model) under different payback scenarios. Respondents who had a less expensive, residential-sized water heater were presented with the lower rebate amounts and payback periods than those with a more expensive, commercial-sized water heater. All respondents were asked the first baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for average sized residential and commercial water heaters in California. A payback period is the amount of time for the average energy savings from the EE technology to equal the difference in cost between the EE and standard efficiency models.

Source: Opinion Dynamics Analysis

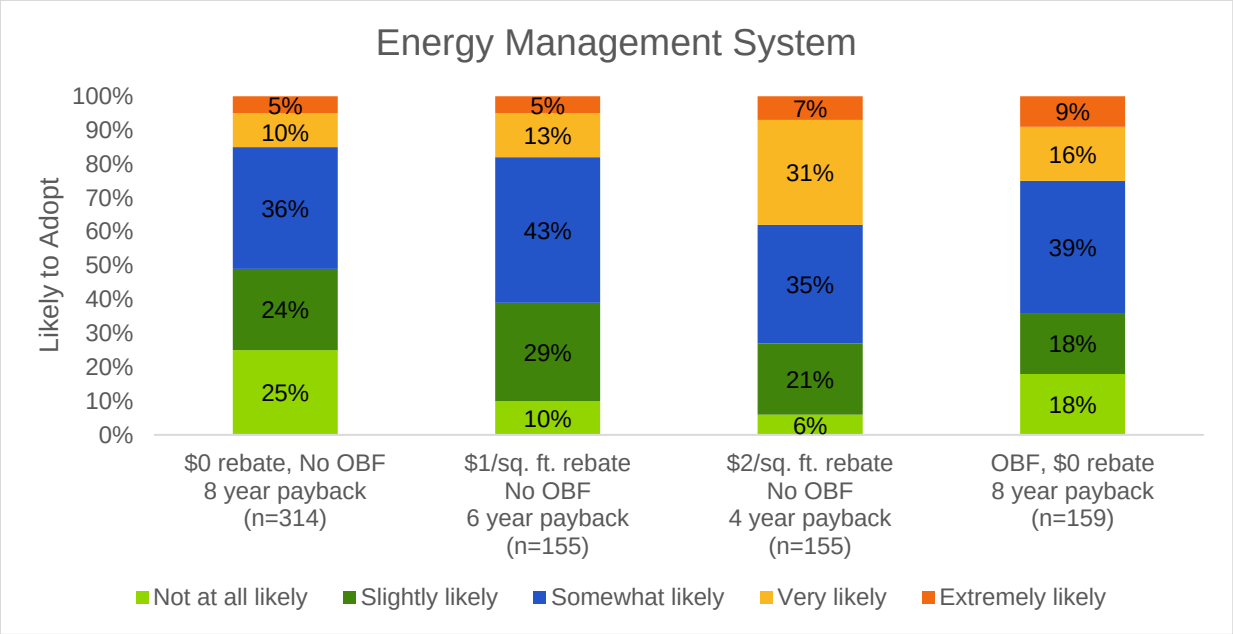
Figure C-23. Commercial Customers' Reported Willingness to Adopt a High Efficiency Insulation Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider adding or upgrading insulation in their walls or ceiling and their willingness to do so under different payback scenarios. All respondents were asked the first baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for high efficiency wall and attic insulation in California. The payback period is the amount of time for the average energy savings from the high efficiency insulation to equal the difference in cost between adopting and not adopting the insulation.

Source: Opinion Dynamics Analysis

Figure C-24. Commercial Customers' Reported Willingness to Adopt an Energy Management System (EMS) Under Different Payback and On-Bill Financing (OBF) Scenarios [a]



[a] Surveyed customers were asked to consider adding or upgrading an EMS in their facility and their willingness to do so under different payback scenarios. All respondents were asked the first baseline scenario without a rebate or OBF, and about half were then asked the two follow-up rebate scenarios and about half were asked the follow-up OBF scenario. Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for EMSs in California. The payback period is the amount of time for the average energy savings from the EMS to equal the difference in cost between adopting and not adopting the EMS.

