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# Consumer Demand for Smart Energy Solutions

**1Q 2020**

# Consumer Analytics: Home Energy Management



*Quantified Consumer* assess results from an online survey of 10,000 U.S. broadband households. The study is a comprehensive analysis of the state of the market, key industry trends, and important consumer behaviors.

## Consumer Demand for Smart Energy Solutions

**Q1 2020**

### Survey Topics

- Role of Energy in the Smart Home and IoT
- Adoption and Usage of Energy-related Smart Home Products, Systems, and Services
- Interest, Adoption and Consumer Preferences of Energy Programs
- Interest in Distributed Generation and Bundling Opportunities
- Interest in Energy Value-added Monitoring Services

The smart home provides connectivity that allows consumers and energy service providers to understand and manage energy consumption throughout the home. As adoption of solar, storage, and electric vehicles grows alongside the smart home, utilities have the opportunity to align operation of these devices to the needs of the grid. This research provides insights on consumer interest in energy management products and services, including features, price sensitivity, and incentives for energy-efficiency solutions.

# Table of Contents

<u>Executive Summary.....</u>	<u>9</u>
<u>Energy Segments .....</u>	<u>15</u>
<u>Energy Programs and Tools .....</u>	<u>23</u>
<u>Demand Response .....</u>	<u>33</u>
<u>Distributed Generation and Storage .....</u>	<u>44</u>
<u>Smart Energy Products .....</u>	<u>67</u>
<u>Smart Products - Importance of Energy Management Features .....</u>	<u>82</u>
<u>Appendix.....</u>	<u>90</u>

# Key Questions Answered

Consumer Demand for Smart Energy Solutions addresses the following major questions in the Energy Research industry.

- 1) What actions are consumers currently taking to save energy?
- 2) What percentage of consumers are aware of and use energy management programs?
- 3) Which energy management tools do consumers find valuable?
- 4) What are the most effective incentives for DR program participation?
- 5) What percentage of consumers have adopted and intend to purchase distributed energy generation and smart energy products?
- 6) What factors will drive purchases of distributed energy generation products?
- 7) Which smart product energy management features do consumer find appealing?

# Survey Methodology

**Data presented in this study are drawn primarily from an online survey conducted in Q4 2019.**

- The survey was fielded to 10,021 heads-of-broadband households in the United States.
- The full survey sample was split to show special topic questions to smaller groups. Some questions related to Energy Management were asked of a ~5,000 sub-segment of the full sample. Sample sizes are noted on each chart.
- Survey results are demographically representative of broadband households for both the full 10,021 survey results as well as for each ~5,000-sample sub-group. Demographic quotas are set for age, gender, household income, and education.
- Trending data is presented from multiple online surveys fielded between 2010 and 2019.

# Defining Heads of Broadband Households

## All survey respondents are heads-of-household age 18 and older

- *A head of household* has equal or greater decision making responsibility for purchasing technology products/services.

## All survey respondents have broadband internet access at home

- *Broadband households (BB HHs)* have access to broadband internet service in their home, delivered to fixed or mobile devices. BB HHs may use multiple methods of accessing broadband internet at home.
- *Fixed broadband households* have broadband internet service to a fixed point in their home through one of the following:
  - a) DSL or fiber optic high-speed Internet services from a telephone company
  - b) Cable high-speed Internet services from a cable company
  - c) Satellite broadband service
  - d) A fixed wireless or 5G home Internet service
- *Mobile broadband households* have broadband internet service to a mobile point in their home through one of the following:
  - a) 3G/4G wireless service with a laptop computer
  - b) A mobile phone or iPad/tablet with 4G/5G wireless Internet access
- *Mobile-only broadband households* use one of the mobile broadband options but no fixed broadband option in the home.
- As of year-end 2019, Parks Associates estimates 88% of all US households have fixed broadband in their home.

# Definitions and Abbreviations

<b>BB HHs</b>	Broadband Households
EE	Energy Efficiency
DR	Demand Response

**Parks Associates uses a 7-pt Likert scale to measure appeal, intention to purchase, and other attributes. We use the following terms for scores.**

- Non-intenders/Low or No Intention/Appeal 1-3
- Neutral 4
- Intenders/Appeal/Likely to Buy 5-7
- High Intenders/Highly Appealing/Highly Likely to Buy 6-7

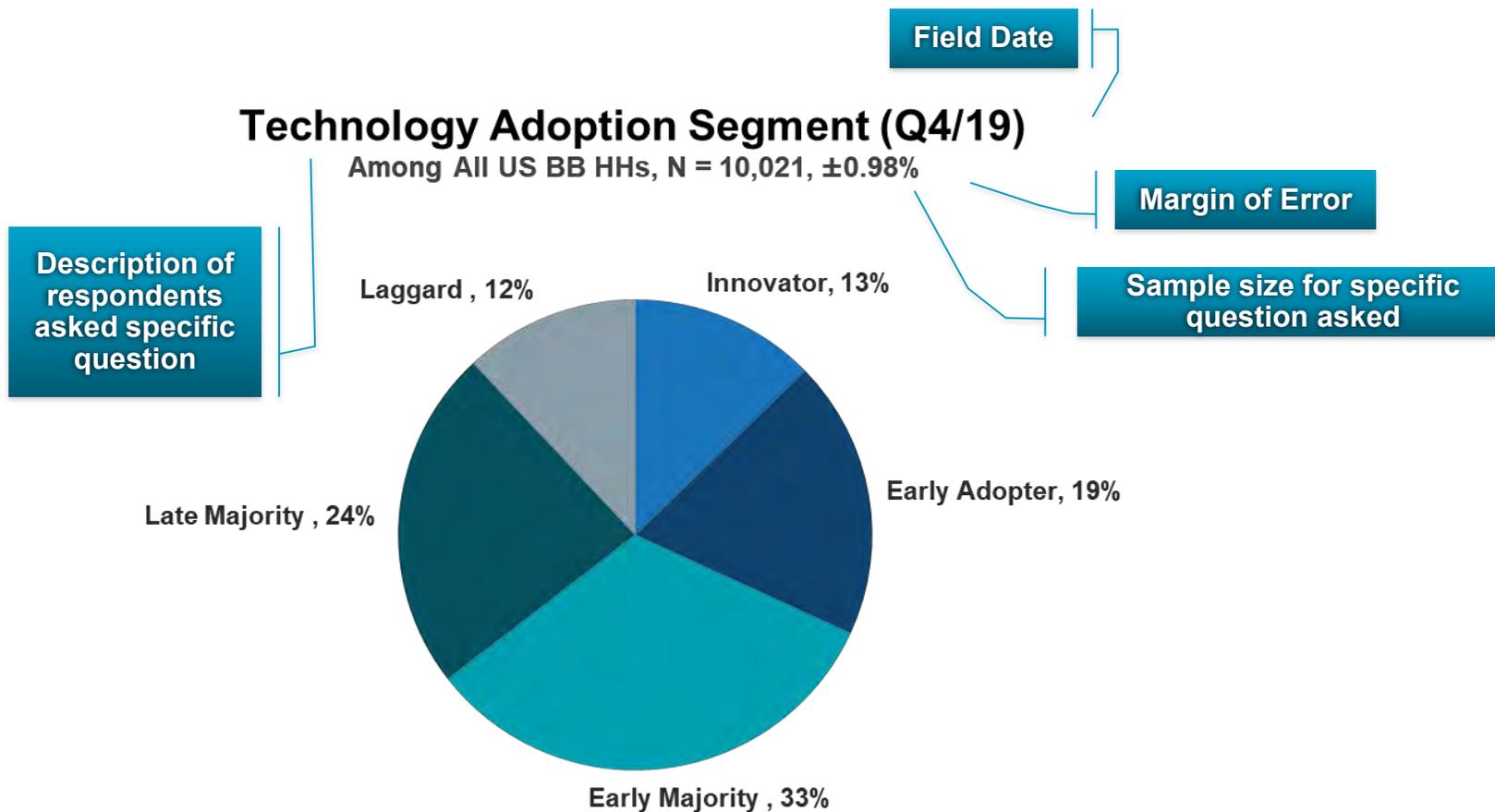
# Reading Parks Associates Charts

**Question wording**—with some modification for sizing.

**Field date**—the period during which consumers responded.

**Survey sample size**—the number of respondents.

**Margin of error**—the statistical range within which a response from the actual population would fall 95% of the time. For example, a survey result of 37% with a margin of error of plus or minus 0.98%, means that 95% of the time, the true adoption level within the represented population (in this case all US broadband households) will be within the range of 36% to 38%.



**Question Wording**

"Q9000. Which of the following best describes your purchasing habits"

Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

**Sample Size of Full Study**



# Consumer Demand for Smart Energy Solutions

## Executive Summary

[Back to Table of Contents](#)

# Industry Insight

According to research by the American Council for an Energy Efficient Economy (ACEEE), energy efficiency programs are the lowest cost energy resource available to today. Energy efficiency programs cost utilities an average of 2.8 cents per kWh, which is one-half to one-third the cost of new electricity alternatives. Utilities consistently develop and introduce customers to new energy efficiency programs. However, sustaining consumer interest in these programs remains a challenge. Traditionally, consumer engagement with their utility has been basic, relegated to paying a monthly bill and calling in to report a power outage. Another challenge is that energy efficient incentives for consumers are not very attractive. As utilities seek new ways to engage consumers, partnerships are emerging that can shift consumer perceptions of energy and provide increased consumer engagement.

Partnerships with digital platform solutions allow energy providers to offer new products, such as dashboards that help consumers understand consumption and recommend ways to save energy. New partnerships with platform providers can facilitate integration with smart home products, allowing these products to be used in demand response programs. Other partnerships facilitate co-marketing of utility energy management programs and smart home products.

Smart product manufacturers are also putting more focus on energy efficiency use cases. Amazon recently invested in ecobee and Tado, a Munich-based company that provides energy-related services to consumers.

As utilities and smart home device manufacturers seek to drive consumer adoption of energy-related smart home products, it is important to understand the types of energy management features that will help drive purchases. Consumer segmentation also provides insight into what energy management programs and services are appealing, and what incentives will drive greater consumer participation.



*Industry Insights from*

**Patrice Samuels**  
Senior Analyst

# Key Findings

## **10% of US broadband households report taking “extreme measures” to save energy.**

The proportion of consumers who report taking extreme measures to save energy has increased by 14% over the past year.

- These consumers tend to be much younger than the average broadband household, are males, and have a higher average income.

## **Growth in awareness of energy programs is slow.**

Among energy programs examined, load control programs have the highest participation rate among consumers who are aware that the program is offered by their utility

- 62% of consumers who are offered load control programs participate in the programs.

# Market Impact

Extreme measures involve making large investments in products like solar panels to save energy. Energy costs in many areas of the US are so low that it takes a long time to experience return on these investments through energy savings. Regulatory changes such as the California PV requirement are helping to drive this increased adoption.

Low awareness is a primary factor driving low participation in energy saving programs. Utility-provided incentives offered are also not compelling to many consumers. Utility marketing efforts to increase consumer participation need to reach a broader range of consumers. This can include co-marketing campaigns with popular consumer brands, making partnerships a key to success.

# Key Findings

## **45% of US broadband households are willing to adjust their thermostat during peak periods to help manage the load on the grid.**

Consumers are significantly less willing to have their device manufacturer adjust their products during peak periods than they are to adjust them themselves.

- Housing factors have stronger influence on willingness to have manufacturers adjust smart energy products than demographic factors.

## **Ownership of distributed energy resources and EVs increased over the past year.**

While the rate of adoption for distributed energy resources increased over the past year, these rates remain below 10% of US broadband households for most products.

- Purchase intentions for all distributed energy resources increased over the past year.

# Market Impact

DR programs are, by nature, invasive as consumers give up some level of comfort and control. To appeal to consumers, programs must be executed in ways that minimize discomfort and provide appropriate incentives. Energy providers must also identify consumer segments for whom these programs are most beneficial in order to market programs efficiently.

Several barriers impact adoption of distributed energy resources including: high upfront costs, slow return on investment, and consumer perception that renewable energy resources are unreliable.

For EVs, poor charging infrastructure in many areas also creates adoption barriers.

# Key Findings

## **Energy independence and resilience are stronger drivers for purchase of solar panels than the desire to reduce one's carbon footprint.**

One-third of consumers who do not own solar panels would purchase one if it allowed them to save 50% on their monthly energy bill.

- Free charging can increase the likelihood of purchasing an EV for nearly 40% of non-EV owners.

## **Only 13% of US broadband households report owning a smart thermostat, despite being introduced 13 years ago.**

- 11% of US broadband households report owning a smart appliance.
- Consumers who take extreme energy-saving measures are more likely to have a smart device or appliance than other consumers.

# Market Impact

Energy savings is a strong driver for solar panel purchases. A fairly high percentage of non-owners would buy a solar panel if it provided 50% energy savings. According to Consumer Reports, solar panels can provide 25% to 100% of a home's electricity needs. States trying to drive renewable energy adoption must create marketing messages that emphasize these energy savings.

Smart thermostats are the most highly adopted smart home device. Many perceive that this position was achieved because of the device's energy management use cases and co-marketing effort with utilities and device manufacturers. Manufacturers of smart lights and smart plugs, must develop and market pragmatic feature-sets that have high value to consumers.

# Key Findings

## **Energy-saving features are most important to consumers when purchasing smart thermostats.**

65% of smart thermostat owners and purchase intenders are willing to pay \$10 per month for an energy monitoring service.

- Energy-saving features are appealing to owners and purchase-intenders for smart refrigerators and smart plugs.
- 24% of clothes washer/dryer owners and purchase intenders find a feature that delays start times until electricity costs are lowest appealing.

# Market Impact

Smart home product energy saving features are beneficial for both energy providers and consumers. These features must often be integrated in product architecture. Energy providers must start partnering with device manufactures to integrate such features in the product design.

Ultimately integrated features will help improve long term grid stability with less effort than demand response events and energy efficiency actions.

# Consumer Demand for Smart Energy Solutions

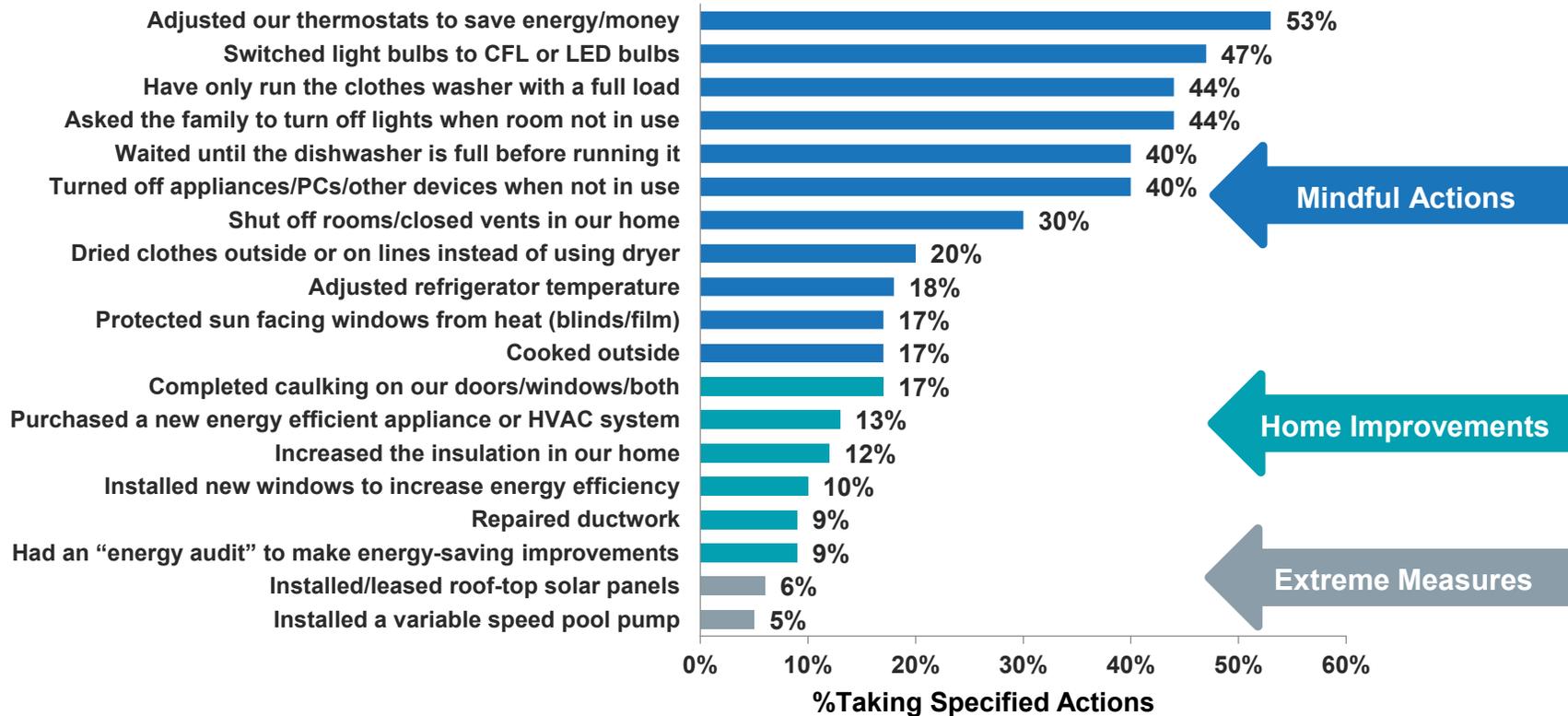
## Energy Segments

[Back to Table of Contents](#)

# Adjusting thermostats is the action US broadband households are most likely to take to reduce energy.

## Energy-Saving Actions Taken Over the Past 12 Months (Q4/19)

Among US BB HHs Surveyed, n = 5,014, ±1.38%



Most households only take mindful actions to save energy.

“**Mindful Actions**” are behavioral ways of reducing energy.

Minor home improvements are termed here as “**Home Improvements**.”

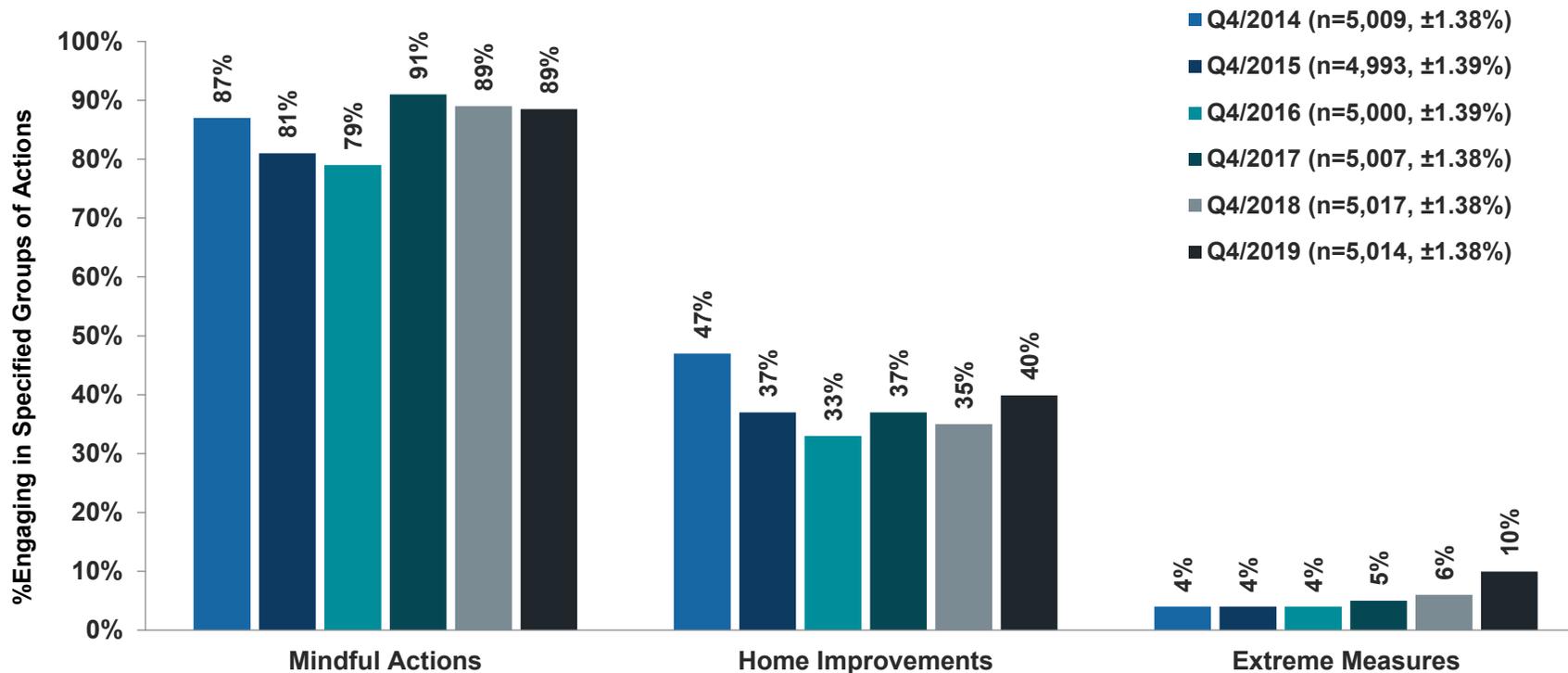
Major home improvements are termed “**Extreme Measures**”, and are much less common.

"Q7510a/Q7510b. Which of these energy-saving actions have you or your household members taken over the past 12 months?" | Asked of a Subgroup of 5,014 US BB HHs | Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

The percentage of consumers taking mindful actions to save energy has remained fairly consistent over the past three years.

## Energy-Saving Actions (2014 - 2019)

Among US BB HHs Surveyed



"Q7510a/Q7510b. Which of these energy-saving actions have you or your household members taken over the past 12 months?" | Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

Consumers are sorted depending on the energy-saving actions taken.