Source: Opinion Dynamics Analysis

Fuel Switching Technologies

Table C-35. Commercial Customers' Reported Average Importance of Factors They Consider About Switching from Gas to Energy Efficient (EE) Electric Fuel Technologies [a]

Purchase Factors	Heat Pump Water Heater (n=195)
Longer lasting equipment	3.3
Lower utility bills	3.3
Improved efficiency and lower energy usage	3.2
Reduced environmental impacts like air and water pollution	3.0
Faster water heating	2.6

[a] Average importance of factors measured on a 1 to 5 scale where 1 means 'not at all important,' 2 means 'slightly important,' 3 means 'moderately important,' 4 means 'very important,' and 5 means 'extremely important.' Asked only to respondents who reported having a gas storage water heater.

Source: Opinion Dynamics Analysis

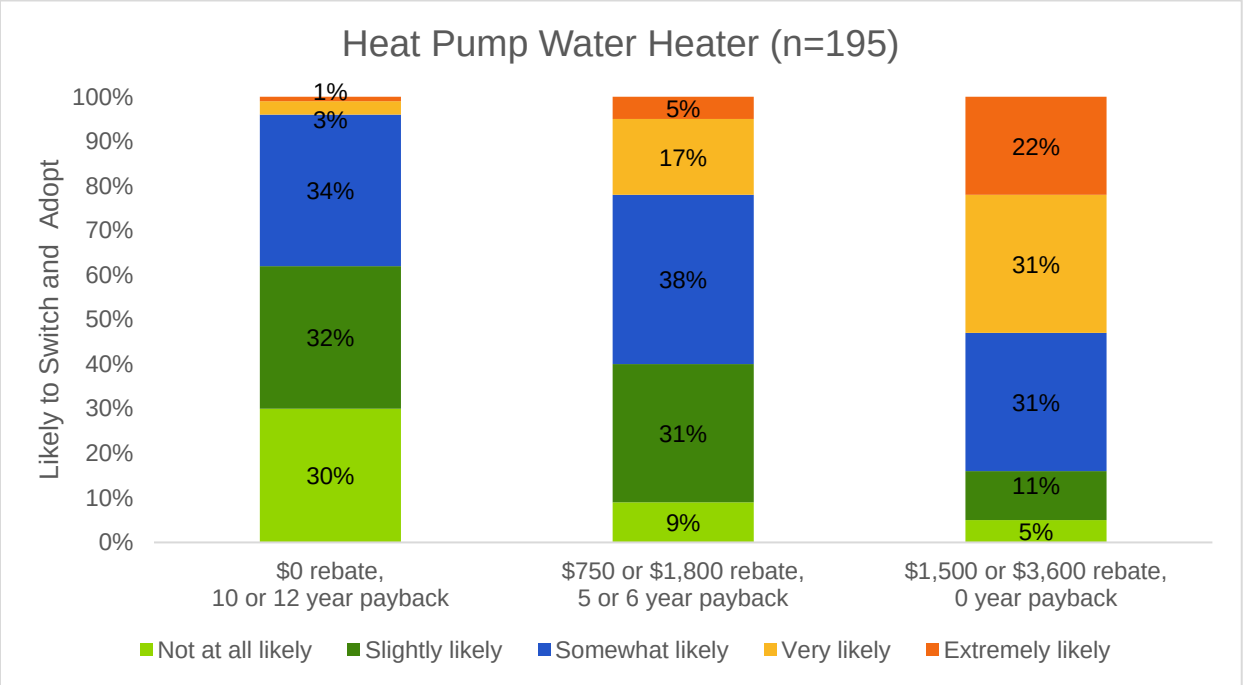
Table C-36. Commercial Customers' Reported Average Importance of Barriers to Switching from Gas to Energy Efficient (EE) Electric Fuel Technologies [a]

Purchase Factors	Heat Pump Water Heater (n=195)
The need for potential structural, electrical, and/or plumbing changes to install the technology in the facility	3.7
The higher upfront cost of an electric EE model	3.4
Uncertainty about energy savings	3.2
Lack of experience or familiarity with the technology	2.7
The slightly larger size of an electric heat pump water heater (vs. standard gas water heater of similar storage capacity)	2.7
Limited or no access to financing options	2.4

[a] Average importance of barriers measured on a 1 to 5 scale where 1 means 'not at a barrier,' 2 means 'minor barrier,' 3 means 'moderate barrier,' 4 means 'considerable barrier,' and 5 means 'major barrier.' Asked only to respondents who reported having a gas storage water heater.