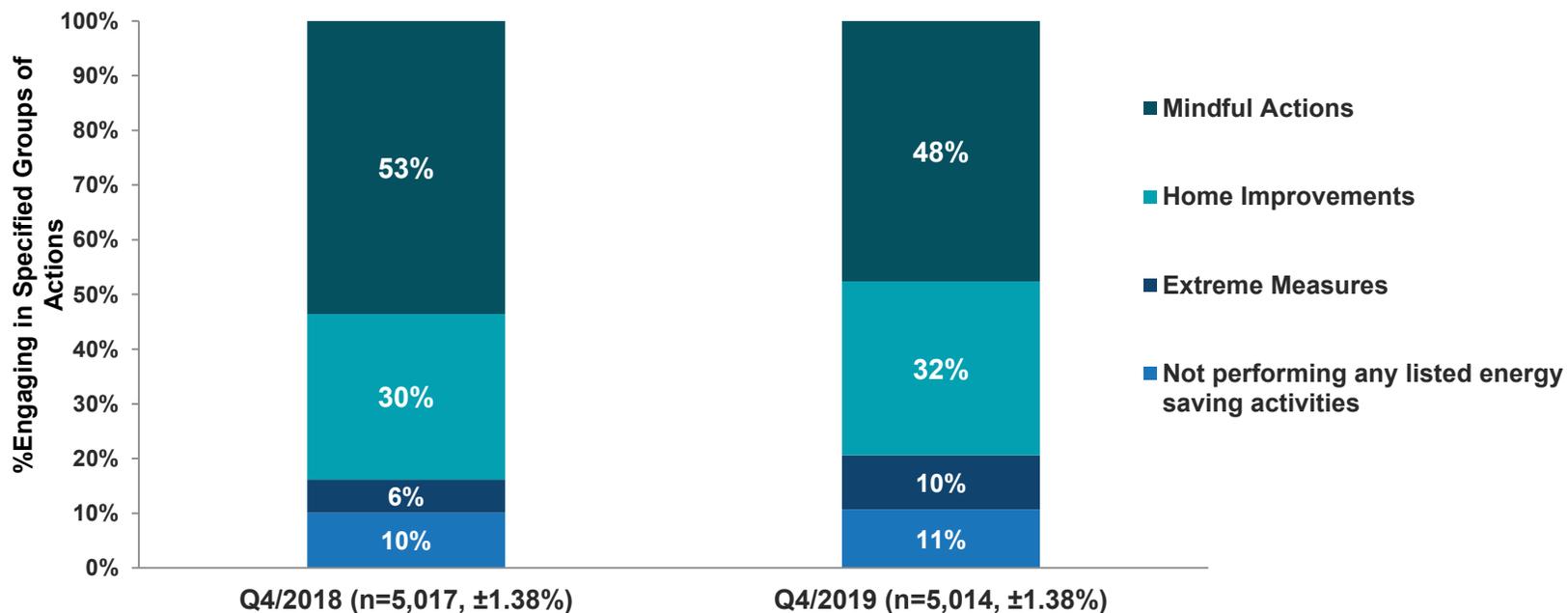
Consumers may have taken energy-saving actions in more than one category.

While the percentage of consumers taking minor actions have remained consistent over the past few years, those taking home improvement actions and extreme measures have increased slightly over the past year.

The proportion of consumers who report taking extreme measures to save energy has increased 67% over the past year.

## Energy-Saving Action Segments (2018 - 2019)

Among US BB HHs Surveyed



Consumers are sorted depending on the highest level of energy-saving actions taken. If they have taken energy-saving actions in more than one category, they are placed in the category with more extreme actions.

For example, if a consumer reports both minor actions and home improvement actions, they are placed in the home improvement actions group. If they report all three actions, they are placed in the “extreme measure” group.

"Q7510a/Q7510b. Which of these energy-saving actions have you or your household members taken over the past 12 months?" | Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

# Consumers who take extreme measures to save energy tend to be much younger than the average broadband household.

## Demographic Breakdown by Energy-Saving Segments (Q4/19)

**Q7510a/Q7510b. Which of these energy-saving actions have you or your household members taken over the past 12 months?**

	All BB HHs (N=10,021, ±0.98%)	Mindful Action (48% of US BB HHs, n=2,388, ±2.01%)	Home Improvements (32% of US BB HHs, n=1,591, ±2.46%)	Extreme Measures (10% of US BB HHs, n=499, ±4.39%)	Not Performing any listed energy-saving actions (11% of US BB HHs, n=536, ±4.23%)
<b>Sample Size</b>	(N=10,021, ±0.98%)	(48% of US BB HHs, n=2,388, ±2.01%)	(32% of US BB HHs, n=1,591, ±2.46%)	(10% of US BB HHs, n=499, ±4.39%)	(11% of US BB HHs, n=536, ±4.23%)
<b>Age Group</b>					
18-24	7%	5%	8%	15%	5%
25-34	18%	13%	18%	36%	19%
35-44	19%	16%	19%	30%	19%
45-54	19%	21%	19%	11%	22%
55-64	20%	24%	18%	3%	21%
65 and older	18%	21%	17%	4%	15%
<b>Gender</b>					
Female	50%	57%	48%	31%	43%
Male	50%	43%	52%	69%	57%
<b>Household Income</b>					
Less than \$30,000	23%	28%	18%	10%	31%
\$30,000 - \$49,999	18%	21%	16%	13%	18%
\$50,000 - \$74,999	16%	15%	18%	16%	16%
\$75,000 - \$99,999	12%	9%	14%	19%	9%
\$100,000 or more	31%	28%	35%	42%	26%
<b>Education Level</b>					
High school degree or lower	33%	36%	30%	18%	38%
Less than college degree	28%	28%	27%	22%	27%
College degree or more	40%	36%	43%	60%	34%
<b>Households with Kids</b>					
Children at home	32%	23%	37%	67%	24%
No children	68%	77%	63%	33%	76%
<b>Technology Adoption Segments</b>					
Innovator	13%	3%	17%	50%	8%
Early Adopter	19%	16%	24%	25%	20%
Early Majority	33%	37%	33%	16%	30%
Late Majority	24%	30%	19%	5%	21%
Laggard	12%	14%	7%	4%	22%

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Those consumers who take extreme measures also tend to be males, have higher incomes than average, and have higher education levels.

These consumers are also significantly more likely to have children at home than other energy segments and are more likely to be innovators.

Innovators are the consumer group who self-report that they tend to acquire new technology as soon as they become available.

# Not surprisingly, homeowners are more likely to take home improvement and extreme measures to save energy than renters.

## Housing Factors Breakdown by Energy Segments (Q4/19)

Q7510a/Q7510b. Which of these energy saving actions have you or your household members taken over the past 12 months?

Sample Size	All BB HHs (N=10,021, ±0.98%)	Mindful Action (48% of US BB HHs, n=2,388, ±2.01%)	Home Improvements (32% of US BB HHs, n=1,591, ±2.46%)	Extreme Measures (10% of US BB HHs, n=499, ±4.39%)	Not Performing any listed energy saving actions (11% of US BB HHs, n=536, ±4.23%)
<b>Home Ownership</b>					
Rent	28%	33%	20%	19%	38%
Own	70%	65%	79%	80%	59%
Other/Not sure	2%	2%	1%	1%	3%
<b>Length of Time in Residence</b>					
Less than 12 months	9%	10%	7%	8%	8%
1-2 years	12%	11%	12%	18%	11%
3-4 years	14%	12%	16%	23%	14%
5-10 years	21%	20%	22%	23%	23%
More than 10 years	43%	46%	43%	28%	43%
<b>Residence Area</b>					
An urban area	28%	23%	29%	54%	27%
A suburban area	48%	52%	47%	36%	47%
A rural area	22%	23%	23%	10%	23%
I don't know	1%	1%	1%	0%	3%
<b>Region</b>					
Northeast	21%	20%	23%	21%	25%
Midwest	22%	23%	24%	15%	21%
South	37%	38%	37%	40%	33%
West	19%	20%	17%	23%	21%
<b>Home Size</b>					
1,500 square ft or less	27%	34%	22%	14%	28%
1,501 – 2,000 square ft	25%	23%	28%	22%	21%
2,001 – 2,500 square ft	19%	14%	24%	32%	15%
2,501 – 3,500 square ft	13%	11%	15%	20%	9%
More than 3,500 square ft	5%	3%	6%	9%	6%
I don't know	12%	15%	6%	3%	21%

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Consumers who own their own home are better targets for energy management programs and solutions that involve home improvement and extreme measures.

Consumers who have been in their homes for 10+ years are significantly less likely than average to take extreme energy-saving measures. Those who have been in their homes for three to four years are the ones who are most likely to take these actions.

Consumers who live in urban areas are significantly more likely than average to take extreme measure. Electricity costs in urban areas tend to be higher than in rural area, making it more likely that home improvement and extreme energy-saving actions will be worth the investments.

Region of residence does not impact energy saving behaviors significantly.

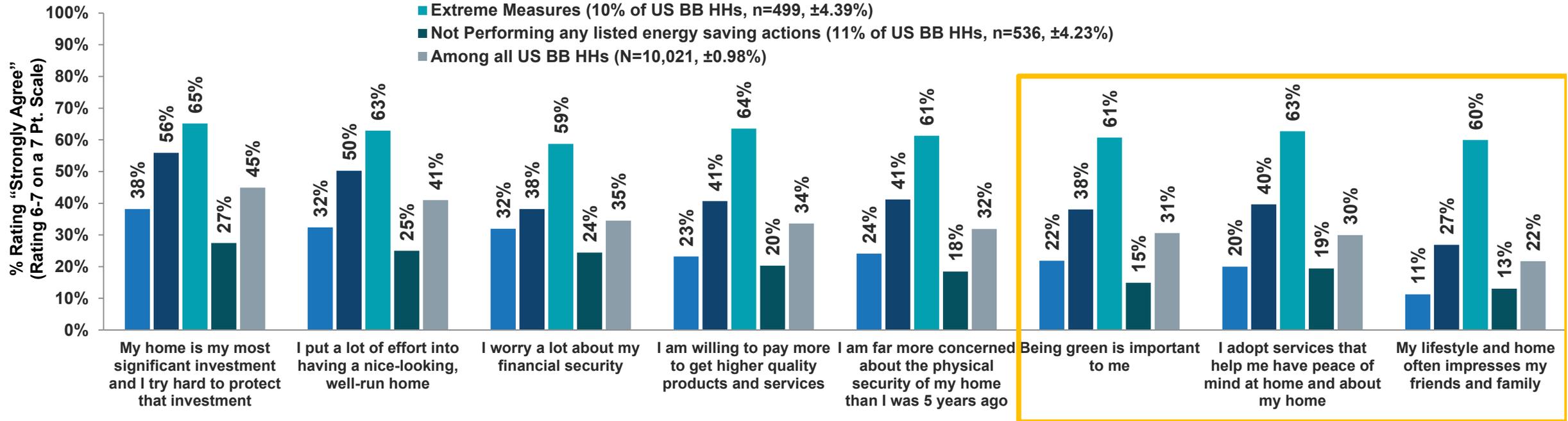
# Consumers who take extreme energy-saving measures are more likely than others to agree with all of the statements below.

They are particularly more likely to agree that their lifestyles impress friends and family, they adopt service to help them have peace of mind, and that being “green” is important to them.

## Lifestyle Attitudes by Energy-Saving Segments (Q4/19)

Among US BB HHs in Specified Group

- Mindful Actions (48% of US BB HHs, n=2,388, ±2.01%)
- Home Improvements (32% of US BB HHs, n=1591, ±2.46%)
- Extreme Measures (10% of US BB HHs, n=499, ±4.39%)
- Not Performing any listed energy saving actions (11% of US BB HHs, n=536, ±4.23%)
- Among all US BB HHs (N=10,021, ±0.98%)



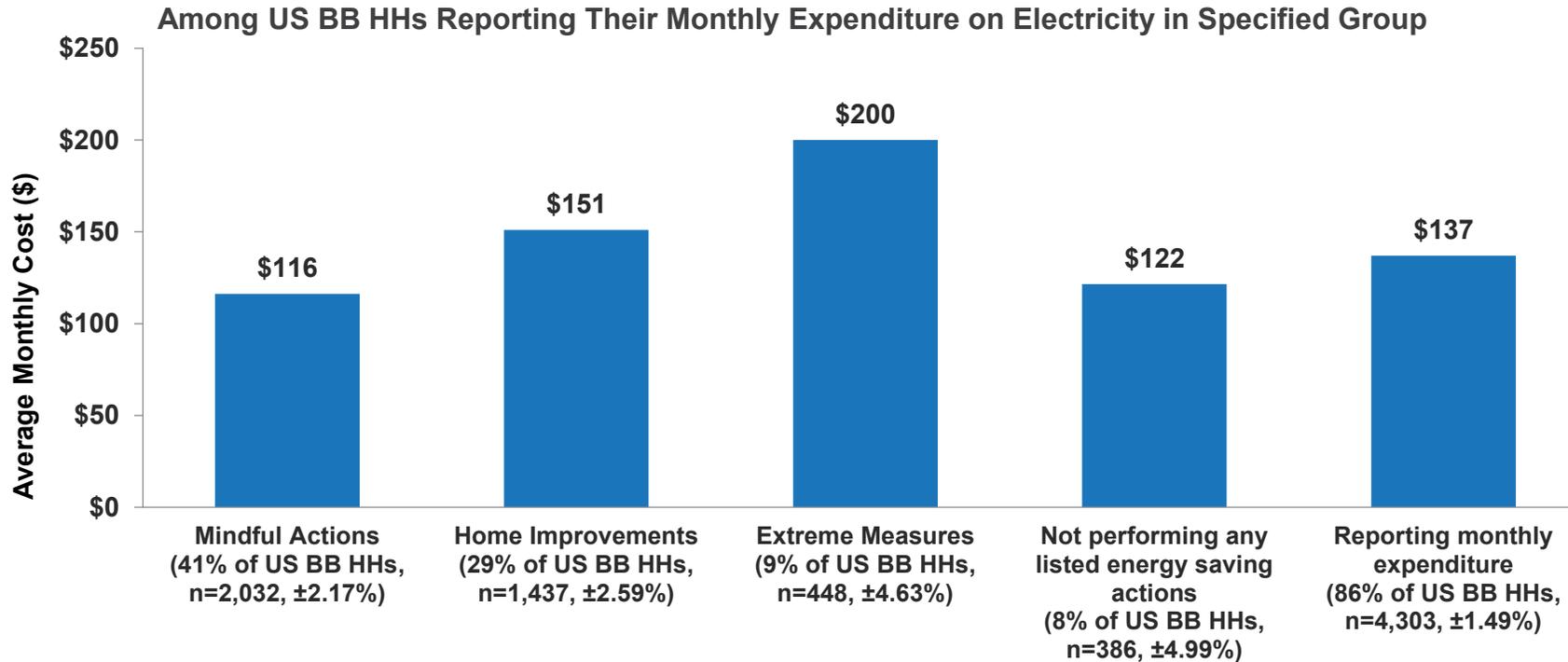
"DT9005. On a scale of 1-7, please select your level of agreement with the following statements:"

"Q7510a/Q7510b. Which of these energy-saving actions have you or your household members taken over the past 12 months?"

Asked of a Subgroup of 5,014 US BB HHs | Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Higher monthly bills drive extreme energy-saving measures.

## Average Monthly Expenditure on Electricity by Energy-Saving Segments (Q4/19)



The average monthly energy bill reported by all US broadband households is \$137.

Consumers who do not perform energy-saving actions and those that perform only mindful actions have lower energy bills than the average broadband households.

Consumers who took home improvement and extreme energy-saving measures have average monthly energy bills that were higher than average broadband households.

Q7505. On average, how much do you pay per month for electricity ... | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates



# Consumer Demand for Smart Energy Solutions

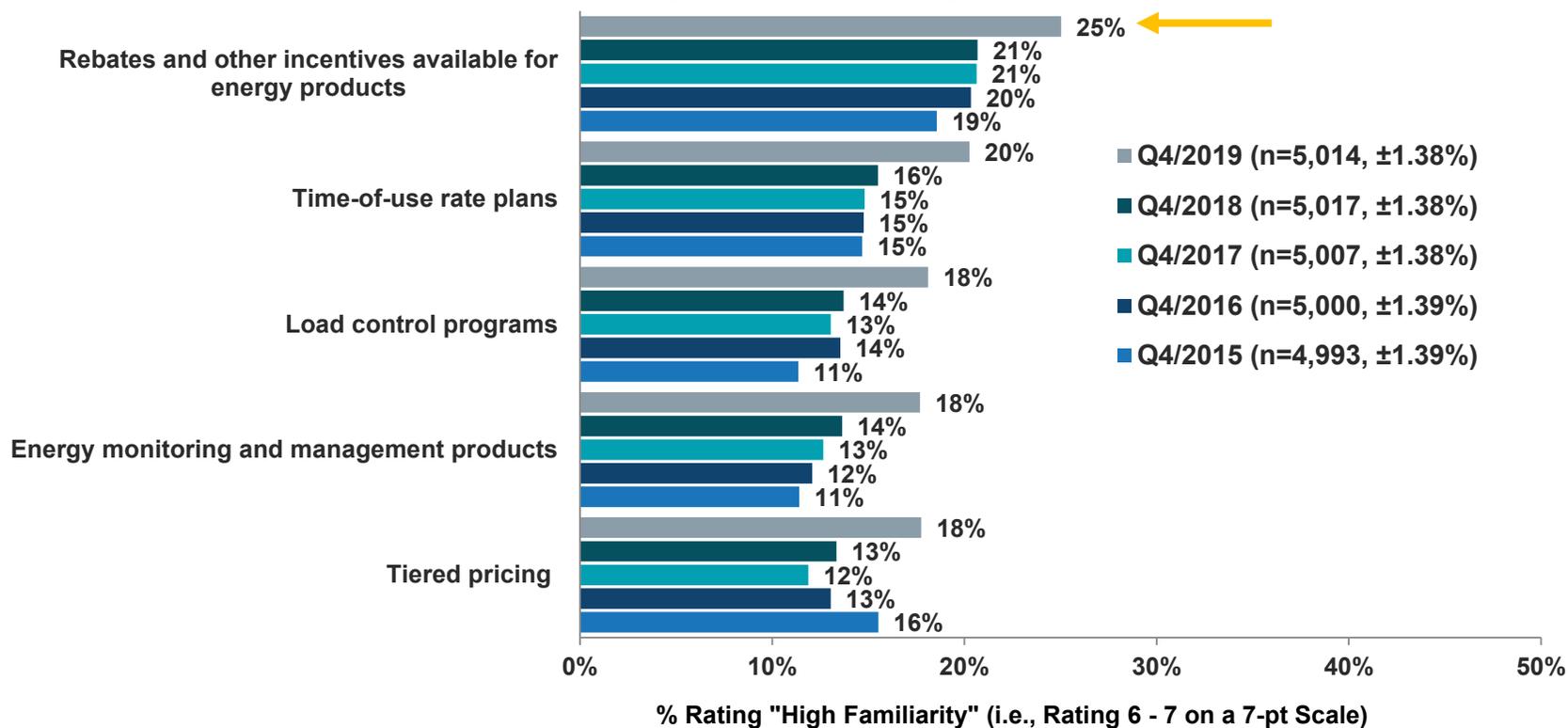
## Energy Programs and Tools

[Back to Table of Contents](#)

# Overall growth in awareness of energy programs has been slow. Consumers are most familiar with rebates and incentives for energy efficient products.

## High Familiarity with Energy Programs Offered (2015 - 2019)

Among US BB HHs Surveyed



"Q7515. How familiar are you with the following programs?"

Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020Parks Associates

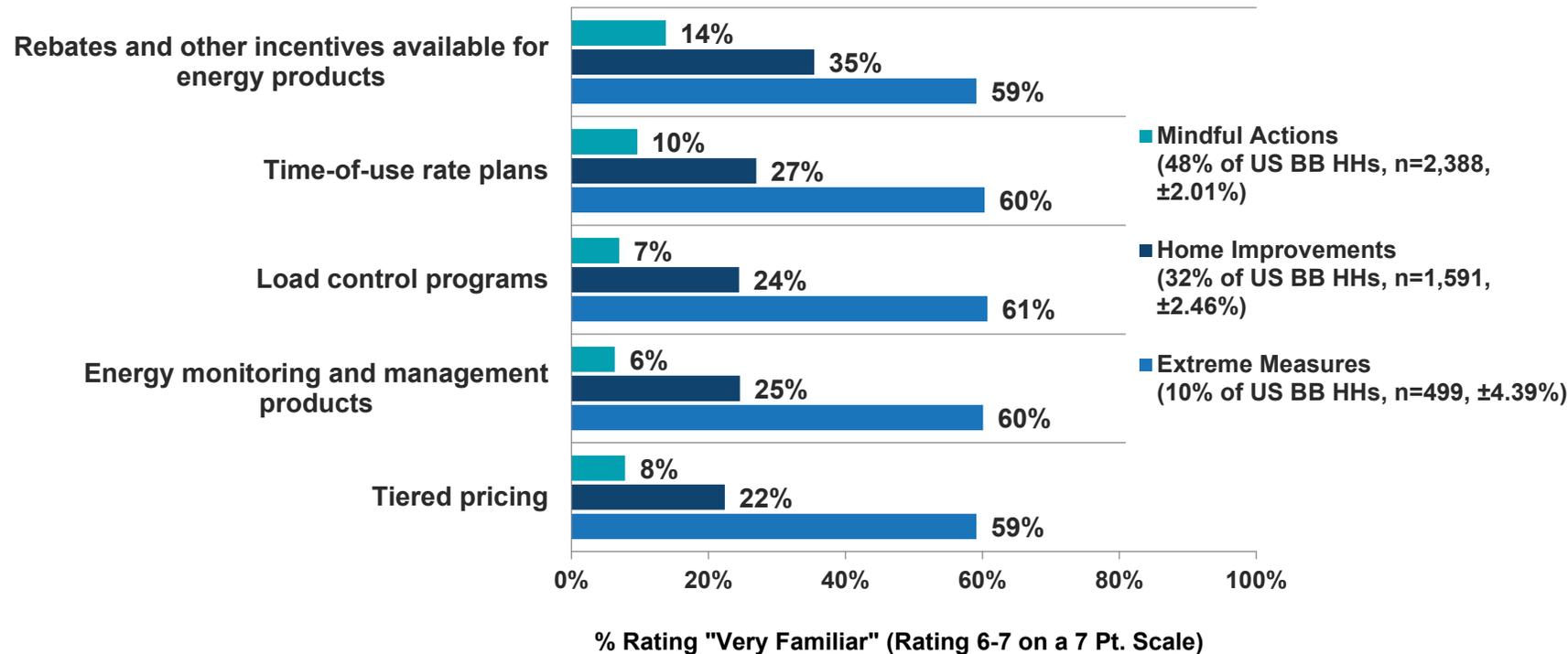
25% of US broadband households report awareness of rebates and incentive for energy efficient products; up 37% from 19% in 2015.

The level of awareness for most programs remained fairly stagnant from 2016 to 2018. Awareness of tiered pricing programs increased 38% between 2018 and 2019.

For the past few years, energy providers have been leveraging partnerships with innovative smart home companies such as Nest and Schneider to help drive awareness of these programs. These partnerships facilitate co-marketing efforts. Utilities promote smart products that can be used in their programs and the smart product manufacturers promote utility programs that their products are integrated with.

# Awareness of energy programs differ by energy segments. Naturally, consumers who take extreme measures are more aware of energy programs than other groups.