Source: Opinion Dynamics Analysis

Figure C-25. Commercial Customers' Reported Willingness Switch to Electric Water Heating and Adopt a Heat Pump Water Heater Under Different Payback Scenarios [a]



[a] Surveyed customers with a gas water heater were asked to consider needing to replace it and their willingness to switch to electricity and adopt the electric EE heat pump model (vs. a gas standard efficiency water heater) under different payback scenarios. Respondents who had a less expensive, residential-sized water heater were presented with the lower rebate amounts and payback periods than those with a more expensive, commercial-sized water heater. Respondents were asked the first baseline scenario without a rebate and were then asked the two follow-up rebate scenarios (and no OBF scenario). Respondents who reported they were 'extremely likely' to adopt in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt in a follow-up scenario than they reported in a previous scenario. Costs and payback periods are from market and engineering estimates for average sized residential and commercial heat pump

water heaters in California. A payback period is the amount of time for the average energy savings from the electric EE technology to equal the difference in cost between the electric EE and gas standard efficiency models.

Source: Opinion Dynamics Analysis

C.3.4 Demand Response Program Awareness, Barriers, and Willingness to Participate

Surveyed customers were assigned to answer questions about one of two demand response programs. Respondents who had a smart thermostat or were asked adoption questions about a smart thermostat (i.e., smaller businesses) were assigned the smart thermostat DR program questions. Respondents who had an energy management system (EMS) or were asked adoption questions about an EMS (i.e., large businesses) were assigned the EMS DR program questions.

The surveyed customers were presented with a brief description of DR programs. Respondents who already have a smart thermostat or EMS in their facility were asked about their awareness of DR programs and their willingness to participate in a DR program with their smart thermostat or EMS. Respondents were presented with three scenarios that included a one-time sign-up bonus and two levels of summer participation incentives.

Respondents who did not already have a smart thermostat or an EMS were asked about their awareness of DR programs and their willingness to adopt a smart thermostat or EMS and participate in a DR program. These respondents were randomly assigned to one of two sets of scenarios. The first set of scenarios presented respondents with a technology rebate, one-time sign-up bonus, and summer participation incentives.

The sample size of respondents who owned a smart thermostat and qualified for the DR smart thermostat questions was very small (n=9).[38] Thus, they were combined with respondents who did not own a smart thermostat for the willingness to participate analyses.

Table C-37. Commercial Customers' Reported Awareness and Participation in Demand Response (DR) Programs for Smart Thermostats and Energy Management Systems (EMS) [a]

Awareness/Participation	Percent
Smart Thermostat DR Program	
Owns a smart thermostat (n=9)	
Never heard of the DR program	38%
Heard of the DR program but never participated	58%
Participated in the DR program before but not currently	4%
Currently participating in DR program	0%
Does not own a smart thermostat (n=78)	
Aware of DR program	37%
Unaware of DR program	63%

[38] This was mostly due to the prevalence of many surveyed customers who reported having both an EMS and smart thermostat in their facility and survey programming logic that prioritized EMS DR program questions over the smart thermostat DR questions since the team expected fewer customers with an EMS.

Awareness/Participation	Percent
Energy Management System (EMS) DR Program	
Owns an EMS (n=390)	
Never heard of the DR program	40%
Heard of the DR program but never participated	42%
Participated in the DR program before but not currently	10%
Currently participating in DR program	8%
Does not own an EMS (n=70)	
Aware of DR program	57%
Unaware of DR program	43%

[a] Surveyed customers with a smart thermostat or with an EMS were asked about their awareness and participation in DR programs while surveyed customers without a smart thermostat or EMS were only asked about their DR program awareness.