## High Familiarity with Energy Programs Offered by Energy-Saving Segments (Q4/19) Among US BB HHs in Specified Group



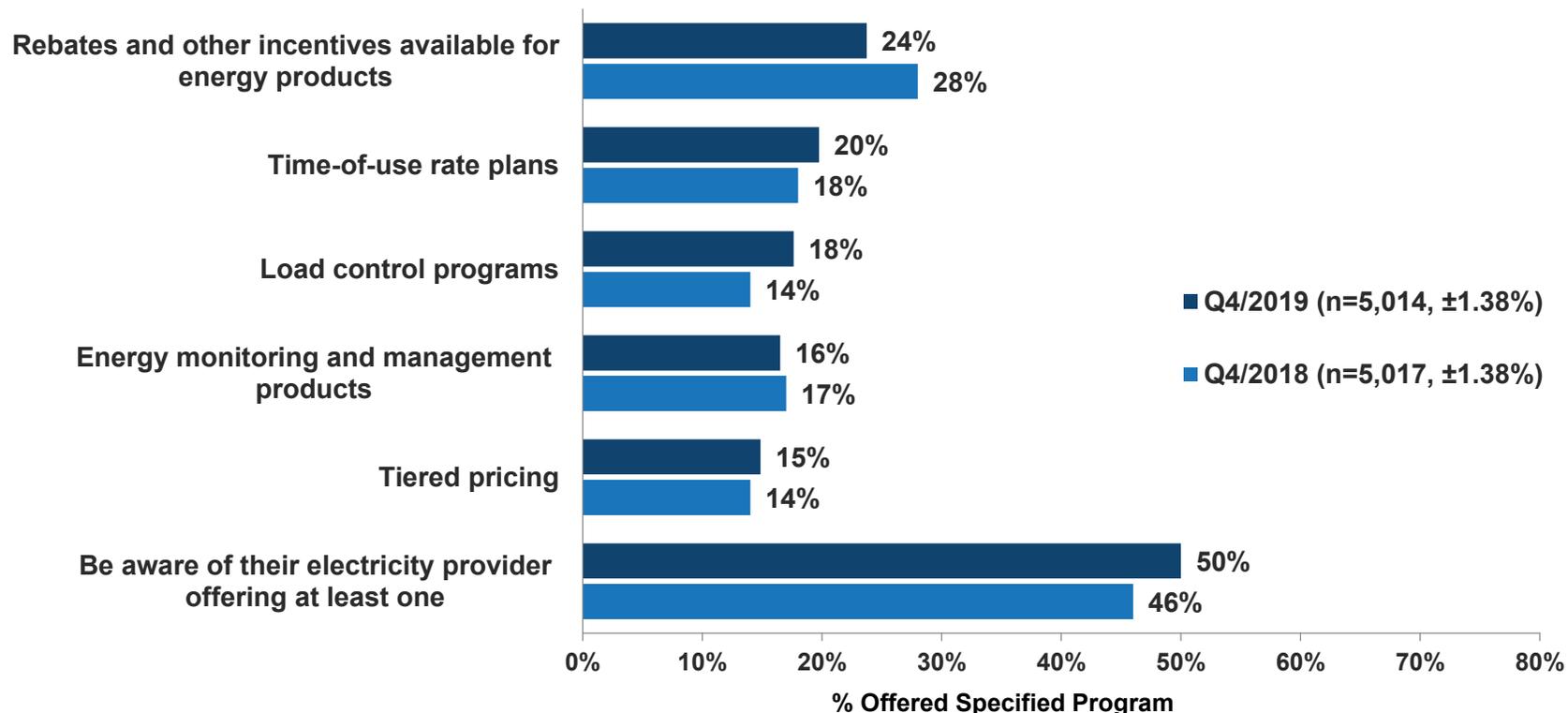
59% of consumers who take extreme energy-saving measures are aware of rebates and incentives for energy-saving products, compared to only 14% of the segment that take mindful actions.

"Q7510a/Q7510b. Which of these energy-saving actions have you or your household members taken over the past 12 months?  
"Q7515. How familiar are you with the following programs?" | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# 25% of US broadband households report that rebates and other incentives for energy efficient products are offered by their electricity provider.

## Energy Programs Offered by Electricity Provider (2018 - 2019)

Among US BB HHs Surveyed



"Q7520A.Which of the following are offered by your electricity provider?"

Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020Parks Associates

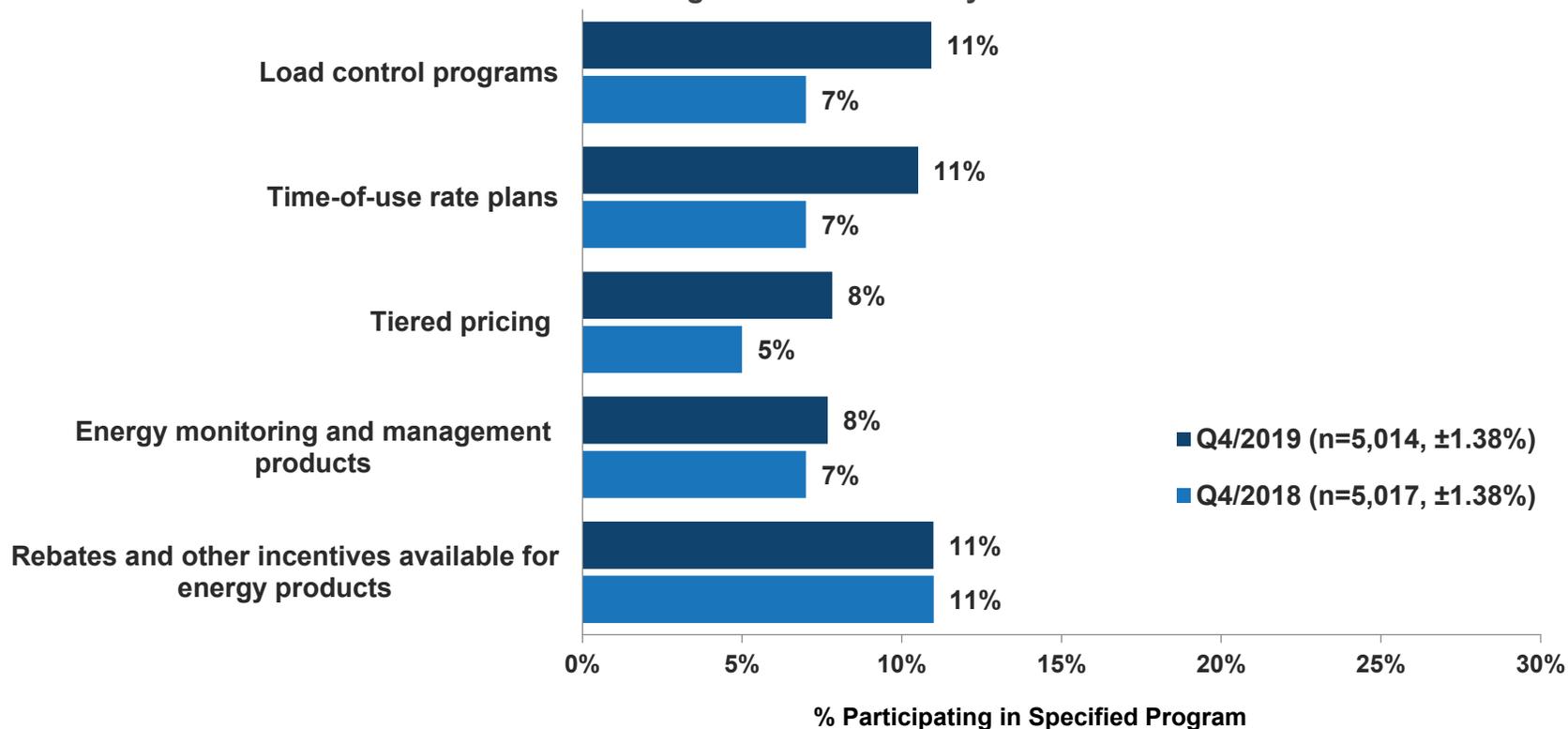
This is consistent with the percentage of US broadband households that report general awareness of these programs.

Given that more than 24% of utilities actually offer these programs, utilities must do more to drive awareness among their installed base of customers.

**Overall participation in energy programs has increased over the past year. Participation in rebates and incentive programs for energy efficient products remained consistent over the past year.**

### Participation in Energy Programs (2018 - 2019)

Among US BB HHs Surveyed



"Q7525. In which programs from your electricity provider do you participate?"

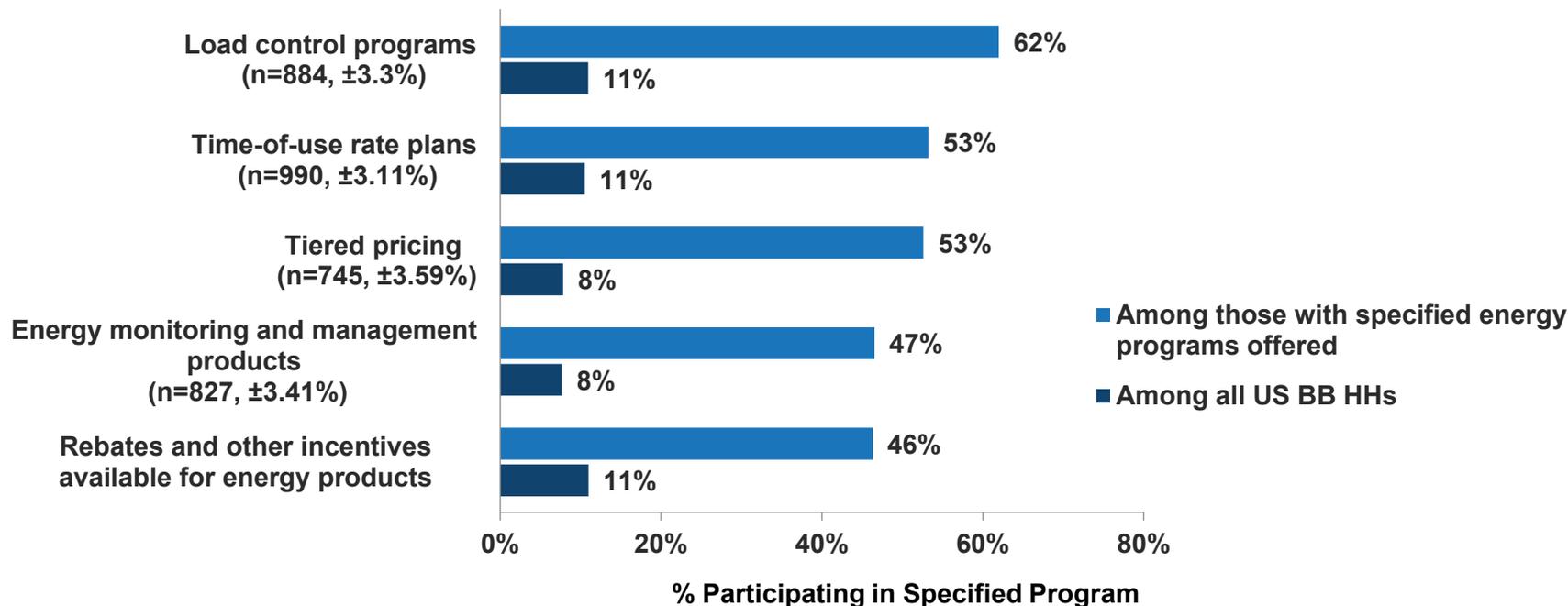
Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020Parks Associates

Consumers participation in programs that help manage peak load (load control programs and time-of-use rate plans) increased more than participation in programs that promote energy efficiency or use of energy monitoring and management products and rebates and incentives for energy efficiency products.

# Only 11% of US broadband households participate in load control programs, time of use rate plans, and rebates and other incentive programs for energy efficient products.

## Adoption of Energy Programs When Offered by Electricity Provider (Q4/19)

Among US BB HHs Offered Specified Energy Programs



"Q7525. In which programs from your electricity provider do you participate?" | Asked of a Subgroup of 5,014 US BB HHs | Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021 ±0.98% | © 2020 Parks Associates

Among energy programs examined, load control programs have the highest participation rate among consumers who are aware that the program is offered by their utility.

62% of consumers who are offered load control programs participate in the programs, compared to only 46% who participate in rebates and other incentive programs for energy efficient products.

Even though rebates and other incentives for energy management products have highest awareness among US broadband households, the percentage of consumers participating in these programs is lower than the percentage participating in other programs offered. This suggests that current program incentives are less appealing than those for other programs.

# Innovators are most likely to participate in all energy programs.

Consumers with income \$100K+ and early adopters are slightly more likely than average to participate in rebate and incentive programs for energy efficiency products.

## Participation in Energy Programs by Demographics (Q4/19)

Q7525. In which programs from your electricity provider do you participate?					
Sample Size	Load control programs	Time-of-use rate plans	Tiered pricing	Energy monitoring and management products	Rebates and other incentives available for energy products
<b>Among US BB HHS Surveyed (n=5,014, ±1.38%)</b>	<b>11%</b>	<b>11%</b>	<b>8%</b>	<b>8%</b>	<b>11%</b>
<b>Age Group</b>					
18-24 (7% of US BB HHS, n=358, ±5.18%)	22%	13%	6%	13%	4%
25-34 (18% of US BB HHS, n=882, ±3.3%)	21%	19%	14%	14%	10%
35-44 (19% of US BB HHS, n=939, ±3.2%)	15%	13%	11%	13%	10%
45-54 (19% of US BB HHS, n=957, ±3.17%)	6%	9%	7%	5%	12%
55-64 (20% of US BB HHS, n=1,000, ±3.1%)	4%	6%	5%	3%	13%
65 and older (17% of US BB HHS, n=878, ±3.31%)	5%	5%	3%	2%	13%
<b>Gender</b>					
Female (50% of US BB HHS, n=2,514, ±1.95%)	7%	8%	6%	5%	11%
Male (50% of US BB HHS, n=2,500, ±1.96%)	15%	13%	10%	10%	11%
<b>Household Income</b>					
Less than \$30,000 (23% of US BB HHS, n=1,156, ±2.88%)	4%	6%	5%	4%	6%
\$30,000 - \$49,999 (18% of US BB HHS, n=902, ±3.26%)	8%	8%	7%	7%	9%
\$50,000 - \$74,999 (16% of US BB HHS, n=808, ±3.45%)	10%	10%	6%	7%	12%
\$75,000 - \$99,999 (12% of US BB HHS, n=577, ±4.08%)	16%	14%	9%	11%	12%
\$100,000 or more (31% of US BB HHS, n=1,571, ±2.47%)	16%	15%	11%	10%	15%
<b>Education Level</b>					
High school degree or lower (32% of US BB HHS, n=1,631, ±2.43%)	6%	7%	4%	5%	8%
Less than college degree (28% of US BB HHS, n=1,361, ±2.66%)	9%	9%	7%	7%	11%
College degree or more (40% of US BB HHS, n=2,022, ±2.18%)	16%	14%	11%	10%	13%
<b>Household with Kids</b>					
Children at home (32% of US BB HHS, n=1604, ±2.45%)	21%	18%	13%	15%	11%
No children (68% of US BB HHS, n=3410, ±1.68%)	6%	7%	5%	4%	11%
<b>Technology Adoption Segments</b>					
Innovator (13% of US BB HHS, n=638, ±3.88%)	37%	39%	24%	25%	13%
Early Adopter (19% of US BB HHS, n=982, ±3.13%)	15%	9%	9%	10%	14%
Early Majority (33% of US BB HHS, n=1,655, ±2.41%)	6%	7%	6%	5%	12%
Late Majority (24% of US BB HHS, n=1,161, ±2.88%)	4%	5%	3%	3%	9%
Laggard (12% of US BB HHS, n=578, ±4.08%)	3%	4%	2%	2%	5%

Asked of a Subgroup of 5,014 US BB HHS © 2020 Parks Associates

Lower than Average

Higher than Average

Note: Compare Results within Columns ONLY

# Consumers with larger homes and those who live in urban areas are more likely to report participation in energy programs.

Consumers who live in Western parts of the US are slightly more engaged with time-of-use rate plans and tiered pricing programs.

## Participation in Energy Programs by Housing Factors (Q4/19)

Q7525. In which programs from your electricity provider do you participate?

Sample Size	Load control programs	Time-of-use rate plans	Tiered pricing	Energy monitoring and management products	Rebates and other incentives available for energy products
<b>Among US BB HHs Surveyed (n=5,014, ±1.38%)</b>	<b>11%</b>	<b>11%</b>	<b>8%</b>	<b>8%</b>	<b>11%</b>
<b>Home Ownership</b>					
Rent (% of US BB HHs, n=1,402, ±2.62%)	6%	8%	6%	6%	6%
Own (% of US BB HHs, n=3,527, ±1.65%)	13%	11%	9%	8%	13%
<b>Home Size</b>					
1,500 square ft or less (27% of US BB HHs, n=1,374, ±2.64%)	5%	6%	5%	5%	9%
1,501 – 2,000 square ft (25% of US BB HHs, n=1,219, ±2.81%)	10%	11%	9%	7%	11%
2,001 – 2,500 square ft (19% of US BB HHs, n=953, ±3.17%)	17%	14%	8%	12%	14%
2,501 – 3,500 square ft (13% of US BB HHs, n=639, ±3.88%)	20%	16%	12%	10%	15%
More than 3,500 square ft (5% of US BB HHs, n=238, ±6.35%)	19%	18%	17%	15%	16%
<b>Region</b>					
Northeast (21% of US BB HHs, n=1,081, ±2.98%)	11%	8%	5%	7%	13%
Midwest (22% of US BB HHs, n=1,102, ±2.95%)	9%	7%	6%	6%	14%
South (37% of US BB HHs, n=1,860, ±2.27%)	12%	11%	8%	9%	8%
West (19% of US BB HHs, n=971, ±3.14%)	12%	16%	14%	7%	12%
<b>Residence Area</b>					
An urban area (28% of US BB HHs, n=1,423, ±2.6%)	19%	17%	13%	13%	11%
A suburban area (48% of US BB HHs, n=2,432, ±1.99%)	9%	9%	7%	6%	12%
A rural area (22% of US BB HHs, n=1,104, ±2.95%)	6%	6%	4%	4%	10%
<b>Length of Time in Residence</b>					
Less than 12 months (9% of US BB HHs, n=433, ±4.71%)	8%	11%	8%	6%	6%
1-2 years (12% of US BB HHs, n=605, ±3.98%)	14%	11%	9%	10%	8%
3-4 years (14% of US BB HHs, n=741, ±3.6%)	16%	13%	9%	12%	9%
5-10 years (21% of US BB HHs, n=1,066, ±3%)	12%	11%	8%	9%	11%
More than 10 years (43% of US BB HHs, n=2,169, ±2.1%)	8%	9%	7%	5%	14%

Asked of a Subgroup of 5,014 US BB HHs © 2020 Parks Associates

Lower than Average

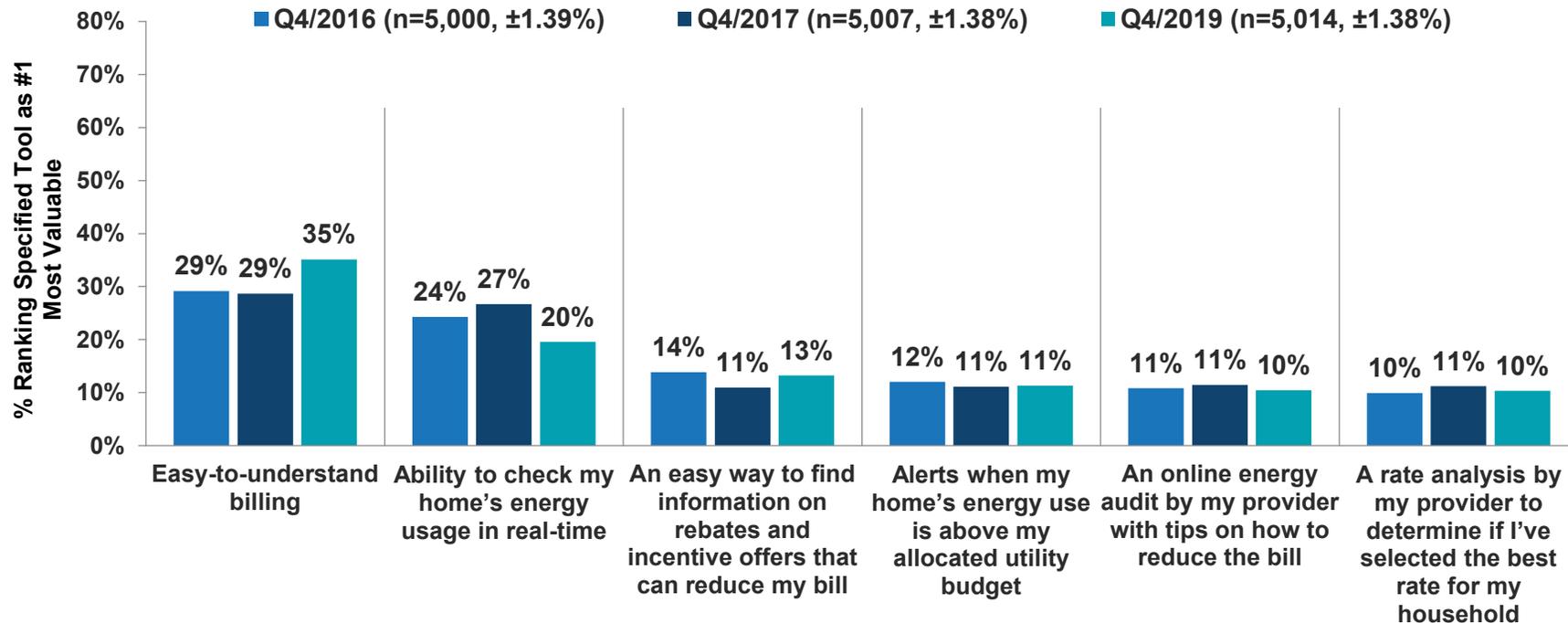
Higher than Average

Note: Compare Results within Columns ONLY

# An easy-to-understand energy bill and the ability to check a home's energy usage in real time are the most valuable energy management features tested.

## Most Valuable Energy Management Features (2016 - 2019)

Among US BB HHs Surveyed



"Q7527. How valuable are these tools in managing your household's energy use and costs? Please rank these from 1 ("Most Valuable") to 6 ("Least Valuable")."  
Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

Traditionally, much of the interaction between utilities and customers was through their monthly bill. This likely influences why a relatively high percentage of consumers rank easy-to-understand billing as the most valuable tool to manage their household's energy cost.

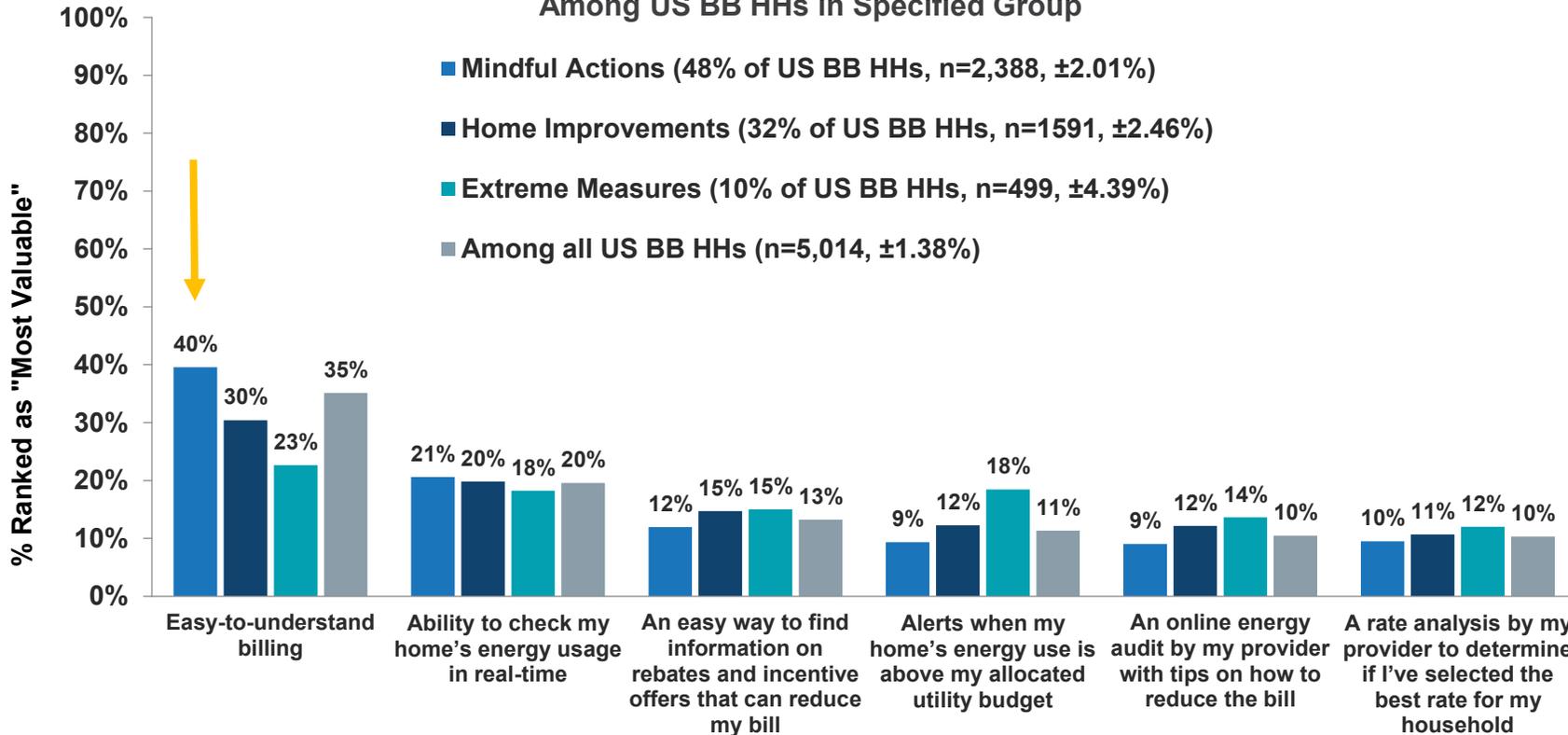
Utilities are increasingly looking to online marketplaces that allow consumers to find information about products, programs, rebates, and incentive offers easily and to improve customer satisfaction and engagement.

However, only 13% of consumers find easy ways to obtain information on rebates and incentive offers that can reduce their bill valuable. This has been consistent for the past three years.

# Consumers in the Mindful Actions segment are more likely to rank easy-to-understand billing as their most valuable energy management tool than the average broadband household.

## Most Valuable Energy Management Tool by Energy Segments (Q4/19)

Among US BB HHs in Specified Group



Those in the Extreme Measures segment are more likely to rank alerts on energy use as most valuable than the average broadband household.

"Q7510a/Q7510b. Which of these energy-saving actions have you or your household members taken over the past 12 months? Q7527. How valuable are these tools in managing your household's energy use and costs? " Asked of a Subgroup of 5,014 US BB HHs | Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Consumer Demand for Smart Energy Solutions

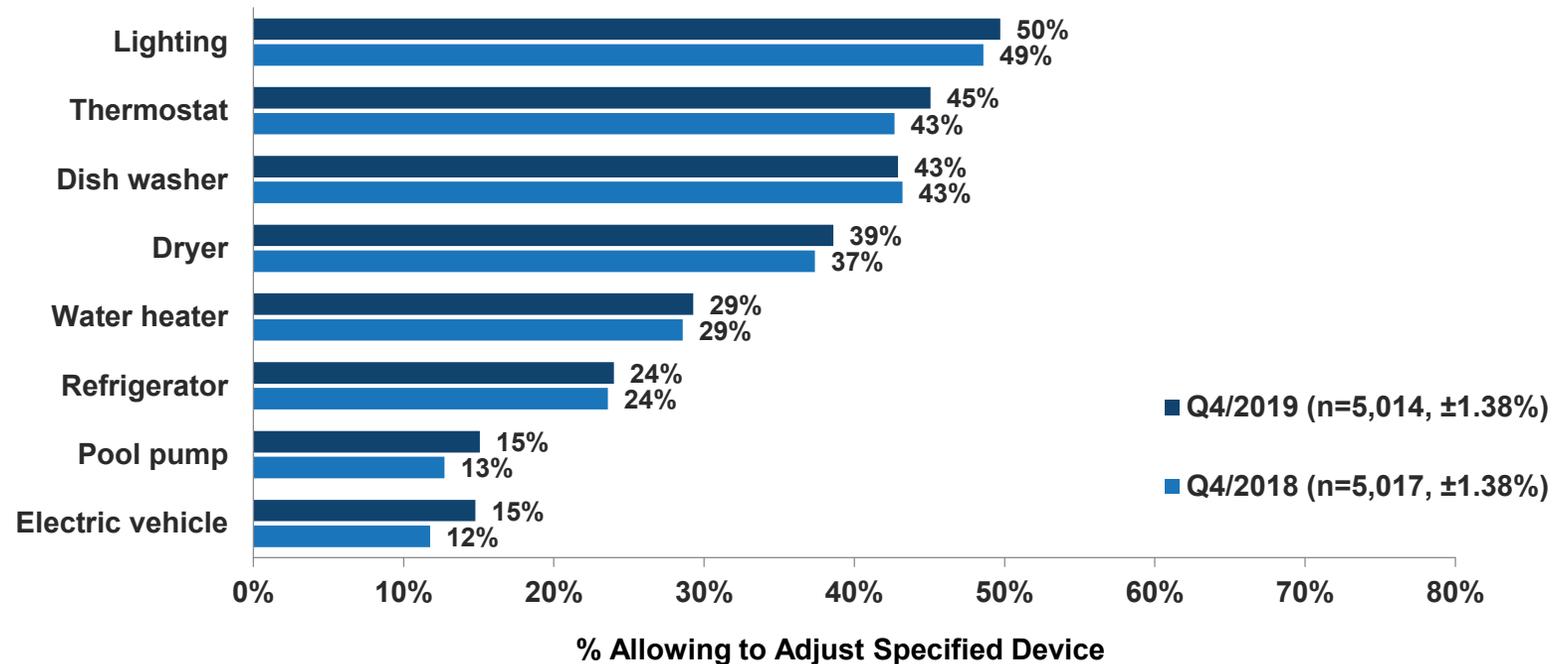
## Demand Response

[Back to Table of Contents](#)

**45% of US broadband households are willing to adjust their thermostat during peak periods to help manage the load on the grid.**

## Willingness to Adjust Smart Energy Products During Peak Periods (2018 - 2019)

Among US BB HHs Surveyed



"Q7530. Which of these products are you willing to adjust during peak energy consumption periods in order to reduce your community's energy consumption and prevent potential blackouts?"  
 Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

The percentage of consumers reporting willingness to adjust energy-related smart home devices and appliances during peak periods has not changed over the past year. However, the percentage willing to adjust pool pumps and electric vehicle charging has experienced a slight increase.

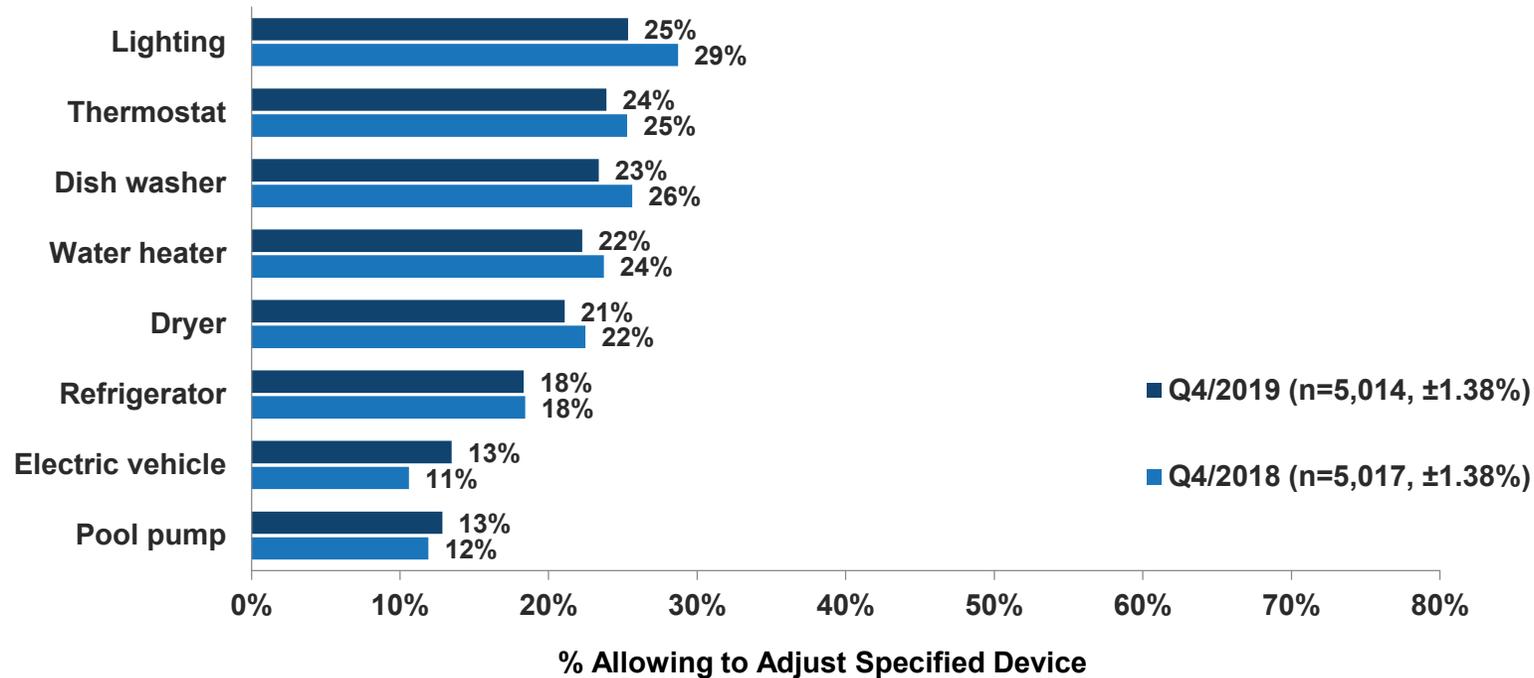
Utilities have recently embarked on major campaigns to identify households that have electric vehicles and market special programs to them that provide incentives, including special rate plans, for charging electric vehicles during off-peak periods.

These incentives are likely helping to drive increased willingness to adjust the products.

# Consumers are significantly less willing to have their device manufacturer adjust their products during peak periods than they are to adjust them themselves.

## Willingness to Allow Manufacturers/Utility to Adjust Smart Energy Products During Peak Periods (2018 - 2019)

Among US BB HHs Surveyed



"Q7535.Which of these products will you allow the manufacturer or utility to adjust during peak energy consumption periods to reduce your community's energy consumption and prevent potential blackouts?"  
Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

For lights, thermostats, dishwashers, and, clothes dryers, willingness to adjust products during peak periods declines by approximately 50% when the device manufacturer is in control of the adjustment.

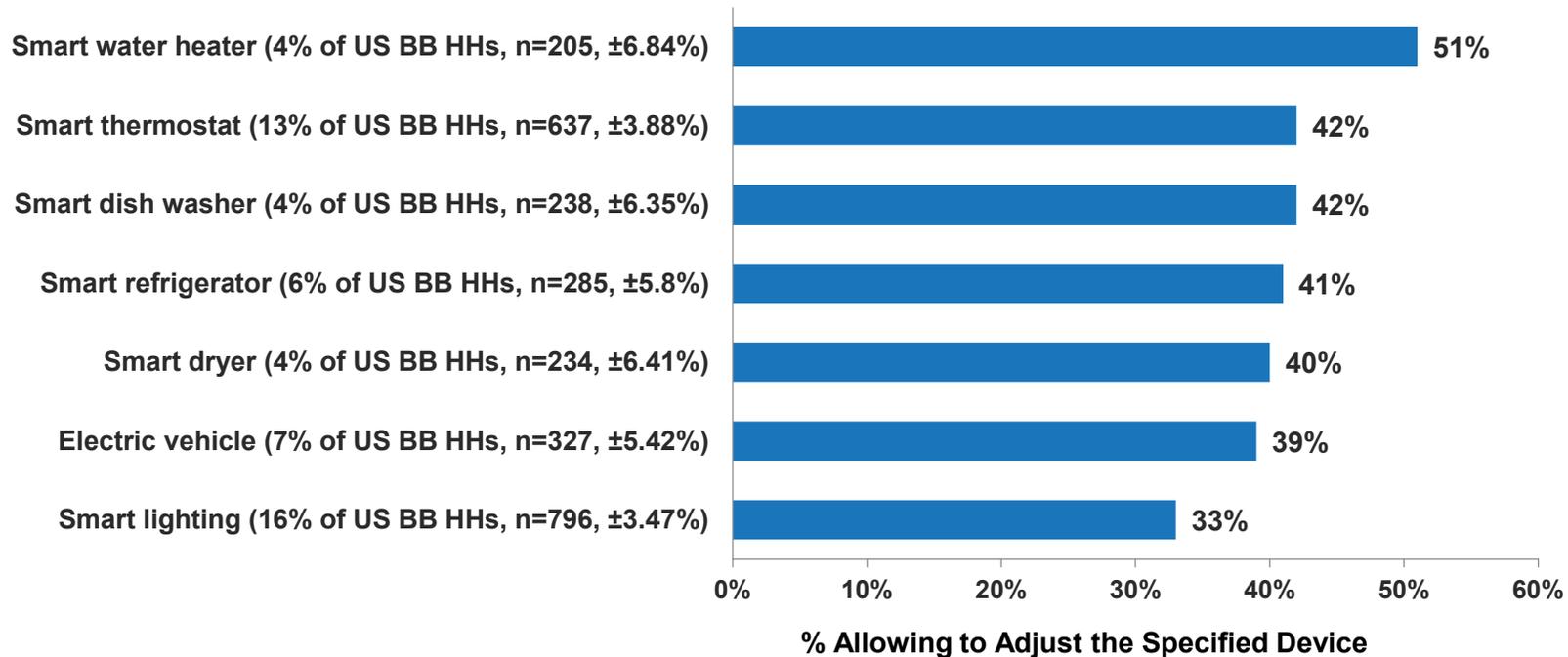
The difference in willingness for self-adjustment versus manufacturer-adjustment is less pronounced for water heaters, refrigerators, EVs, and pool pumps.

Generally, consumers want to maintain control over the devices that they interact with more regularly.

# Willingness to allow manufacturer control of smart energy products is higher among consumers who own the products than among all broadband households.

## Willingness to Allow Manufacturers/Utility to Adjust Smart Energy Products by Product Ownership (Q4/19)

Among US BB HHs Owning Specified Home Device



42% of smart thermostat owners are willing to have their thermostat controlled by a utility/manufacturer, compared to just 24% of all broadband households.

Smart water heater owners are more than twice as likely to report willingness to have a smart water heater controlled by a manufacturer/utility than all broadband households.

Although smart water heater owners are a small group, 4% of US broadband households, they are good targets for DR programs.

"Q7535.Which of these products will you allow the manufacturer or utility to adjust during peak energy consumption periods to reduce your community's energy consumption and prevent potential blackouts?" | Asked of a Subgroup of 5,014 US BB HHs  
 Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020Parks Associates

# Among demographic factors examined, technology adoption segment has the strongest impact on willingness to have manufacturers or utilities control energy smart energy products.

## Willingness to Allow Manufacturer/Utility to Adjust Smart Energy Products by Demographics (Q4/19)

Q7535. Which of these products will you allow the manufacturer or utility to adjust during peak energy consumption periods to reduce your community's energy consumption and prevent potential blackouts?								
	Lighting	Thermostat	Dish Washer	Water Heater	Dryer	Refrigerator	Electric Vehicle	Pool Pump
<b>Among All US BB HHs Surveyed (n=5,014, ±1.38%)</b>	<b>25%</b>	<b>24%</b>	<b>23%</b>	<b>22%</b>	<b>21%</b>	<b>18%</b>	<b>13%</b>	<b>13%</b>
<b>Age Group</b>								
18-24 (7% of US BB HHs, n=358, ±5.18%)	31%	27%	25%	26%	26%	25%	21%	15%
25-34 (18% of US BB HHs, n=882, ±3.3%)	30%	29%	26%	27%	25%	25%	20%	19%
35-44 (19% of US BB HHs, n=939, ±3.2%)	28%	28%	27%	25%	22%	24%	16%	15%
45-54 (19% of US BB HHs, n=957, ±3.17%)	24%	20%	20%	19%	21%	15%	9%	10%
55-64 (20% of US BB HHs, n=1,000, ±3.1%)	22%	21%	21%	19%	18%	14%	10%	9%
65+ (17% of US BB HHs, n=878, ±3.31%)	22%	20%	23%	20%	18%	13%	10%	11%
<b>Gender</b>								
Female (50% of US BB HHs, n=2,514, ±1.95%)	26%	23%	23%	21%	22%	17%	12%	11%
Male (50% of US BB HHs, n=2,500, ±1.96%)	24%	25%	24%	24%	20%	19%	15%	15%
<b>Household Income</b>								
Less than \$30,000 (23% of US BB HHs, n=1,156, ±2.88%)	26%	20%	17%	19%	18%	16%	10%	9%
\$30,000 - \$49,999 (18% of US BB HHs, n=902, ±3.26%)	26%	22%	22%	20%	22%	18%	11%	11%
\$50,000 - \$74,999 (16% of US BB HHs, n=808, ±3.45%)	25%	25%	22%	23%	21%	19%	12%	13%
\$75,000 - \$99,999 (12% of US BB HHs, n=577, ±4.08%)	29%	26%	24%	25%	21%	19%	17%	14%
\$100,000 or more (31% of US BB HHs, n=1,571, ±2.47%)	24%	26%	30%	25%	23%	20%	17%	16%
<b>Households with Kids</b>								
Children at home (32% of US BB HHs, n=1,604, ±2.45%)	30%	30%	28%	29%	27%	26%	19%	18%
No children (68% of US BB HHs, n=3,410, ±1.68%)	23%	21%	21%	19%	18%	15%	11%	10%
<b>Technology Adoption Segment</b>								
Innovator (13% of US BB HHs, n=638, ±3.88%)	39%	37%	36%	39%	34%	35%	30%	27%
Early Adopter (19% of US BB HHs, n=982, ±3.13%)	27%	30%	26%	25%	24%	22%	17%	15%
Early Majority (33% of US BB HHs, n=1,655, ±2.41%)	23%	22%	22%	21%	20%	16%	11%	11%
Late Majority (24% of US BB HHs, n=1,161, ±2.88%)	24%	19%	21%	17%	17%	14%	9%	10%
Laggard (12% of US BB HHs, n=578, ±4.08%)	17%	14%	13%	13%	13%	10%	6%	4%

Innovators are most willing to have their smart energy products controlled by a manufacturer/utility, while laggards are least willing.

35% of innovators are willing to have a manufacturer/utility control their smart refrigerator, compared to only 10% of laggards.

Lower than Average Higher than Average

Note: Compare Results within Columns ONLY

Asked of a Subgroup of 5,014 US BB HHs © 2020 Parks Associates

# Housing factors have stronger influence on willingness to have manufacturers and utilities adjust smart energy products than demographic factors.

## Willingness to Allow Manufacturer/Utility to Adjust Home Devices by Housing Factors (Q4/19)

**Q7535. Which of these products will you allow the manufacturer or utility to adjust during peak energy consumption periods to reduce your community's energy consumption and prevent potential blackouts?**

All US BB HHs Surveyed (n=5,014, ±1.38%)	Lighting	Thermostat	Dish Washer	Water Heater	Dryer	Refrigerator	Electric Vehicle	Pool Pump
<b>Home Ownership</b>								
Rent (28% of US BB HHs, n=1,402, ±2.62%)	28%	23%	20%	20%	20%	18%	11%	11%
Own (70% of US BB HHs, n=3,527, ±1.65%)	25%	24%	25%	23%	22%	18%	15%	14%
<b>Residence Area</b>								
An urban area (28% of US BB HHs, n=1,423, ±2.6%)	30%	26%	27%	26%	25%	24%	18%	17%
A suburban area (48% of US BB HHs, n=2,432, ±1.99%)	24%	24%	23%	21%	20%	16%	12%	12%
A rural area (22% of US BB HHs, n=1,104, ±2.95%)	24%	21%	19%	20%	18%	16%	10%	11%
<b>Home Size</b>								
1,500 square ft. or less (27% of US BB HHs, n=1,374, ±2.64%)	25%	21%	21%	20%	18%	17%	11%	10%
1,501 – 2,000 square ft. (25% of US BB HHs, n=1,219, ±2.81%)	25%	23%	24%	22%	23%	18%	13%	12%
2,001 – 2,500 square ft. (19% of US BB HHs, n=953, ±3.17%)	27%	29%	28%	26%	25%	21%	18%	16%
2,501 – 3,500 square ft. (13% of US BB HHs, n=639, ±3.88%)	23%	27%	28%	28%	22%	22%	16%	16%
More than 3,500 square ft. (5% of US BB HHs, n=238, ±6.35%)	32%	29%	29%	24%	26%	21%	22%	23%
<b>Region</b>								
Northeast (21% of US BB HHs, n=1,081, ±2.98%)	25%	20%	23%	18%	20%	17%	13%	11%
Midwest (22% of US BB HHs, n=1,102, ±2.95%)	24%	22%	21%	21%	19%	17%	12%	11%
South (37% of US BB HHs, n=1,860, ±2.27%)	27%	27%	25%	25%	23%	20%	14%	14%
West (19% of US BB HHs, n=971, ±3.14%)	24%	25%	23%	22%	22%	19%	15%	14%
<b>Length of Time in Residence</b>								
Less than 12 months (9% of US BB HHs, n=433, ±4.71%)	30%	24%	26%	23%	23%	18%	13%	14%
1-2 years (12% of US BB HHs, n=605, ±3.98%)	24%	27%	24%	24%	21%	21%	17%	14%
3-4 years (14% of US BB HHs, n=741, ±3.6%)	28%	25%	24%	25%	22%	22%	18%	17%
5-10 years (21% of US BB HHs, n=1,066, ±3%)	27%	27%	25%	24%	23%	21%	14%	12%
More than 10 years (43% of US BB HHs, n=2,169, ±2.1%)	23%	21%	21%	20%	19%	15%	11%	11%

Asked of a Subgroup of 5,014 US BB HHs © 2020 Parks Associates

Consumers with homes 3,500 square ft. and larger indicate highest willingness to have their smart energy products controlled by a manufacturer/utility.