Source: Opinion Dynamics Analysis

Table C-38. Commercial Customers' Reported Average Importance of Barriers to Participating in Demand Response (DR) Smart Thermostat Programs [a]

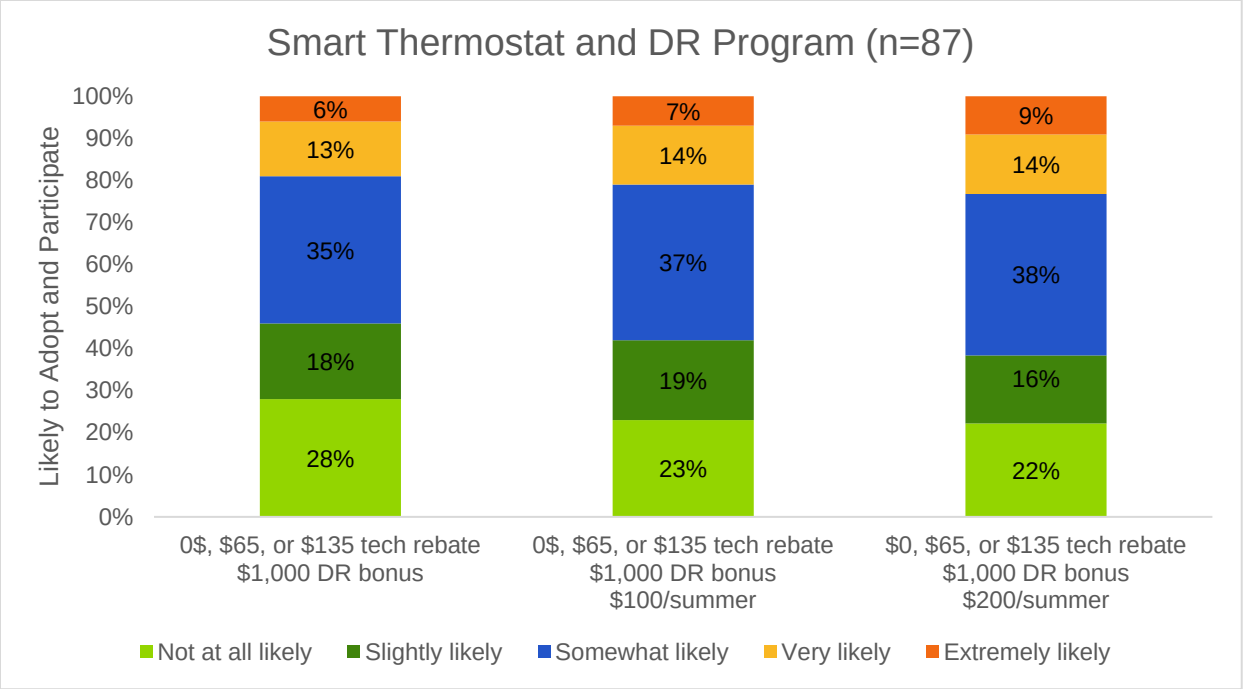
Participation Barriers	Smart Thermostat (n=88) [b]	Energy Management System (n=430) [b]	Total (n=518)
Allowing your utility to adjust the settings during high demand events	3.4	3.1	3.2
Making changes to the settings during high demand events	3.0	3.0	3.0
Your level of familiarity or experience with a DR program	2.6	2.6	2.6
Sharing data with your utility	3.0	2.3	2.6
Your level of familiarity or experience with the technology	2.4	2.6	2.5

[a] Average importance of barriers measured on a 1 to 5 scale where 1 means 'not at a barrier,' 2 means 'minor barrier,' 3 means 'moderate barrier,' 4 means 'considerable barrier,' and 5 means 'major barrier.'

[b] Surveyed customers who reported currently participating in a DR program at the time of the survey were excluded from this analysis.

Source: Opinion Dynamics Analysis

Figure C-26. Commercial Customers' Reported Willingness to Adopt a Smart Thermostat and Participate in a Demand Response (DR) Program or Participate with Their Own Smart Thermostat Under Different Incentive Scenarios [a, b]