Area of residence also impacts willingness to have manufacturer/utility adjust products.

Consumers in urban areas are more willing to have their products adjusted compared to consumers in rural areas. Consumers in urban areas are particularly more willing to have their refrigerators adjusted than the average broadband household.

Lower than Average

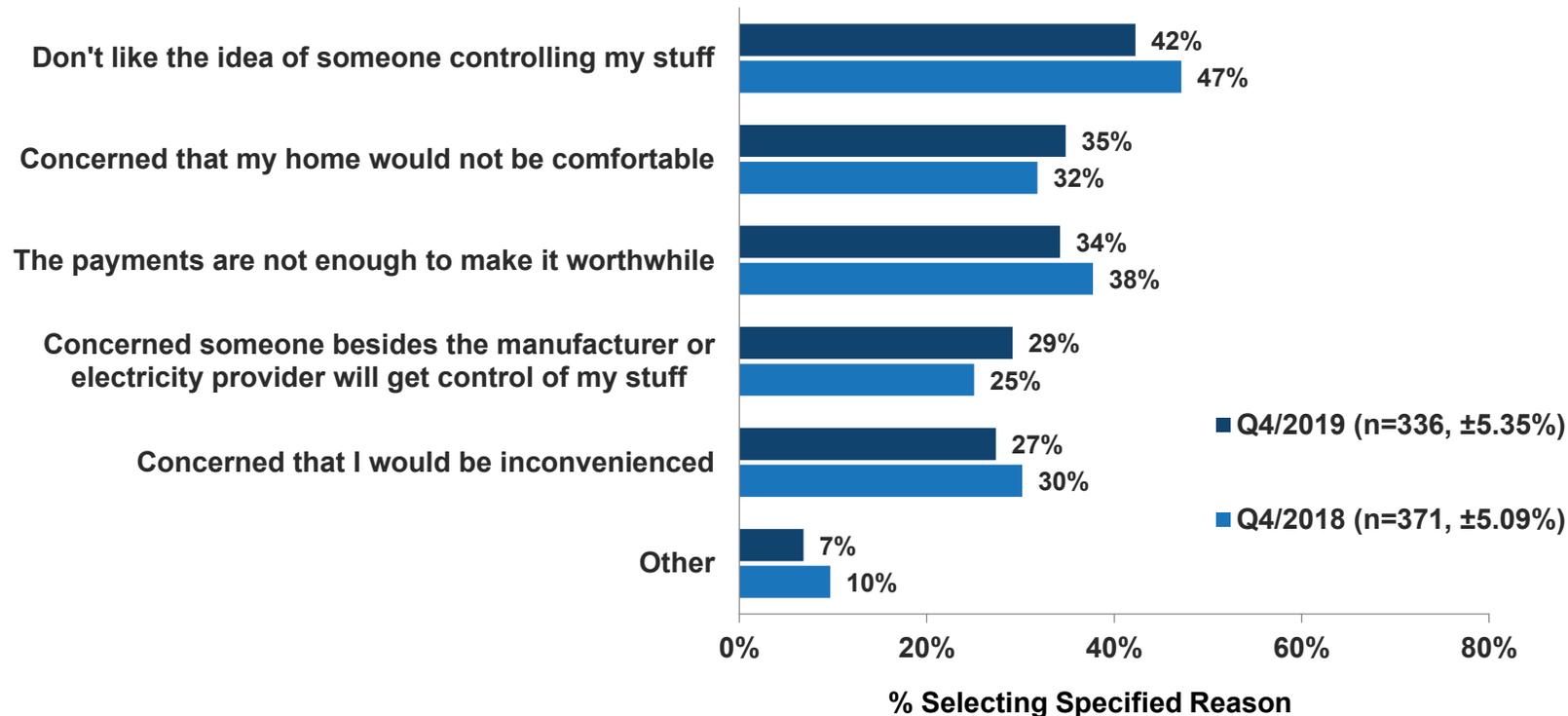
Higher than Average

Note: Compare Results within Columns ONLY

# Wanting to maintain control is the primary reason consumers do not want to participate in DR programs.

## Reasons For Not Participating in Load Control Programs (2018 - 2019)

Among US BB HHs Not Participating in the Load Control Program Offered



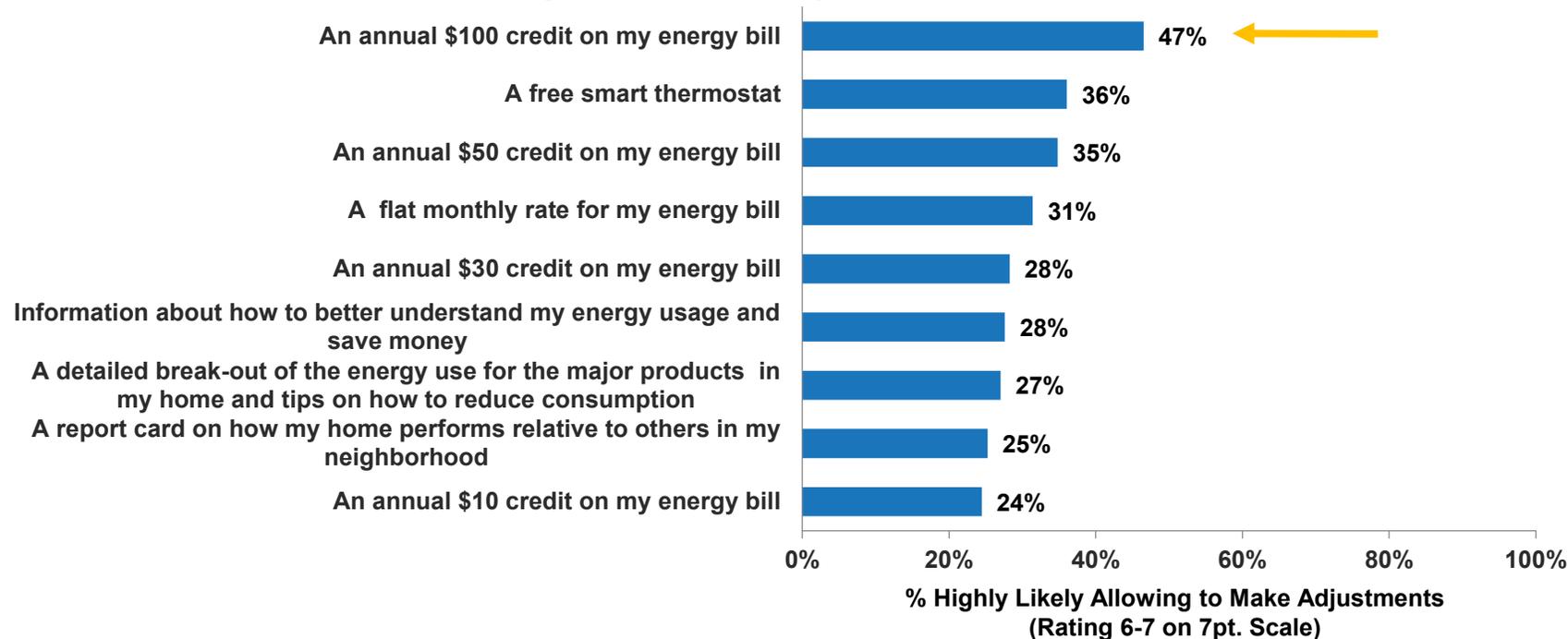
DR programs must be designed around the consumer maintaining control of smart energy products or run the risk of low participation. Giving consumers the ability to override adjustments for DR events is a promising strategy to secure initial program participation.

"Q7550. Which of the following describe why you have not enrolled in the load control program offered by your electricity provider?"  
Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

# Nearly one-half of consumers are willing to have their smart energy products adjusted by their electricity provider for a \$100 annual credit on their energy bill.

## High Likelihood of Allowing Electricity Providers to Make Energy-Saving Adjustments (Q4/19)

Among US BB HHs Surveyed, n = 5,014 ±1.38%



"Q7560. How likely are you to allow your electricity provider to make energy-saving adjustments to your household devices during periods of peak energy use in return for the following?" | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

Among incentives examined, an annual credit on their energy bill is the most popular incentive to drive participation in DR programs. A free smart thermostat will drive participation among 36% of US broadband households. These are the incentives with highest monetary value.

Incentives that provide greater understanding into energy consumption throughout the home and tips on how to save energy are less popular incentive for driving DR program participation.

# Not surprisingly, Innovators are most likely to allow energy providers to make energy-saving adjustments to their smart energy products for various incentives.

13% of US broadband households fall into the Innovator segment.

## High Likelihood of Allowing Electricity Provider to Make Energy-Saving Adjustments by Demographics (Q4/19)

(Rating 6-7 on 7-pt. Scale)									
Among US BB HHs Surveyed	Annual \$100 credit on energy bill	Free smart thermostat	Annual \$50 credit on energy bill	Flat monthly rate for energy bill	Annual \$30 credit on energy bill	Information about how to better understand my energy usage and save money	A detailed break-out of the energy use for the major products in my home and tips on how to reduce consumption	A report card on how my home performs relative to others in my neighborhood	Annual \$10 credit on energy bill
(n=5,014, ±1.38%)	47%	36%	35%	31%	28%	28%	27%	25%	24%
<b>Age Group</b>									
18-24 (7% of US BB HHs, n=358, ±5.18%)	49%	49%	45%	46%	37%	37%	34%	33%	31%
25-34 (18% of US BB HHs, n=882, ±3.3%)	54%	48%	46%	47%	44%	41%	42%	42%	42%
35-44 (19% of US BB HHs, n=939, ±3.2%)	51%	39%	41%	38%	35%	33%	32%	31%	32%
45-54 (19% of US BB HHs, n=957, ±3.17%)	45%	34%	32%	26%	25%	24%	22%	21%	19%
55-64 (20% of US BB HHs, n=1,000, ±3.1%)	42%	28%	28%	23%	19%	19%	19%	16%	15%
65 and older (17% of US BB HHs, n=878, ±3.31%)	40%	28%	24%	19%	17%	18%	18%	15%	13%
<b>Gender</b>									
Female (50% of US BB HHs, n=2,514, ±1.95%)	48%	35%	35%	31%	27%	25%	24%	22%	21%
Male (50% of US BB HHs, n=2,500, ±1.96%)	45%	37%	35%	32%	30%	30%	30%	28%	28%
<b>Household Income</b>									
Less than \$30,000 (23% of US BB HHs, n=1,156, ±2.88%)	45%	31%	34%	31%	27%	26%	22%	20%	23%
\$30,000 - \$49,999 (18% of US BB HHs, n=902, ±3.26%)	44%	34%	32%	29%	25%	24%	24%	21%	22%
\$50,000 - \$74,999 (16% of US BB HHs, n=808, ±3.45%)	48%	36%	35%	30%	26%	26%	26%	24%	23%
\$75,000 - \$99,999 (12% of US BB HHs, n=577, ±4.08%)	49%	42%	38%	38%	35%	33%	33%	33%	31%
\$100,000 or more (31% of US BB HHs, n=1,571, ±2.47%)	48%	39%	36%	31%	30%	30%	31%	29%	26%
<b>Households with Kids</b>									
Children at home (32% of US BB HHs, n=1,604, ±2.45%)	56%	50%	48%	48%	42%	42%	41%	40%	41%
No children (68% of US BB HHs, n=3,410, ±1.68%)	42%	30%	29%	24%	22%	21%	20%	18%	17%
<b>Technology Adoption Segment</b>									
Innovator (13% of US BB HHs, n=638, ±3.88%)	74%	73%	70%	71%	69%	70%	71%	68%	69%
Early Adopter (19% of US BB HHs, n=982, ±3.13%)	51%	40%	38%	34%	31%	31%	30%	29%	27%
Early Majority (33% of US BB HHs, n=1,655, ±2.41%)	41%	31%	28%	25%	21%	22%	20%	19%	15%
Late Majority (24% of US BB HHs, n=1,161, ±2.88%)	42%	28%	27%	22%	19%	17%	17%	14%	15%
Laggard (12% of US BB HHs, n=578, ±4.08%)	35%	22%	26%	20%	19%	15%	13%	12%	16%

Asked of a Subgroup of 5,014 US BB HHs © 2020 Parks Associates

Note: Compare Results within Columns ONLY

Lower than Average

Higher than Average

# Among housing factors examined, area of residence has strongest influence on likelihood to have smart energy products adjusted for various incentives.

A report card on how the home performs relative to others in the neighborhood has significant influence on those with homes sizes 3,500 square ft. and above.

## High Likelihood of Allowing Electricity Provider to Make Energy-Saving Adjustments by Housing Factors (Q4/19)

(Rating 6-7 on 7-pt. Scale)

Among US BB HHs Surveyed	Annual \$100 credit on energy bill	Free smart thermostat	Annual \$50 credit on energy bill	Flat monthly rate for energy bill	Annual \$30 credit on energy bill	Information about how to better understand my energy usage and save money	A detailed break-out of the energy use for the major products in my home and tips on how to reduce consumption	A report card on how my home performs relative to others in my neighborhood	Annual \$10 credit on energy bill
(n=5,014, ±1.38%)	47%	36%	35%	31%	28%	28%	27%	25%	24%
<b>Home Ownership</b>									
Rent (28% of US BB HHs, n=1,402, ±2.62%)	48%	35%	37%	35%	31%	27%	26%	23%	26%
Own (70% of US BB HHs, n=3,527, ±1.65%)	46%	37%	34%	30%	27%	28%	28%	26%	24%
<b>Residence Area</b>									
An urban area (28% of US BB HHs, n=1,423, ±2.6%)	54%	47%	46%	44%	41%	40%	38%	38%	39%
A suburban area (48% of US BB HHs, n=2,432, ±1.99%)	43%	32%	30%	26%	23%	23%	23%	21%	19%
A rural area (22% of US BB HHs, n=1,104, ±2.95%)	44%	31%	32%	28%	23%	21%	21%	18%	18%
<b>Home Size</b>									
1,500 square ft or less (27% of US BB HHs, n=1,374, ±2.64%)	45%	31%	33%	29%	26%	23%	21%	20%	20%
1,501 – 2,000 square ft (25% of US BB HHs, n=1,219, ±2.81%)	46%	36%	34%	29%	27%	27%	26%	24%	23%
2,001 – 2,500 square ft (19% of US BB HHs, n=953, ±3.17%)	51%	42%	38%	38%	32%	34%	34%	32%	29%
2,501 – 3,500 square ft (13% of US BB HHs, n=639, ±3.88%)	50%	44%	39%	34%	32%	34%	36%	33%	30%
More than 3,500 square ft (5% of US BB HHs, n=238, ±6.35%)	50%	41%	41%	35%	38%	37%	36%	38%	34%
<b>Region</b>									
Northeast (21% of US BB HHs, n=1,081, ±2.98%)	45%	34%	35%	31%	28%	27%	26%	24%	24%
Midwest (22% of US BB HHs, n=1,102, ±2.95%)	44%	34%	32%	29%	26%	25%	24%	23%	23%
South (37% of US BB HHs, n=1,860, ±2.27%)	50%	40%	38%	34%	31%	30%	30%	27%	28%
West (19% of US BB HHs, n=971, ±3.14%)	45%	34%	32%	29%	25%	27%	26%	25%	21%
<b>Length of Time in Residence</b>									
Less than 12 months (9% of US BB HHs, n=433, ±4.71%)	51%	40%	40%	35%	37%	27%	25%	24%	27%
1-2 years (12% of US BB HHs, n=605, ±3.98%)	48%	41%	40%	38%	33%	35%	34%	30%	29%
3-4 years (14% of US BB HHs, n=741, ±3.6%)	51%	41%	42%	39%	35%	33%	34%	33%	34%
5-10 years (21% of US BB HHs, n=1,066, ±3%)	50%	38%	37%	33%	30%	29%	29%	26%	27%
More than 10 years (43% of US BB HHs, n=2,169, ±2.1%)	42%	31%	29%	25%	22%	23%	22%	21%	18%

Asked of a Subgroup of 5,014 US BB HHs © 2020 Parks Associates

Note: Compare Results within Columns ONLY

Lower than Average Higher than Average

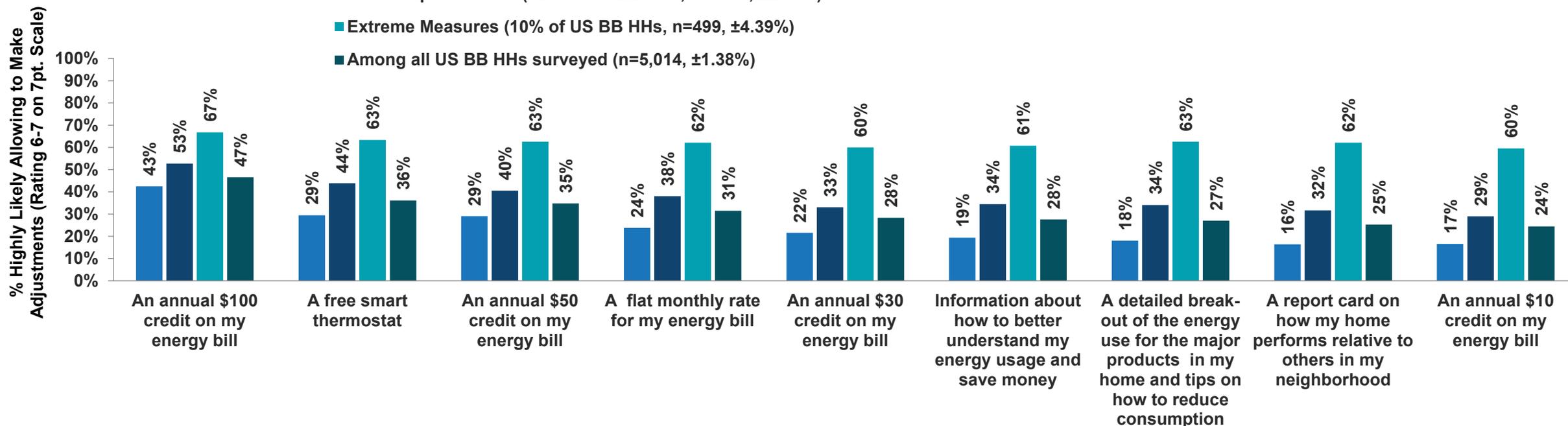
# Consumers in the Extreme Measures energy-saving category are more likely to be motivated to participate in DR programs by the various incentives examined than those in other groups.

The percentage of consumers in the Extreme Measures category who are likely to participate in DR programs is nearly consistent across incentives. By comparison, the percentage of consumers in other categories that are likelihood to participate is significantly higher for more popular incentives than less popular incentives.

## Likelihood of Allowing Electricity Providers to Make Energy-Saving Adjustments by Segments (Q4/19)

Among US BB HHs in Specified Group

- Mindful Actions (48% of US BB HHs, n=2,388, ±2.01%)
- Home Improvemnets (32% of US BB HHs, n=1591, ±2.46%)
- Extreme Measures (10% of US BB HHs, n=499, ±4.39%)
- Among all US BB HHs surveyed (n=5,014, ±1.38%)



"Q7560. How likely are you to allow your electricity provider to make energy-saving adjustments to your household devices during periods of peak energy use in return for the following?"  
 Asked of a Subgroup of 5,014 US BB HHs | Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Consumer Demand for Smart Energy Solutions

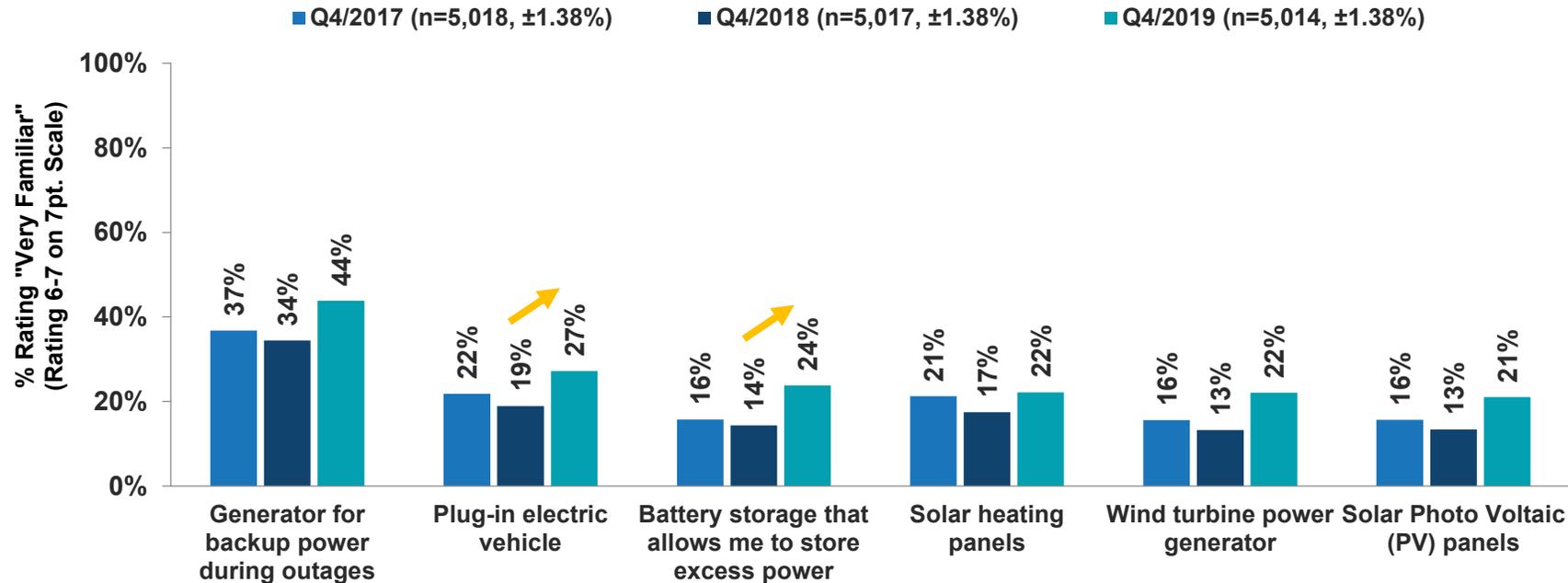
## Distributed Generation and Storage

[Back to Table of Contents](#)

**High familiarity with distributed generation resources has grown slightly over the past year. High familiarity with EVs has increased 22% since 2017.**

## High Familiarity of Energy Devices (2017 - 2019)

Among US BB HHs Surveyed



Consumers are most familiar with generators for backup electricity. Familiarity with generators grew by 30% over the past year.