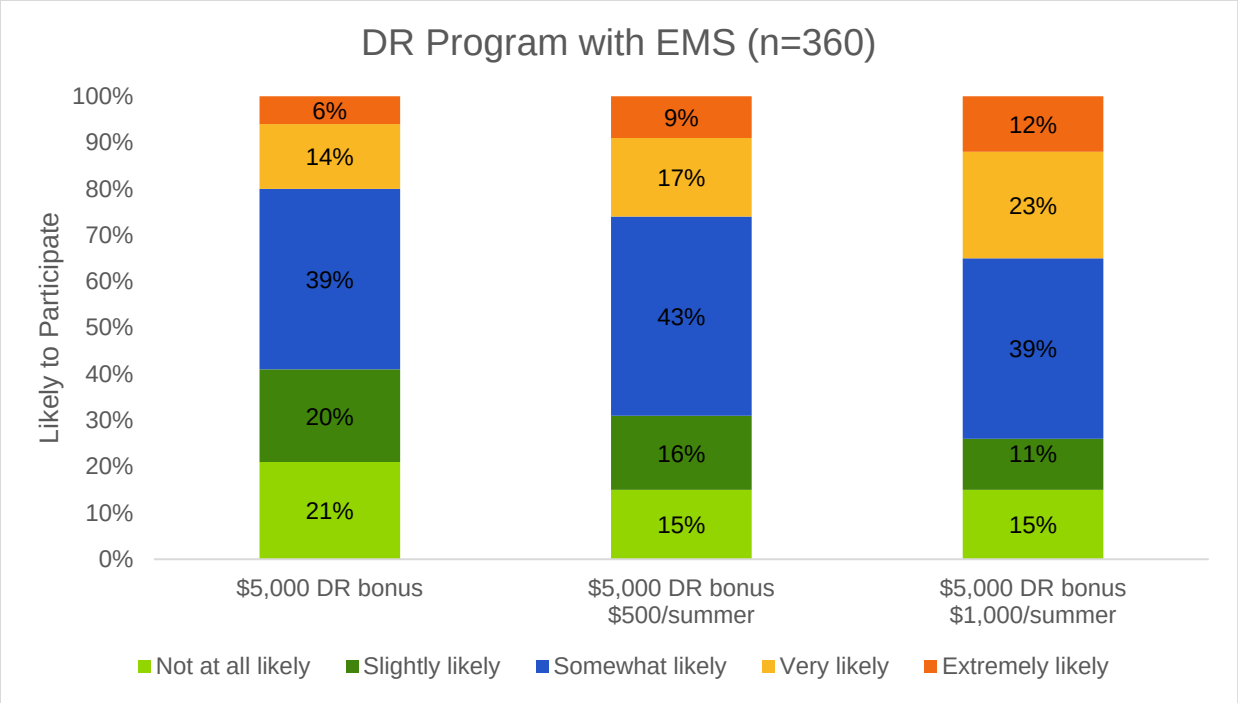


[a] Surveyed customers without a smart thermostat were asked about their willingness to adopt a smart thermostat and participate in a smart thermostat DR program under different incentive scenarios. These respondents were asked about a first baseline scenario with a technology rebate and a DR sign-up bonus, and were then asked about two follow-up scenarios that also included different amounts of a summer DR participation incentive. Surveyed customers with a smart thermostat (n=9) were asked the same scenarios but without the technology rebate included, and are combined with respondents without a smart thermostat because of the small sample size. Respondents who reported they were 'extremely likely' to adopt and participate in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt and participate in a follow-up scenario than they reported in a previous scenario.

[b] Respondents in this analysis without a smart thermostat also answered questions about their willingness to purchase a smart thermostat with a rebate (and no DR program) earlier in the survey. Some respondents reported they were "extremely likely" to adopt a smart thermostat with a $65 rebate (that reduced payback period by half) and others did so with a $135 rebate (that reduced payback period to zero). When presented with the DR program scenario, respondents were reminded of the tech rebate amount they preferred earlier in the survey. The respondents with different tech rebate preferences are combined in this analysis because separating them produces smaller counts with less statistical confidence/precision, and their reported willingness to participate in the DR program did not differ significantly by the rebate amount. Respondents in this analysis with a smart thermostat do not need a rebate. This is the reason for '$0, $65, or $135 tech rebate' criteria in the figure.