Battery storage experienced the highest increase in familiarity – a 71% increase over 2018.

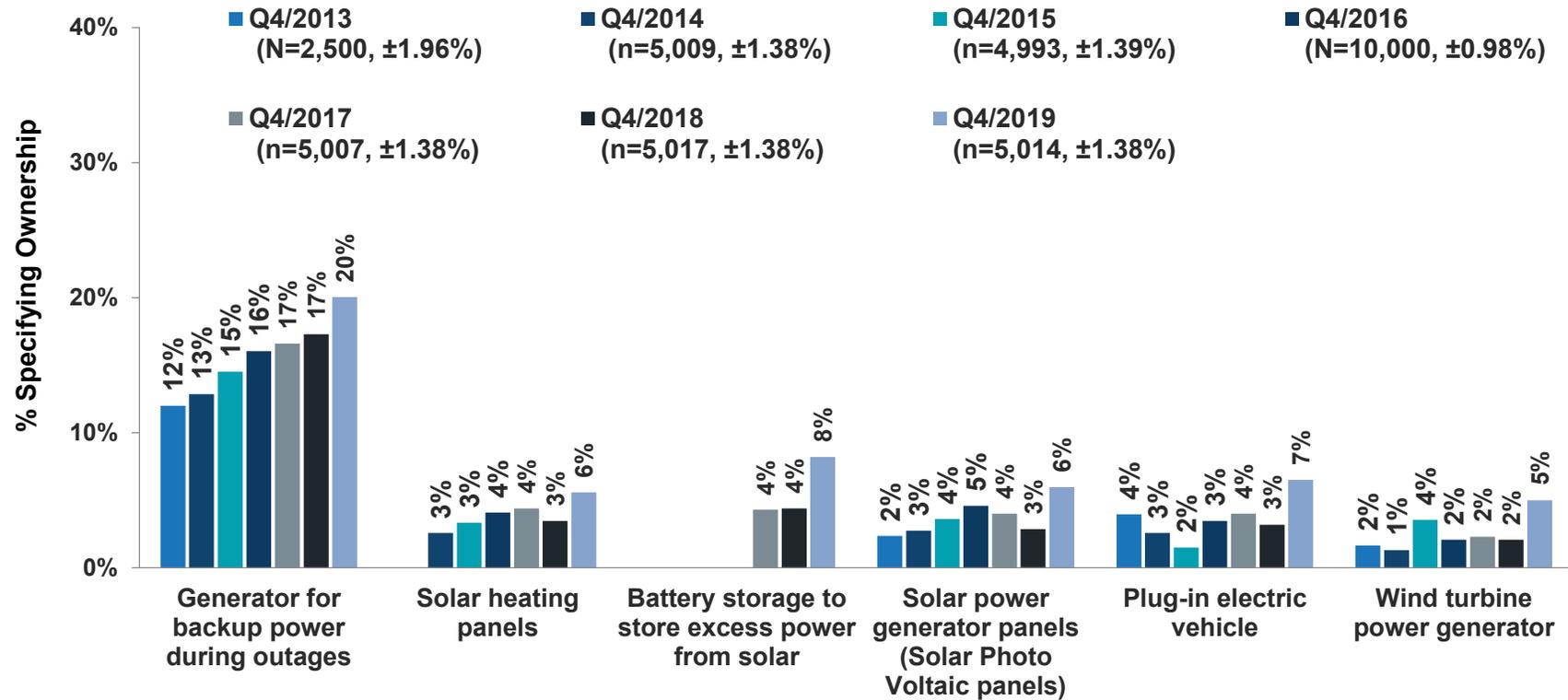
"Q7805. How familiar are you with the following products?"

Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

Ownership of all distributed energy resources increased over the past year. 20% of consumers report owning a generator for backup power and 7% report owning an electric vehicle, an increase of 130% over 2018.

## Energy Efficient Equipment or Vehicle Ownership (2013 - 2019)

Among US BB HHs Surveyed



"Q7800/Q7525. Do you own for your home?"

Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

Nearly one-half of the consumers who report familiarity with generators own one.

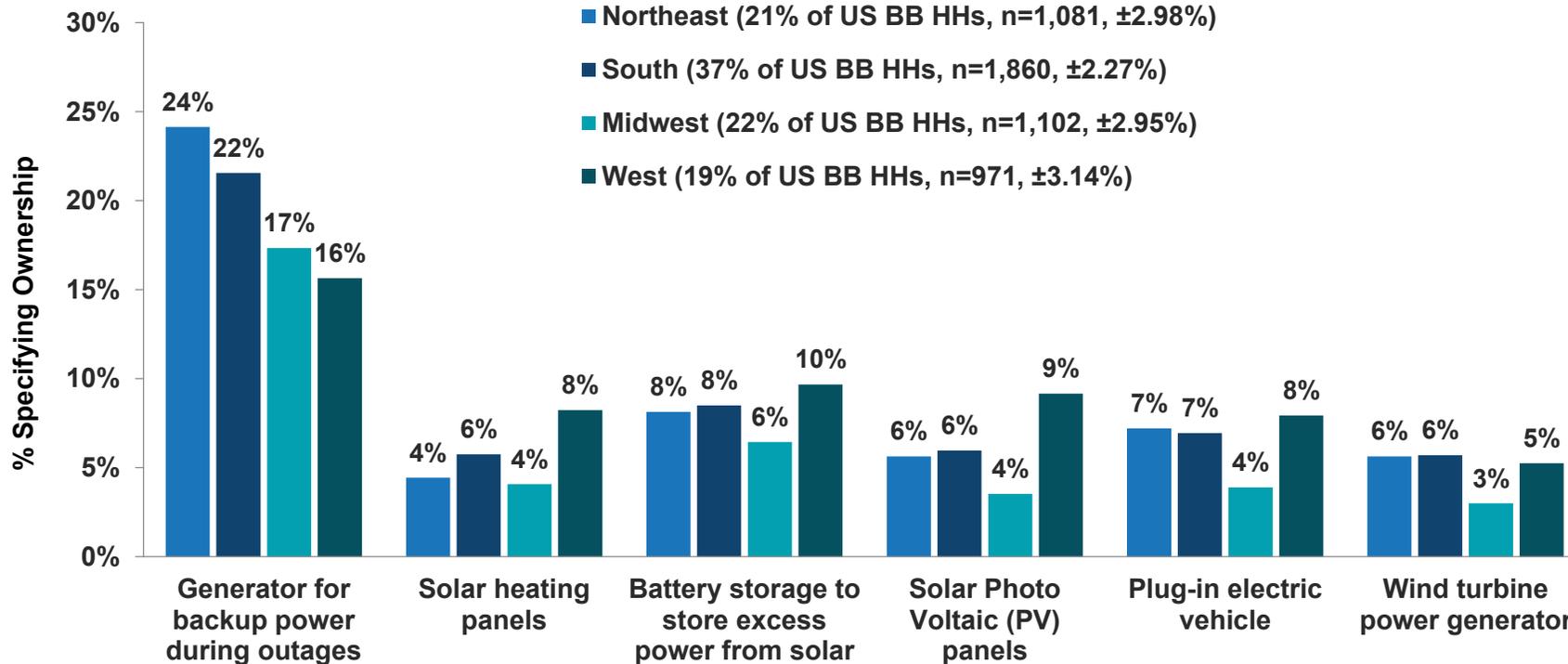
Even though the rate of adoption for distributed energy resources increased over the past year, it has remained below 10% of US broadband households for most products. Several factors challenge growth of these markets:

1. Adoption of these product require a significant investment.
2. Since the cost of electricity in some areas is not very high, it takes a long time to experience return on the investment.
3. Consumers fear that energy from natural resources is less reliable.

# Consumers in the Northeastern regions of the US are most likely to own a generator for backup power.

## Energy Efficient Equipment or Vehicle Ownership by Region (Q4/19)

Among US BB Living in Specified Area



Consumers in Western regions are more likely to own solar heating panels and solar PV panels. High electricity costs in states like California are helping drive adoption of solar panels in the West. New regulation in California that requires new buildings to have solar photovoltaic (PV) systems is also helping drive adoption.

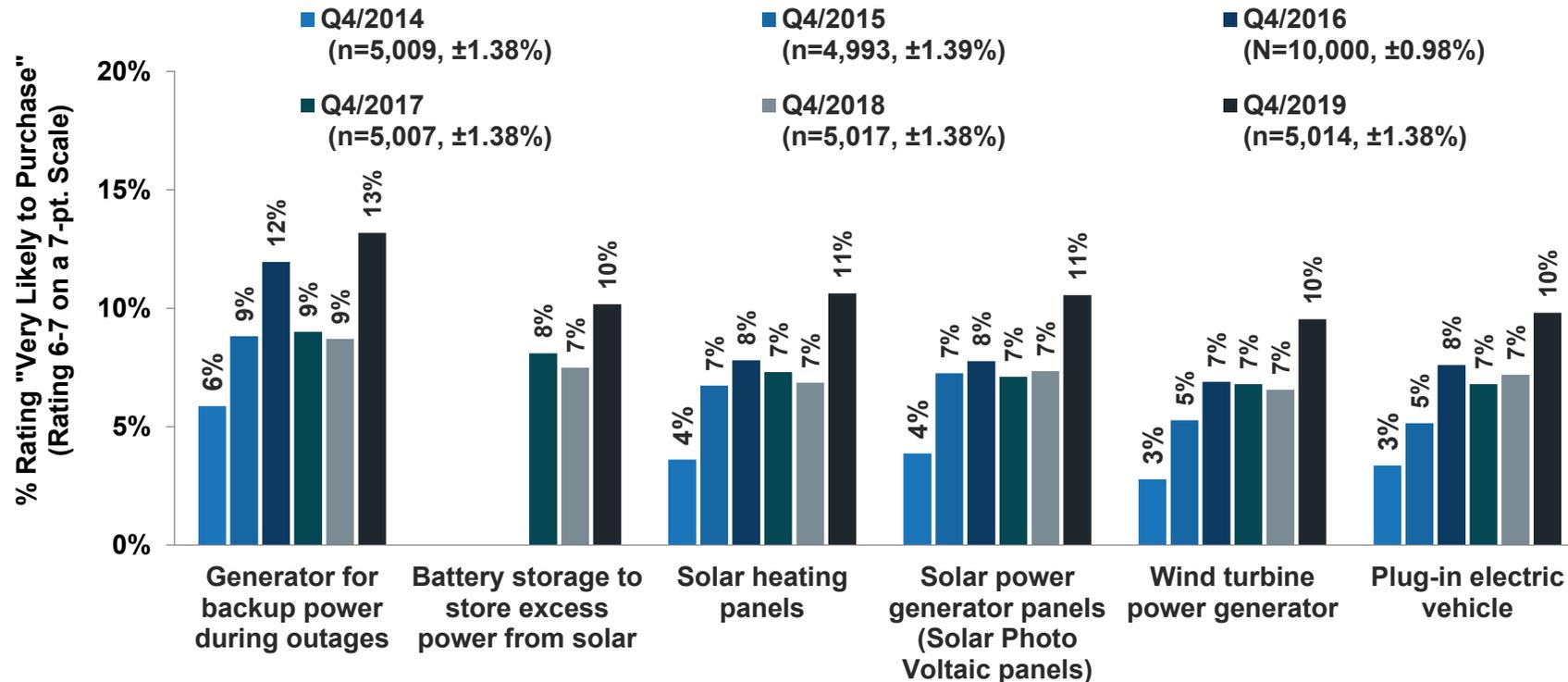
"Q7800. Do you own any of the following products?" | Asked of a Subgroup of 5,014 US BB HHs |

Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Purchase intentions for all distributed energy resources increased significantly over the past year.

## Purchase Intention of Energy Efficient Equipment or Vehicle (2014 - 2019)

Among US BB HHs Surveyed



"Q7820. How likely is your household to purchase the following in the next year?"

Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

Several factors are helping drive purchase intentions for distributed energy resources:

1. Industry players in the renewables space have started to offer financing solutions that reduce the upfront cost of acquiring distributed energy resources.
2. Regulatory changes in California that require new buildings to have solar photovoltaic (PV) systems for electricity and New York that promote greater adoption of renewable energy resources.
3. Marketing efforts that promote clean energy choices are helping to create more energy conscious consumers.

# Purchase intentions for distributed energy resources are highest among Innovators, people with children at home, and younger groups.

## High Purchase Intenders of Distributed Energy and EVs by Demographics (Q4/19)

Highly Likely to Purchase (Rating 6-7 on 7pt. Scale)							
All BB HHs Surveyed (n=5,014, ±1.38%)	Generator for backup power during outages	Solar Photo Voltaic (PV) panels	Solar heating panels	Wind turbine power generator	Battery storage that allows me to store excess power	Plug-in electric vehicle	
	13%	11%	11%	10%	10%	10%	
<b>Age Group</b>							
18-24 (7% of US BB HHs, n=358, ±5.18%)	20%	22%	21%	16%	19%	20%	
25-34 (18% of US BB HHs, n=882, ±3.3%)	24%	23%	23%	21%	21%	20%	
35-44 (19% of US BB HHs, n=939, ±3.2%)	19%	17%	17%	16%	14%	15%	
45-54 (19% of US BB HHs, n=957, ±3.17%)	11%	7%	7%	6%	8%	7%	
55-64 (20% of US BB HHs, n=1,000, ±3.1%)	7%	2%	2%	2%	4%	3%	
65 and older (17% of US BB HHs, n=878, ±3.31%)	4%	1%	0.3%	0.3%	1%	1%	
<b>Gender</b>							
Female (50% of US BB HHs, n=2,514, ±1.95%)	11%	7%	7%	6%	7%	6%	
Male (50% of US BB HHs, n=2,500, ±1.96%)	15%	14%	14%	13%	13%	14%	
<b>Household Income</b>							
Less than \$30,000 (23% of US BB HHs, n=1,156, ±2.88%)	9%	6%	6%	6%	7%	6%	
\$30,000 - \$49,999 (18% of US BB HHs, n=902, ±3.26%)	11%	8%	10%	7%	8%	9%	
\$50,000 - \$74,999 (16% of US BB HHs, n=808, ±3.45%)	14%	11%	9%	9%	10%	9%	
\$75,000 - \$99,999 (12% of US BB HHs, n=577, ±4.08%)	18%	17%	17%	14%	14%	15%	
\$100,000 or more (31% of US BB HHs, n=1,571, ±2.47%)	15%	13%	13%	12%	12%	12%	
<b>Education Level</b>							
High school degree or lower (32% of US BB HHs, n=1,631, ±2.43%)	11%	7%	7%	6%	7%	7%	
Less than college degree (28% of US BB HHs, n=1,361, ±2.66%)	13%	9%	10%	8%	10%	9%	
College degree or more (40% of US BB HHs, n=2,022, ±2.18%)	15%	15%	14%	13%	13%	13%	
<b>Households with Kids</b>							
Children at home (32% of US BB HHs, n=1,604, ±2.45%)	23%	22%	22%	20%	20%	20%	
No children (68% of US BB HHs, n=3,410, ±1.68%)	9%	5%	5%	5%	6%	5%	
<b>Technology Adoption Segments</b>							
Innovator (13% of US BB HHs, n=638, ±3.88%)	40%	46%	45%	43%	37%	39%	
Early Adopter (19% of US BB HHs, n=982, ±3.13%)	18%	12%	13%	12%	14%	13%	
Early Majority (33% of US BB HHs, n=1,655, ±2.41%)	9%	5%	5%	4%	5%	5%	
Late Majority (24% of US BB HHs, n=1,161, ±2.88%)	5%	2%	2%	2%	3%	2%	
Laggard (12% of US BB HHs, n=578, ±4.08%)	5%	3%	3%	2%	3%	3%	

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Lower than Average

Higher than Average

Note: Compare Results within Columns ONLY

# Among housing factors examined, area of residence has strongest influence on purchase intentions for distributed energy resources.

Consumers in urban areas report relatively high intention to purchase products, while those in rural areas report low intention. Consumers with home size 3,500 square ft. or higher report relatively high intentions to purchase EVs, compared to other groups.

## High Purchase Intenders of Distributed Energy and EVs by Housing Factors (Q4/19)

Highly Likely to Purchase (Rating 6-7 on 7pt. Scale)						
All BB HHs Surveyed (n=5,014, ±1.38%)	Generator for backup power during outages	Solar Photo Voltaic (PV) panels	Solar heating panels	Wind turbine power generator	Battery storage that allows me to store excess power	Plug-in electric vehicle
<b>Home Ownership</b>						
Rent (28% of US BB HHs, n=1,402, ±2.62%)	12%	8%	9%	8%	10%	9%
Own (70% of US BB HHs, n=3,527, ±1.65%)	14%	12%	11%	10%	10%	10%
<b>Residence Area</b>						
An urban area (28% of US BB HHs, n=1,423, ±2.6%)	21%	22%	22%	18%	19%	19%
A suburban area (48% of US BB HHs, n=2,432, ±1.99%)	10%	7%	7%	7%	7%	7%
A rural area (22% of US BB HHs, n=1,104, ±2.95%)	11%	5%	6%	5%	7%	5%
<b>Home Size</b>						
1,500 square ft or less (27% of US BB HHs, n=1,374, ±2.64%)	9%	6%	6%	5%	6%	6%
1,501 – 2,000 square ft (25% of US BB HHs, n=1,219, ±2.81%)	14%	11%	11%	10%	10%	9%
2,001 – 2,500 square ft (19% of US BB HHs, n=953, ±3.17%)	18%	16%	16%	15%	15%	16%
2,501 – 3,500 square ft (13% of US BB HHs, n=639, ±3.88%)	19%	16%	15%	14%	14%	13%
More than 3,500 square ft (5% of US BB HHs, n=238, ±6.35%)	17%	18%	18%	16%	14%	18%
<b>Region</b>						
Northeast (21% of US BB HHs, n=1,081, ±2.98%)	12%	10%	12%	9%	10%	10%
Midwest (22% of US BB HHs, n=1,102, ±2.95%)	11%	8%	7%	8%	7%	9%
South (37% of US BB HHs, n=1,860, ±2.27%)	14%	11%	12%	10%	11%	9%
West (19% of US BB HHs, n=971, ±3.14%)	14%	12%	11%	10%	12%	12%
<b>Length of Time in Residence</b>						
Less than 12 months (9% of US BB HHs, n=433, ±4.71%)	13%	9%	11%	10%	11%	9%
1-2 years (12% of US BB HHs, n=605, ±3.98%)	17%	14%	15%	14%	14%	15%
3-4 years (14% of US BB HHs, n=741, ±3.6%)	16%	17%	15%	11%	15%	13%
5-10 years (21% of US BB HHs, n=1,066, ±3%)	17%	14%	13%	13%	12%	12%
More than 10 years (43% of US BB HHs, n=2,169, ±2.1%)	9%	6%	7%	6%	7%	6%

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Lower than Average

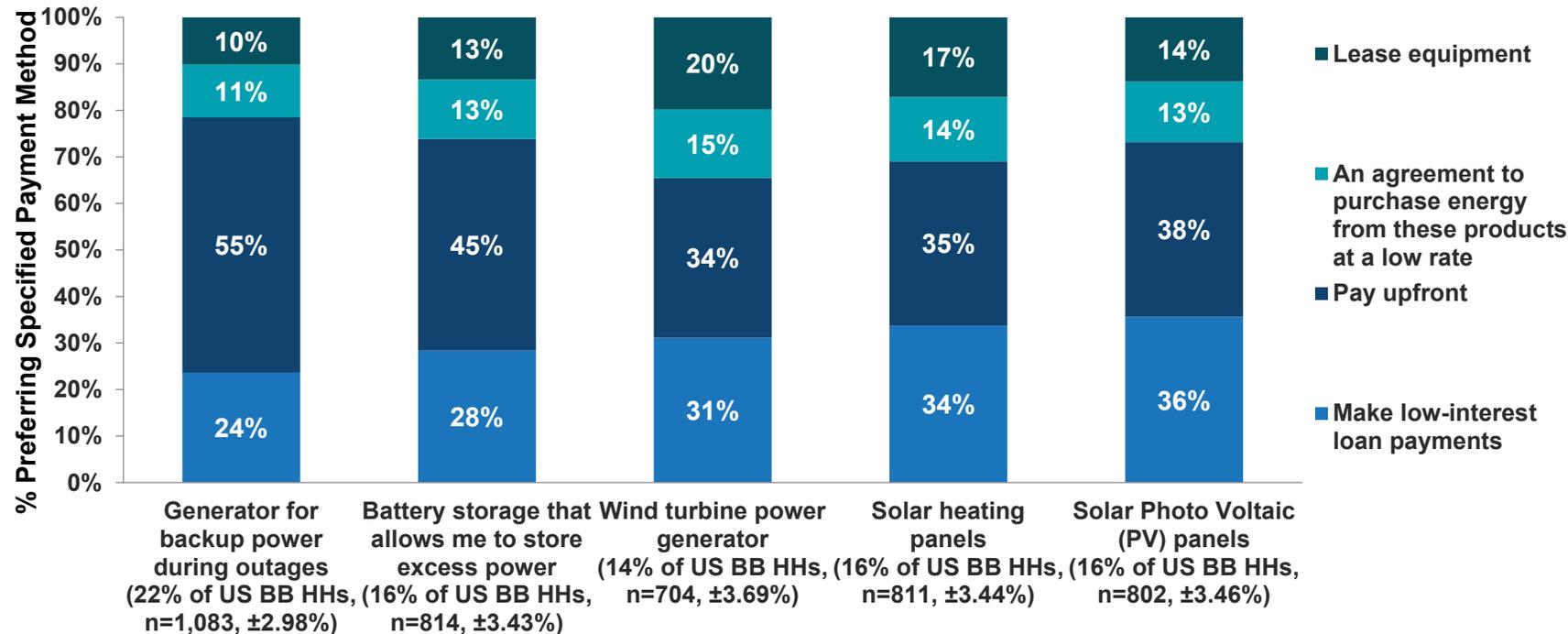
Higher than Average

Note: Compare Results within Columns ONLY

# Consumers prefer to pay upfront for generators and battery storage, followed by low interest payments.

## Distributed Energy: Payment Preference (Q4/19)

Among US BB HHs Intend to Purchase (Rating 5-7) Specified Products



Consumers prefer to acquire wind generators, solar heating panels, and solar voltaic (PV) panels through either upfront payments or low-interest loans.

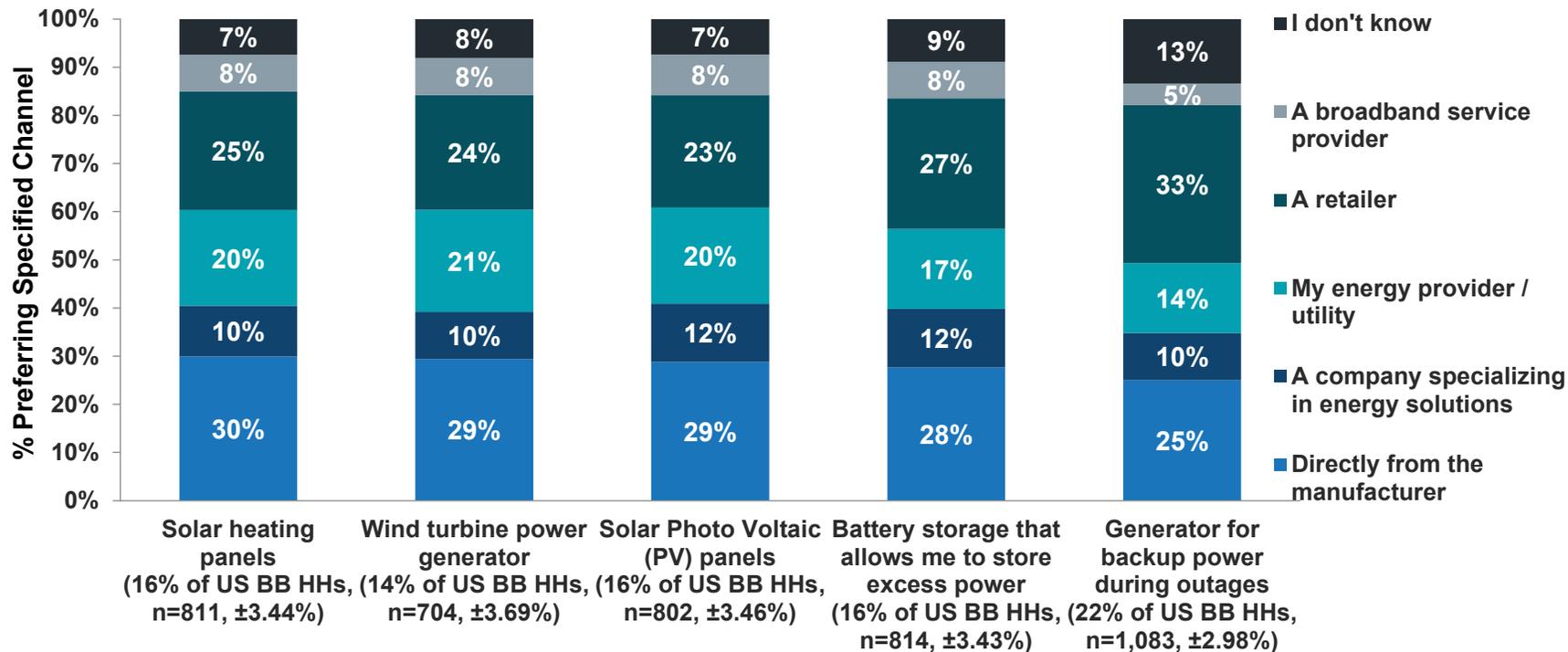
These preferred acquisition strategies suggest that consumers prefer to own equipment rather than lease or rent. The extended length of time to experience ROI with these distributed sources of energy likely contributes to this preference.

"Q7835. If you purchase/acquire any of the following products, which payment method is most appealing?" | Asked of a Subgroup of 5,014 US BB HHs  
 Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Product manufacturers are the preferred sources for solar heating panels, wind power generators, and solar PV panels.

## Distributed Energy: Purchase Channel Preference (Q4/19)

Among US BB HHs Intend to Purchase (Rating 5-7) Specified Products



Consumers prefer to get the more popular products like generators and battery storage from a retailer.

Energy providers have a significant opportunity to sell solar heating panels, wind power generators, and solar PV panels.

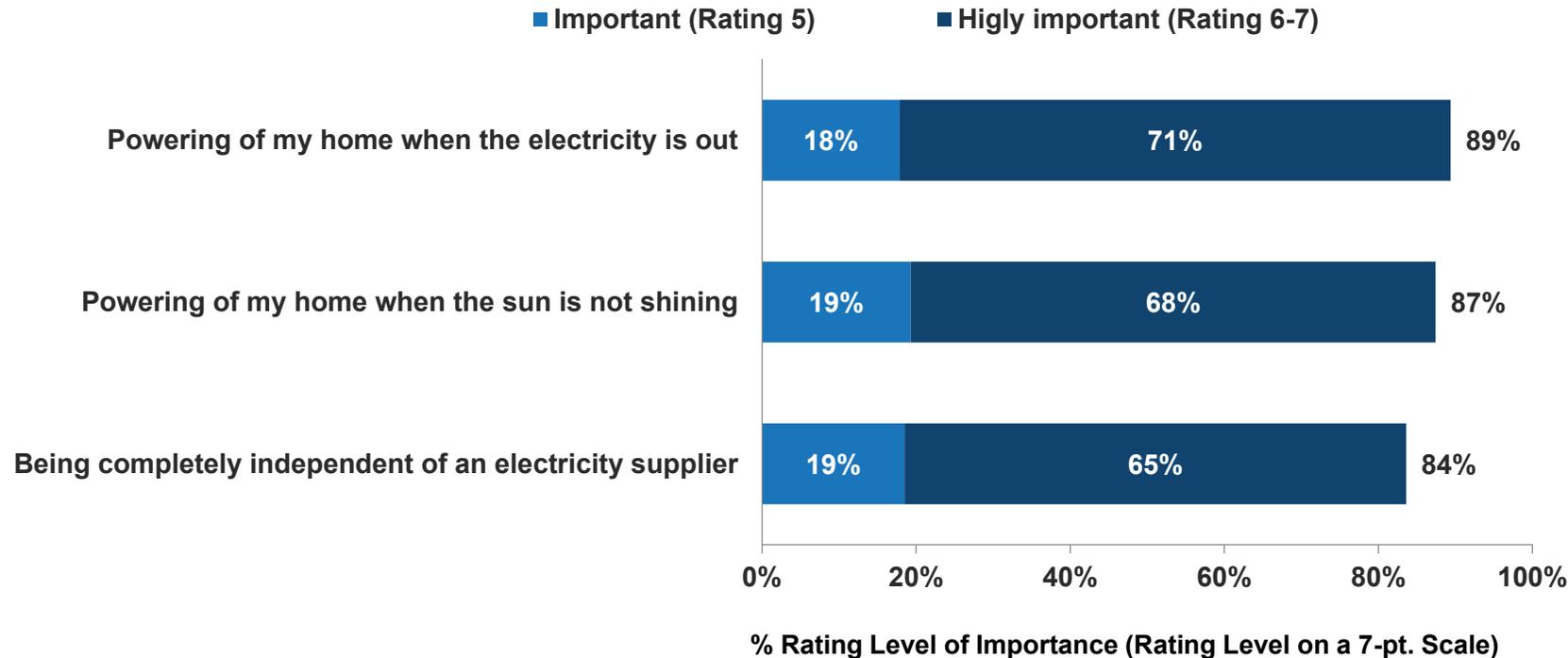
Approximately one-fifth of consumers would prefer to purchase these products from their energy provider.

"Q7840. From which type of company do you want to purchase these products?" | Asked of a Subgroup of 5,014 US BB HHs  
 Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# When considering battery storage for solar energy, energy resilience is slightly more important than energy independence.

## Importance of Using Solar Panels with Battery Storage (Q4/19)

Among the 26% of US BB HHs That Are Solar Panel Owners or Intenders (Rating 5-7), n = 1,280, ±2.74%



89% of consumers report that being able to power their home when electricity is out is important when considering battery storage, compared to 84% who report that being completely independent of the electricity supplier is important.

"Q7845. When considering battery storage for solar panels, how important are the following to you?" | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Consumers 18 to 24 years generally do not find the factors examined important when considering battery storage for solar panels.

## High Importance of Using Solar Panels with Storage by Demographics (Q4/19)

Q7845. When considering battery storage for solar panels, how important are the following to you?			
Among Solar Panel Owners or Intenders (Rating 5-7) (26% of US BB HHs, n=1,280, ±2.74%)	Powering of my home when the sun is not shining	Being completely independent of an electricity supplier	Powering of my home when the electricity is out
<b>Age Group</b>	<b>68%</b>	<b>71%</b>	<b>65%</b>
18-24 (3% of US BB HHs, n=165, ±7.63%)	53%	53%	59%
25-34 (8% of US BB HHs, n=426, ±4.75%)	72%	71%	74%
35-44 (7% of US BB HHs, n=335, ±5.35%)	73%	70%	76%
45-54 (4% of US BB HHs, n=193, ±7.05%)	71%	69%	74%
55-64 (2% of US BB HHs, n=103, ±9.66%)	61%	46%	65%
65 and older (1% of US BB HHs, n=58, ±12.9%)	53%	45%	67%
<b>Gender</b>			
Female (9% of US BB HHs, n=436, ±4.69%)	66%	60%	70%
Male (17% of US BB HHs, n=844, ±3.37%)	69%	68%	72%
<b>Household Income</b>			
Less than \$30,000 (3% of US BB HHs, n=158, ±7.8%)	66%	59%	70%
\$30,000 - \$49,999 (4% of US BB HHs, n=191, ±7.09%)	59%	55%	63%
\$50,000 - \$74,999 (4% of US BB HHs, n=209, ±6.78%)	61%	59%	69%
\$75,000 - \$99,999 (4% of US BB HHs, n=221, ±6.59%)	70%	67%	72%
\$100,000 or more (10% of US BB HHs, n=501, ±4.38%)	70%	72%	76%
<b>Households with Kids</b>			
Children at home (15% of US BB HHs, n=747, ±3.59%)	73%	72%	75%
No children (11% of US BB HHs, n=533, ±4.24%)	61%	55%	66%
<b>Technology Adoption Segment</b>			
Innovator (10% of US BB HHs, n=514, ±4.32%)	84%	84%	85%
Early Adopter (7% of US BB HHs, n=344, ±5.28%)	62%	57%	67%
Early Majority (6% of US BB HHs, n=276, ±5.9%)	55%	47%	59%
Late Majority (2% of US BB HHs, n=92, ±10.22%)	52%	49%	61%
Laggard (1% of US BB HHs, n=54, ±13.34%)	46%	50%	56%

Asked of a Subgroup of 5,014 US BB HHs © 2020 Parks Associates

Lower than Average

Higher than Average

Note: Compare Results within Columns ONLY

# Home size and area of residence influence the importance of the factors examined when considering battery storage for solar panels.

Consumers with housing size of 2500+ square ft. and those in urban areas are more likely to consider these factors important. Consumers in Southern regions and those in their homes for 5-10 years place higher than average importance on energy independence from supplier.

## High Importance of Using Solar Panels with Storage by Housing Factors (Q4/19)

Q7845. When considering battery storage for solar panels, how important are the following to you?			
Among Solar Panel Owners or Intenders (Rating 5-7) (26% of US BB HHs, n=1,280, ±2.74%)	Powering of my home when the sun is not shining	Being completely independent of an electricity supplier	Powering of my home when the electricity is out
<b>Home Ownership</b>			
Rent (5% of US BB HHs, n=273, ±5.93%)	65%	67%	62%
Own (20% of US BB HHs, n=997, ±3.1%)	69%	73%	66%
<b>Home Size</b>			
1,500 square ft or less (4% of US BB HHs, n=193, ±7.05%)	65%	66%	61%
1,501 – 2,000 square ft (6% of US BB HHs, n=314, ±5.53%)	68%	70%	59%
2,001 – 2,500 square ft (8% of US BB HHs, n=287, ±5.78%)	63%	69%	65%
2,501 – 3,500 square ft (5% of US BB HHs, n=237, ±6.37%)	76%	79%	73%
More than 3,500 square ft (2% of US BB HHs, n=95, ±10.05%)	80%	77%	78%
<b>Residence Area</b>			
An urban area (12% of US BB HHs, n=605, ±3.98%)	76%	75%	76%
A suburban area (10% of US BB HHs, n=478, ±4.48%)	61%	56%	67%
A rural area (4% of US BB HHs, n=192, ±7.07%)	64%	54%	68%
<b>Region</b>			
Northeast (6% of US BB HHs, n=276, ±5.9%)	66%	69%	66%
Midwest (4% of US BB HHs, n=219, ±6.62%)	62%	66%	59%
South (10% of US BB HHs, n=485, ±4.45%)	74%	77%	69%
West (6% of US BB HHs, n=300, ±5.66%)	65%	68%	62%
<b>Length of Time in Residence</b>			
Less than 12 months (2% of US BB HHs, n=100, ±9.8%)	71%	66%	66%
1-2 years (4% of US BB HHs, n=202, ±6.9%)	62%	66%	60%
3-4 years (5% of US BB HHs, n=261, ±6.07%)	66%	70%	67%
5-10 years (6% of US BB HHs, n=320, ±5.48%)	72%	77%	68%
More than 10 years (8% of US BB HHs, n=397, ±4.92%)	69%	73%	63%

Asked of a Subgroup of 5,014 US BB HHs © 2020 Parks Associates

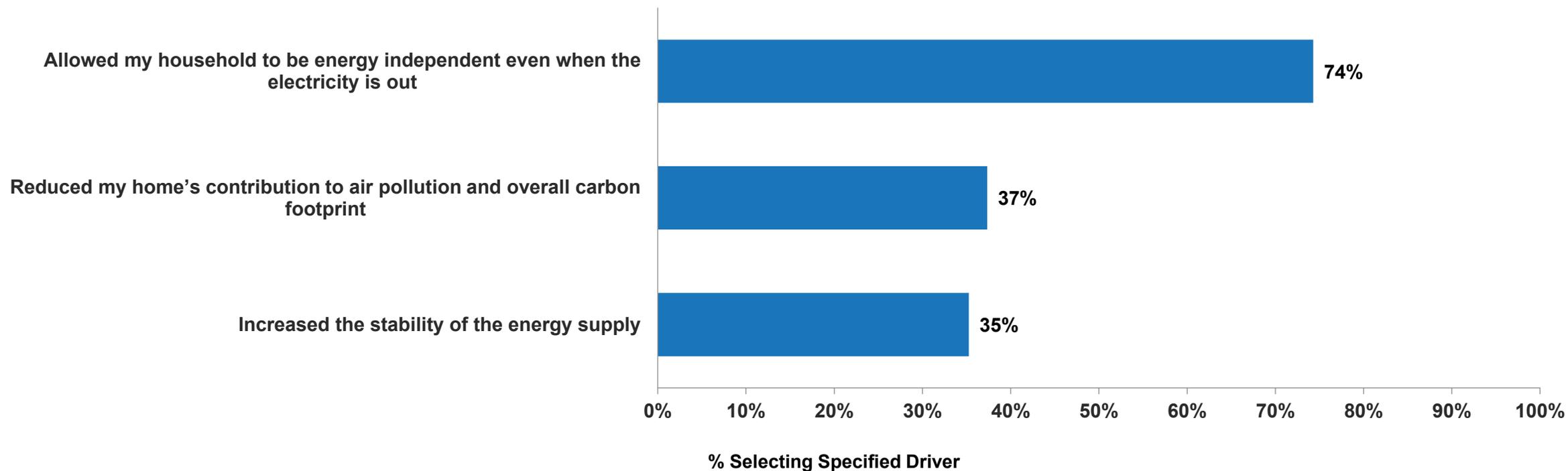
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Note: Compare Results within Columns ONLY

# Energy independence and resilience are stronger drivers for purchase of solar panels than the desire to reduce carbon footprint and increase the stability of the energy grid.

## Purchase Drivers of Solar Panels (Q4/19)

Among the 90% of US BB HHs That Are Not Solar Panel Owners, n = 4,519, ±1.46%



"Q7860B. Which of the following increases your likelihood of purchasing solar panels? If solar panels..." | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Drivers for purchasing solar panels differ by age.

## Purchase Drivers of Solar Panels by Demographics (Q4/19)

Q7860B. Which of the following increases your likelihood of purchasing solar panels? If solar panels...

Sample Size	Allowed my household to be energy independent even when the electricity is out	Increased the stability of the energy supply	Reduced my home's contribution to air pollution and overall carbon footprint
<b>Among Solar Panels Non-owners</b> (90% of US BB HHs, n=4,519, ±1.46%)	74%	35%	37%
<b>Age Group</b>			
18-24 (6% of US BB HHs, n=304, ±5.62%)	57%	49%	43%
25-34 (14% of US BB HHs, n=708, ±3.68%)	67%	43%	43%
35-44 (16% of US BB HHs, n=821, ±3.42%)	70%	43%	41%
45-54 (18% of US BB HHs, n=891, ±3.28%)	78%	37%	38%
55-64 (19% of US BB HHs, n=952, ±3.18%)	82%	26%	33%
65 and older (17% of US BB HHs, n=843, ±3.38%)	79%	24%	31%
<b>Households with Kids</b>			
Children at home (26% of US BB HHs, n=1,296, ±2.72%)	69%	43%	41%
No children (64% of US BB HHs, n=3,223, ±1.73%)	76%	32%	36%
<b>Education Level</b>			
High school degree or lower (34% of US BB HHs, n=1,549, ±2.49%)	74%	31%	33%
Less than college degree (28% of US BB HHs, n=1,254, ±2.77%)	77%	38%	39%
College degree or more (38% of US BB HHs, n=1,716, ±2.37%)	72%	37%	40%
<b>Technology Adoption Segment</b>			
Innovator (8% of US BB HHs, n=402, ±4.89%)	53%	54%	41%
Early Adopter (17% of US BB HHs, n=877, ±3.31%)	72%	40%	41%
Early Majority (31% of US BB HHs, n=1,557, ±2.48%)	77%	36%	40%
Late Majority (22% of US BB HHs, n=1,128, ±2.92%)	82%	29%	34%
Laggard (11% of US BB HHs, n=555, ±4.16%)	71%	25%	28%

Asked of a Subgroup of 5,014 US BB HHs © 2019 Parks Associates

Younger consumers (age 18-44) are more driven to improve the stability of the electricity grid and reduce their carbon footprint, while consumers 45 years and older are more driven by the desire to be energy independent and resilient.

Drivers for purchasing solar panels also differ by technology adoption segment. Innovators are more driven by the ability to increase grid stability than other segments, and those in the Late Majority segment are more motivated by energy independence and resilience.

Lower than Average

Higher than Average

Note: Compare Results within Columns ONLY

# Length of time in residence and area of residence has significant impact on the drivers for purchasing solar panels.

## Purchase Drivers of Solar Panels by Housing Factors (Q4/19)

**Q7860B. Which of the following increases your likelihood of purchasing solar panels? If solar panels...**

Sample Size	Allowed my household to be energy independent even when the electricity is out	Increased the stability of the energy supply	Reduced my home's contribution to air pollution and overall carbon footprint
<b>Among Solar Panels Non-owners (90% of US BB HHs, n=4,519, ±1.46%)</b>	<b>74%</b>	<b>35%</b>	<b>37%</b>
<b>Home Ownership</b>			
Rent (29% of US BB HHs, n=1,326, ±2.69%)	71%	35%	39%
Own (69% of US BB HHs, n=3,111, ±1.76%)	76%	35%	37%
<b>Region</b>			
Northeast (22% of US BB HHs, n=988, ±3.12%)	75%	32%	35%
Midwest (23% of US BB HHs, n=1,027, ±3.06%)	74%	36%	39%
South (37% of US BB HHs, n=1,675, ±2.39%)	76%	36%	37%
West (18% of US BB HHs, n=829, ±3.4%)	71%	37%	38%
<b>Residence Area</b>			
An urban area (23% of US BB HHs, n=1,174, ±2.86%)	66%	39%	40%
A suburban area (45% of US BB HHs, n=2,260, ±2.06%)	77%	35%	38%
A rural area (21% of US BB HHs, n=1,031, ±3.05%)	80%	32%	32%
<b>Home Size</b>			
1,500 square ft or less (26% of US BB HHs, n=1317, ±2.7%)	74%	33%	39%
1,501 – 2,000 square ft (22% of US BB HHs, n=1115, ±2.93%)	76%	36%	38%
2,001 – 2,500 square ft (16% of US BB HHs, n=792, ±3.48%)	71%	39%	39%
2,501 – 3,500 square ft (10% of US BB HHs, n=524, ±4.28%)	75%	35%	34%
More than 3,500 square ft (4% of US BB HHs, n=193, ±7.05%)	75%	33%	35%
<b>Length of Residence</b>			
Less than 12 months (9% of US BB HHs, n=395, ±4.93%)	70%	39%	42%
1-2 years (12% of US BB HHs, n=535, ±4.24%)	69%	40%	37%
3-4 years (14% of US BB HHs, n=633, ±3.9%)	70%	38%	38%
5-10 years (21% of US BB HHs, n=954, ±3.17%)	74%	38%	41%
More than 10 years (44% of US BB HHs, n=2,002, ±2.19%)	78%	31%	35%

Consumers in rural areas are more driven by energy independence when there is a blackout, while those in urban areas are more driven by the desire to increase the stability of the electricity grid and reduce their homes' contribution to air pollution.

Consumers with older homes are more driven by the desire to be energy independent, while those in newer homes are more interested in grid stability and reducing their carbon footprint.