Source: Opinion Dynamics Analysis

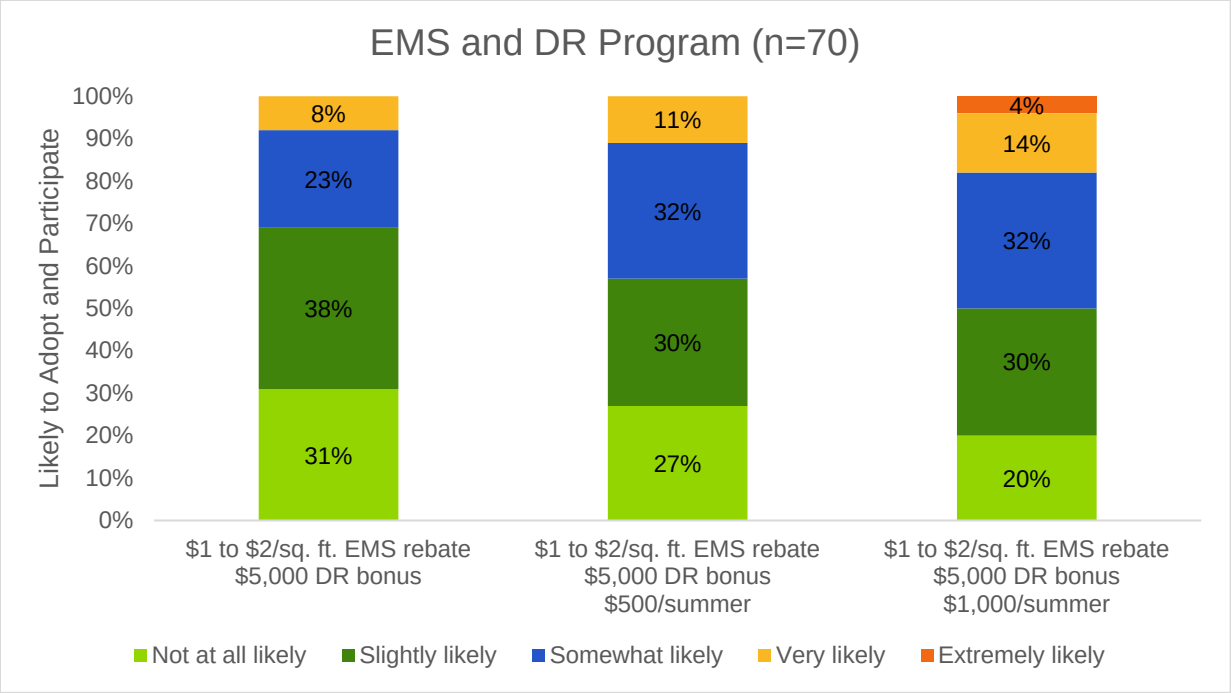
Figure C-27. Commercial Customers' Reported Willingness to Participate in a Demand Response (DR) Program with Their Energy Management System (EMS) Under Different Incentive Scenarios [a]



[a] Surveyed customers with an EMS and who are not currently participating in a DR program were asked about their willingness participate in a DR program with their EMS under different incentive scenarios. Respondents were asked the first baseline scenario with just a DR sign-up bonus, and were then asked about two follow-up scenarios that also included different amounts of a summer DR participation incentive. Respondents who reported they were 'extremely likely' to participate in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to participate in a follow-up scenario than they reported in a previous scenario.

Source: Opinion Dynamics Analysis

Figure C-28. Commercial Customers' Reported Willingness to Adopt an Energy Management System (EMS) and Participate in a Demand Response (DR) Program Under Different Incentive Scenarios [a, b]



[a] Surveyed customers without an EMS were asked about their willingness to adopt an EMS and participate in an EMS DR program under different incentive scenarios. Respondents were first asked about a baseline scenario with a technology rebate and a DR sign-up bonus, and were then asked about two follow-up scenarios that also included different amounts of a summer DR participation incentive. Respondents who reported they were 'extremely likely' to adopt and participate in one scenario were not asked but were included as 'extremely likely' in the follow-up scenarios. Respondents also could not report a lower willingness to adopt and participate in a follow-up scenario than they reported in a previous scenario.

[b] Respondents without an EMS also answered questions about their willingness to purchase an EMS with a rebate (and no DR program) earlier in the survey. Some respondents reported they were "extremely likely" to adopt an EMS with a $1/sq. ft. rebate (that reduced payback period by one-fourth) and others did so with a $2/sq. ft. rebate (that reduced payback period by one-half). When presented with the DR program scenario, respondents were reminded of the EMS rebate amount they preferred earlier in the survey. The respondents with different tech rebate preferences are combined in this analysis because separating them produces smaller counts with less statistical confidence/precision, and their reported willingness to participate in the DR program did not differ significantly by the rebate amount. This is the reason for '$1 to $2/sq. ft. EMS rebate' criteria in the figure.

Source: Opinion Dynamics Analysis

C.3.5 COVID-19 Pandemic Impacts

Surveyed customers were asked about how the COVID-19 pandemic has impacted their business and their comfort level with having contractors in their facility(ies). See Table C-39 and Table C-40 for the reported COVID-19 impacts on specific cost barriers.

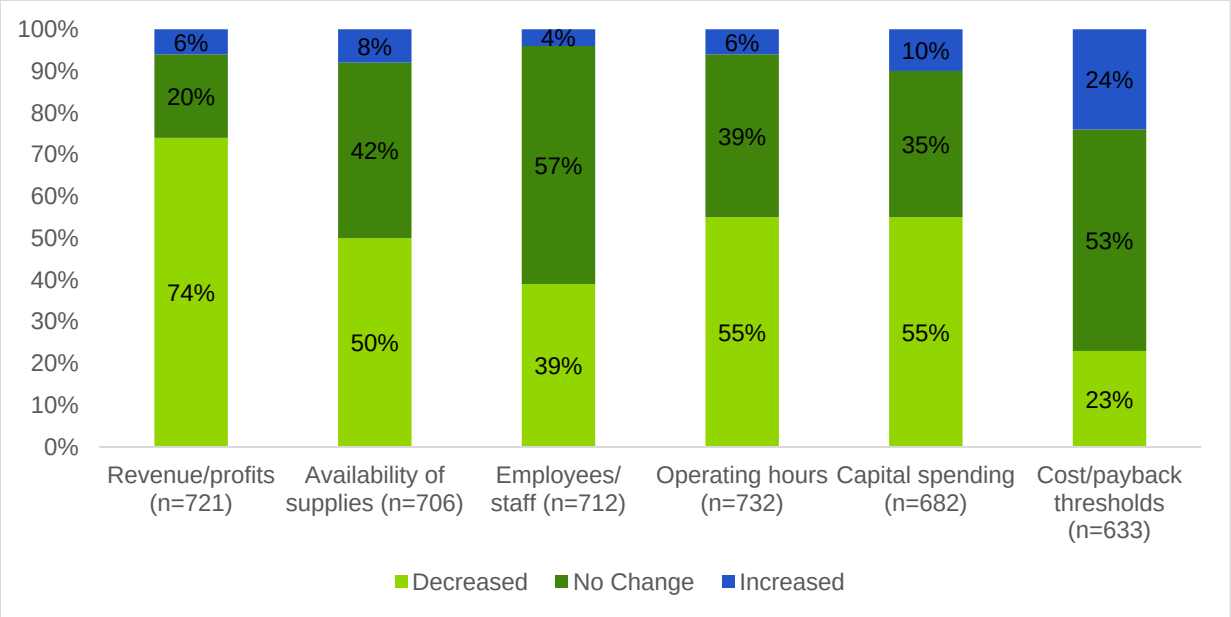
Table C-39. Commercial Customers' Reported Impacts of the COVID-19 Pandemic

Impacts	Percent
Impact on business overall (n=740)	
Large negative impact	39%
Moderate negative impact	37%
Little or no impact	16%
Moderate positive impact	6%
Large positive impact	2%
Changes to planned investment projects (n=681) [a]	
No planned projects during pandemic	47%
Postponed project(s)	37%
Canceled project(s)	21%
Fast-tracked or sped up planned project(s)	7%
Number of projects postponed (n=195)	
1 to 10	30%
11 to 20	23%
21 to 40	19%
More than 40	28%
Range	1 to 240
Average	25

[a] Excludes 'Don't know' responses.

Source: Opinion Dynamics Analysis

Figure C-29. Commercial Customers' Reported Change in Aspects of Their Business Due to the COVID-19 Pandemic [a]



[a] Excludes 'Don't know' and 'Not applicable' responses.

Source: Opinion Dynamics Analysis

Table C-40. Commercial Customers' Reported Comfort Level With Contractors Working Inside Their Facility During the COVID-19 Pandemic

Comfort Level	Percent (n=757)
Very comfortable	36%
Somewhat comfortable	32%
Somewhat uncomfortable	17%
Very uncomfortable	11%
Don't know	4%

Source: Opinion Dynamics Analysis