Lower than Average Higher than Average

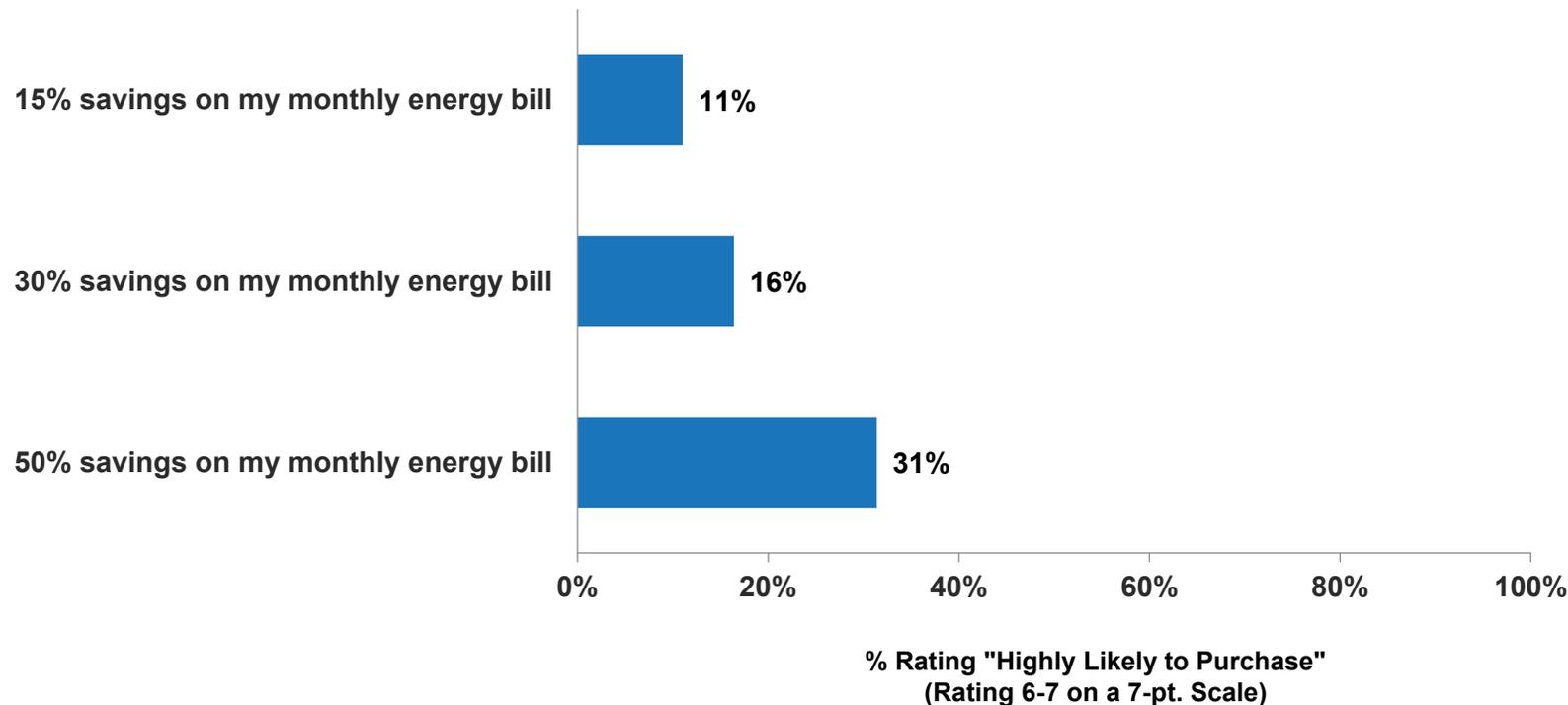
Note: Compare Results within Columns ONLY

Asked of a Subgroup of 5,014 US BB HHs © 2020 Parks Associates

# One-third of consumers who do not own solar panels report a high likelihood to purchase one if it allowed them to save 50% on their monthly energy bill.

## High Likelihood of Purchasing Solar Panels by Monthly Savings (Q4/19)

Among the 90% of US BB HHs That Are Not Solar Panel Owners, n = 4,519, ±1.46%



"Q7860A. How likely are you to purchase solar panels if they provide the following?" | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

A 15% saving on monthly energy bill would drive 11% of consumers to purchase a solar panel.

An increase in energy-savings from 30% to 50% can increase the likelihood to adopt a solar panel by 94%.

The actual savings derived from solar panel depends on the size of the panel installed. According to Consumer Reports, solar panels can cover 25% to 100% of a home's electricity needs.

# Age, the presence children at home, and technology adoption segment influence whether or not savings various amounts on energy bills is a driver for adoption of solar panels.

## High Likelihood of Purchasing Solar Panels by Demographics (Q4/19)

Highly Likely to Purchase (i.e., Rating 6 - 7 on a 7-pt Scale)			
Sample Size	15% Savings	30% Savings	50% Savings
<b>Among Solar Panels Non-owners (90% of US BB HHS, n=4,519, ±1.46%)</b>	<b>11%</b>	<b>16%</b>	<b>31%</b>
<b>Age Group</b>			
18-24 (6% of US BB HHS, n=304, ±5.62%)	23%	28%	46%
25-34 (14% of US BB HHS, n=708, ±3.68%)	25%	31%	46%
35-44 (16% of US BB HHS, n=821, ±3.42%)	18%	27%	43%
45-54 (18% of US BB HHS, n=891, ±3.28%)	7%	15%	30%
55-64 (19% of US BB HHS, n=952, ±3.18%)	3%	6%	22%
65 and older (17% of US BB HHS, n=843, ±3.38%)	1%	3%	14%
<b>Household Income</b>			
Less than \$30,000 (22% of US BB HHS, n=1,121, ±2.93%)	8%	12%	27%
\$30,000 - \$49,999 (17% of US BB HHS, n=847, ±3.37%)	10%	15%	31%
\$50,000 - \$74,999 (15% of US BB HHS, n=734, ±3.62%)	11%	18%	34%
\$75,000 - \$99,999 (10% of US BB HHS, n=499, ±4.39%)	17%	24%	39%
\$100,000 or more (26% of US BB HHS, n=1,318, ±2.7%)	12%	17%	31%
<b>Households with Kids</b>			
Children at home (26% of US BB HHS, n=1,296, ±2.72%)	23%	31%	49%
No children (64% of US BB HHS, n=3,223, ±1.73%)	6%	11%	24%
<b>Education Level</b>			
High school degree or lower (31% of US BB HHS, n=1,549, ±2.49%)	9%	13%	27%
Less than college degree (25% of US BB HHS, n=1,254, ±2.77%)	10%	16%	33%
College degree or more (34% of US BB HHS, n=1,716, ±2.37%)	13%	19%	34%
<b>Technology Adoption Segment</b>			
Innovator (8% of US BB HHS, n=402, ±4.89%)	42%	34%	20%
Early Adopter (17% of US BB HHS, n=877, ±3.31%)	24%	27%	28%
Early Majority (31% of US BB HHS, n=1,557, ±2.48%)	20%	24%	32%
Late Majority (22% of US BB HHS, n=1,128, ±2.92%)	10%	10%	15%
Laggard (11% of US BB HHS, n=555, ±4.16%)	4%	4%	6%

Asked of a Subgroup of 5,014 US BB HHS © 2020 Parks Associates

Energy-savings has most significant influence on Innovators and consumers with children in the home.

For consumers 18 to 44 years, the higher the saving provided, the more likely it will drive this group to purchase solar panels.

Lower than Average Higher than Average

Note: Compare Results within Columns ONLY

# Among housing factors examined, area of residence has the strongest impact on the likelihood of being motivated by energy savings of varying amounts.

Home size and length of time in home are also have moderate impact.

## High Likelihood of Purchasing Solar Panels by Housing Factors (Q4/19)

Highly Likely to Purchase (i.e., Rating 6 - 7 on a 7-pt Scale)				
Sample Size		15% Savings	30% Savings	50% Savings
<b>Among Solar Panels Non-owners (90% of US BB HHs, n=4,519, ±1.46%)</b>		<b>11%</b>	<b>16%</b>	<b>31%</b>
<b>Home Ownership</b>				
Rent (26% of US BB HHs, n=1,326, ±2.69%)		10%	16%	29%
Own (68% of US BB HHs, n=3,111, ±1.76%)		11%	17%	32%
<b>Home Size</b>				
1,500 square ft or less (26% of US BB HHs, n=1,317, ±2.7%)		7%	12%	28%
1,501 – 2,000 square ft (22% of US BB HHs, n=1,115, ±2.93%)		12%	18%	34%
2,001 – 2,500 square ft (16% of US BB HHs, n=792, ±3.48%)		16%	22%	37%
2,501 – 3,500 square ft (10% of US BB HHs, n=524, ±4.28%)		15%	19%	34%
More than 3,500 square ft (4% of US BB HHs, n=193, ±7.05%)		18%	20%	37%
<b>Region</b>				
Northeast (20% of US BB HHs, n=988, ±3.12%)		11%	18%	30%
Midwest (20% of US BB HHs, n=1,027, ±3.06%)		8%	13%	29%
South (33% of US BB HHs, n=1,675, ±2.39%)		13%	17%	34%
West (17% of US BB HHs, n=829, ±3.4%)		12%	17%	32%
<b>Residence Area</b>				
An urban area (23% of US BB HHs, n=1,174, ±2.86%)		21%	26%	38%
A suburban area (45% of US BB HHs, n=2,260, ±2.06%)		8%	13%	29%
A rural area (21% of US BB HHs, n=1,031, ±3.05%)		8%	13%	30%
<b>Length of Time in Residence</b>				
Less than 12 months (8% of US BB HHs, n=395, ±4.93%)		10%	17%	33%
1-2 years (11% of US BB HHs, n=535, ±4.24%)		17%	22%	39%
3-4 years (13% of US BB HHs, n=633, ±3.9%)		18%	22%	36%
5-10 years (19% of US BB HHs, n=954, ±3.17%)		13%	18%	35%
More than 10 years (40% of US BB HHs, n=2,002, ±2.19%)		7%	12%	26%

Asked of a Subgroup of 5,014 US BB HHs © 2020 Parks Associates

Lower than Average

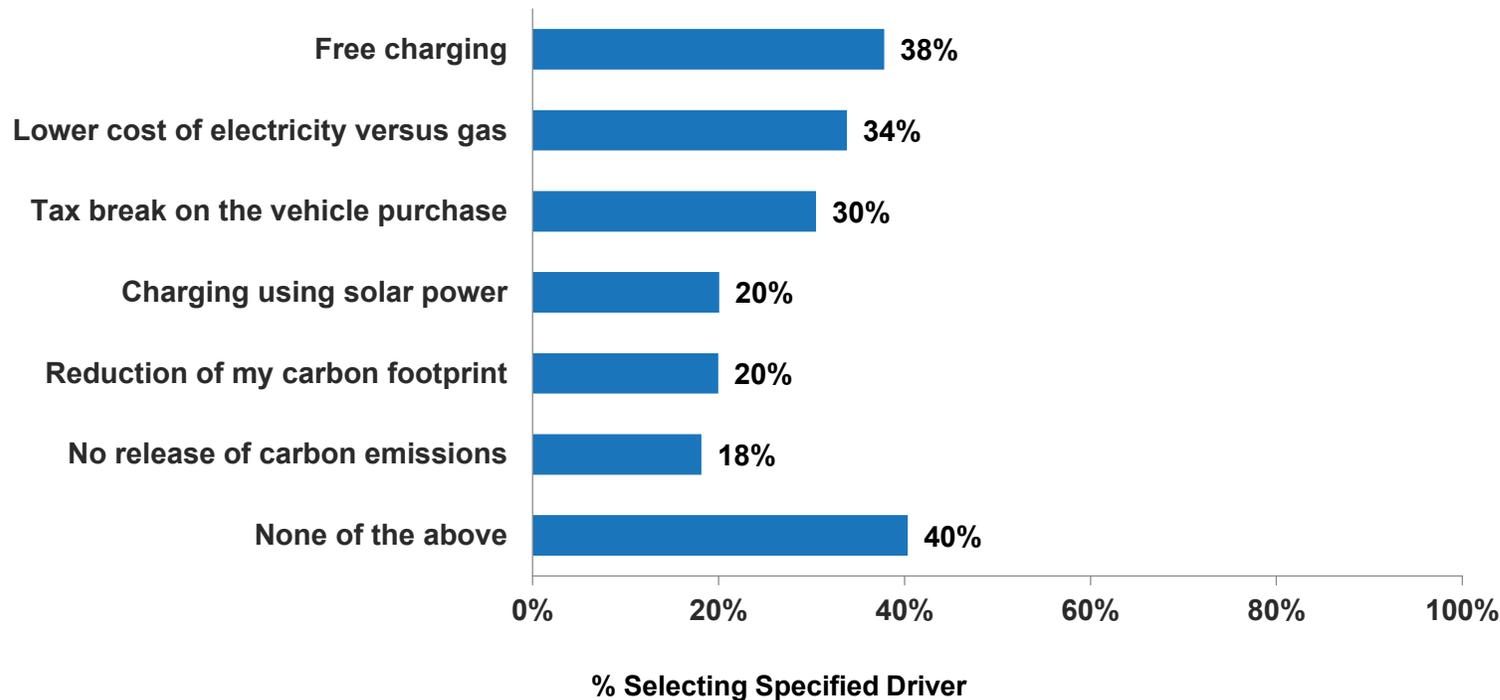
Higher than Average

Note: Compare Results within Columns ONLY

# Among factors examined, free charging is most likely to drive EV purchases among non-owners.

## Purchase Drivers of Electric Vehicle (Q4/19)

Among the 93% of US BB HHs That Are Not Electric Vehicle Owners, n = 4,687, ±1.43%



"Q7855. Which of the following increases your likelihood of purchasing a plug-in electric vehicle?" | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

Nearly 40% of consumers who do not own an EV report that they would be more likely to purchase one if they were able to charge it for free.

Free charging virtually eliminates a major cost involved in maintaining a vehicle, yet only 38% of non owners would purchase an EV if this were offered to them.

This suggests that several other factors limit EV adoption. However, these findings do indicate that free charging has significant appeal among consumers and suggest that utility programs that offer special (lower) charging rates to EV owners can drive participation in load control programs.

# Free charging is an EV purchase driver for consumers 34 years old and under as well as innovators and early adopters.

## Purchase Drivers of Electric Vehicle by Demographics (Q4/19)

Q7855. Which of the following increases your likelihood of purchasing a plug-in electric vehicle?						
Sample Size	Free charging	Lower cost of electricity versus gas	Tax break on the vehicle purchase	Charging using solar power	Reduction of my carbon footprint	No release of carbon emissions
<b>Among Electric Vehicle Non-owners (93% of US BB HHs, n=4,687, ±1.43%)</b>	<b>38%</b>	<b>34%</b>	<b>30%</b>	<b>20%</b>	<b>20%</b>	<b>18%</b>
<b>Age Group</b>						
18-24 (7% of US BB HHs, n=327, ±5.42%)	43%	43%	31%	31%	28%	27%
25-34 (15% of US BB HHs, n=734, ±3.62%)	47%	43%	35%	28%	29%	25%
35-44 (17% of US BB HHs, n=856, ±3.35%)	41%	40%	32%	23%	22%	20%
45-54 (18% of US BB HHs, n=920, ±3.23%)	38%	34%	32%	20%	18%	17%
55-64 (20% of US BB HHs, n=983, ±3.13%)	35%	28%	29%	16%	16%	15%
65 and older (17% of US BB HHs, n=867, ±3.33%)	27%	22%	26%	12%	13%	12%
<b>Gender</b>						
Woman (48% of US BB HHs, n=2,417, ±1.99%)	34%	31%	28%	17%	19%	17%
Man (45% of US BB HHs, n=2,270, ±2.06%)	42%	37%	33%	23%	21%	20%
<b>Household Income</b>						
Less than \$30,000 (23% of US BB HHs, n=1,132, ±2.91%)	34%	29%	22%	18%	16%	18%
\$30,000 - \$49,999 (17% of US BB HHs, n=870, ±3.32%)	37%	35%	28%	22%	18%	19%
\$50,000 - \$74,999 (15% of US BB HHs, n=758, ±3.56%)	38%	36%	31%	18%	21%	19%
\$75,000 - \$99,999 (10% of US BB HHs, n=526, ±4.27%)	39%	39%	34%	22%	24%	19%
\$100,000 or more (28% of US BB HHs, n=1,401, ±2.62%)	40%	34%	37%	21%	22%	18%
<b>Households with Kids</b>						
Children at home (28% of US BB HHs, n=1,386, ±2.63%)	41%	41%	34%	25%	25%	21%
No children (66% of US BB HHs, n=3,301, ±1.71%)	37%	31%	29%	18%	18%	17%
<b>Technology Adoption Segment</b>						
Innovator (9% of US BB HHs, n=448, ±4.63%)	46%	42%	33%	35%	33%	28%
Early Adopter (18% of US BB HHs, n=914, ±3.24%)	45%	42%	38%	24%	27%	23%
Early Majority (32% of US BB HHs, n=1,606, ±2.45%)	41%	35%	33%	20%	20%	19%
Late Majority (23% of US BB HHs, n=1,149, ±2.89%)	33%	30%	27%	16%	15%	15%
Laggard (11% of US BB HHs, n=570, ±4.1%)	22%	18%	16%	12%	8%	8%

Asked of a Subgroup of 5,014 US BB HHs © 2020 Parks Associates

The factors that motivate different demographic groups vary.

- Younger consumers and consumers with children at home would be more likely to purchase an EV if the cost of electricity is lower than the cost of gas.
- Consumers with incomes of \$100K and above would be more likely to purchase an EV if they got a tax break on the vehicle purchased.

Lower than Average Higher than Average

Note: Compare Results within Columns ONLY

# Several housing factors impact purchase drivers for EVs.

## Purchase Drivers of Electric Vehicle by Housing Factors (Q4/19)

Q7855. Which of the following increases your likelihood of purchasing a plug-in electric vehicle?

Sample Size	Free charging	Lower cost of electricity versus gas	Tax break on the vehicle purchase	Charging using solar power	Reduction of my carbon footprint	No release of carbon emissions
<b>Among Electric Vehicle Non-owners (93% of US BB HHs, n=4,687, ±1.43%)</b>	<b>38%</b>	<b>34%</b>	<b>30%</b>	<b>20%</b>	<b>20%</b>	<b>18%</b>
<b>Home Ownership</b>						
Rent (27% of US BB HHs, n=1,344, ±2.67%)	39%	33%	26%	20%	20%	20%
Own (65% of US BB HHs, n=3,260, ±1.72%)	37%	34%	32%	20%	20%	17%
<b>Home Size</b>						
1,500 square ft or less (27% of US BB HHs, n=1,335, ±2.68%)	37%	34%	29%	19%	19%	18%
1,501-2,000 square ft (23% of US BB HHs, n=1,154, ±2.88%)	38%	34%	33%	21%	20%	19%
2,001 - 2,500 square ft (17% of US BB HHs, n=852, ±3.36%)	42%	36%	32%	20%	25%	20%
2,501 – 3,500 square ft (11% of US BB HHs, n=558, ±4.15%)	39%	35%	35%	24%	20%	18%
More than 3,500 square ft (4% of US BB HHs, n=204, ±6.86%)	33%	34%	29%	18%	19%	14%
<b>Region</b>						
Northeast (20% of US BB HHs, n=1,003, ±3.09%)	34%	31%	28%	16%	18%	17%
Midwest (21% of US BB HHs, n=1,059, ±3.01%)	38%	34%	30%	19%	19%	19%
South (35% of US BB HHs, n=1,731, ±2.36%)	37%	36%	31%	21%	20%	18%
West (45% of US BB HHs, n=894, ±3.28%)	42%	34%	32%	23%	24%	18%
<b>Residence Area</b>						
An urban area (25% of US BB HHs, n=1,233, ±2.79%)	40%	36%	30%	25%	25%	19%
A suburban area (46% of US BB HHs, n=2,327, ±2.03%)	40%	35%	34%	19%	19%	18%
A rural area (21% of US BB HHs, n=1,073, ±2.99%)	31%	29%	24%	17%	16%	16%
<b>Length of Time in Residence</b>						
Less than 12 months (8% of US BB HHs, n=412, ±4.83%)	40%	39%	31%	25%	26%	24%
1-2 years (11% of US BB HHs, n=561, ±4.14%)	41%	37%	31%	25%	24%	22%
3-4 years (13% of US BB HHs, n=656, ±3.83%)	41%	36%	30%	22%	21%	19%
5-10 years (19% of US BB HHs, n=976, ±3.14%)	41%	36%	32%	22%	22%	20%
More than 10 years (42% of US BB HHs, n=2,082, ±2.15%)	34%	30%	30%	16%	16%	15%

Asked of a Subgroup of 5,014 US BB HHs © 2020 Parks Associates

- Consumers with home size 2,001 to 2,500 square ft. and consumers living in Western regions are driven more than the average consumer by free charging.
- Consumers with home size 2,501 to 3,500 square ft. are more driven than average by a tax breaks on vehicle purchase.
- Consumers in urban areas are driven more than average by the ability to charge the vehicle using solar power.
- Multiple factors would increase the likelihood of EV purchase for consumers who have been in their homes for less than 12 months.

Lower than Average Higher than Average

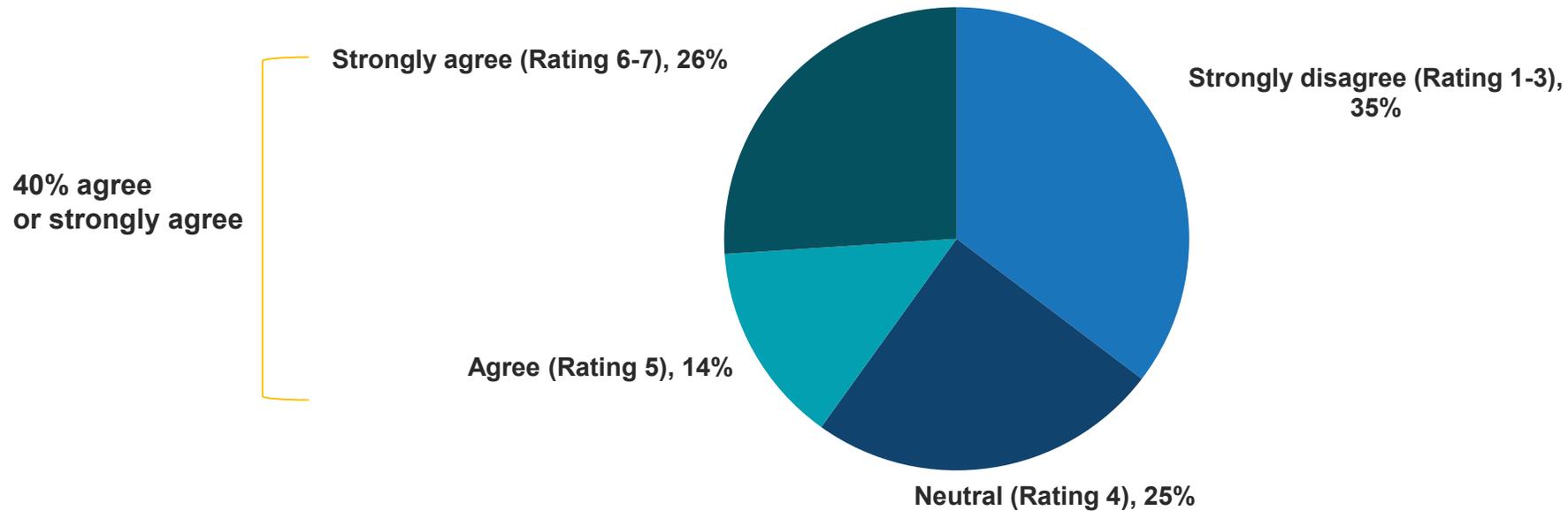
Note: Compare Results within Columns ONLY

# 40% of US broadband households prefer to live in a community powered by solar energy.

Utilities in several states including Minnesota, Illinois, Maryland, Massachusetts, New York, and Rhode Island continue to invest in community solar projects that make solar energy accessible to a broader cross section of consumers.

## Agreement on Living in a Community Powered by Solar Energy (Q4/19)

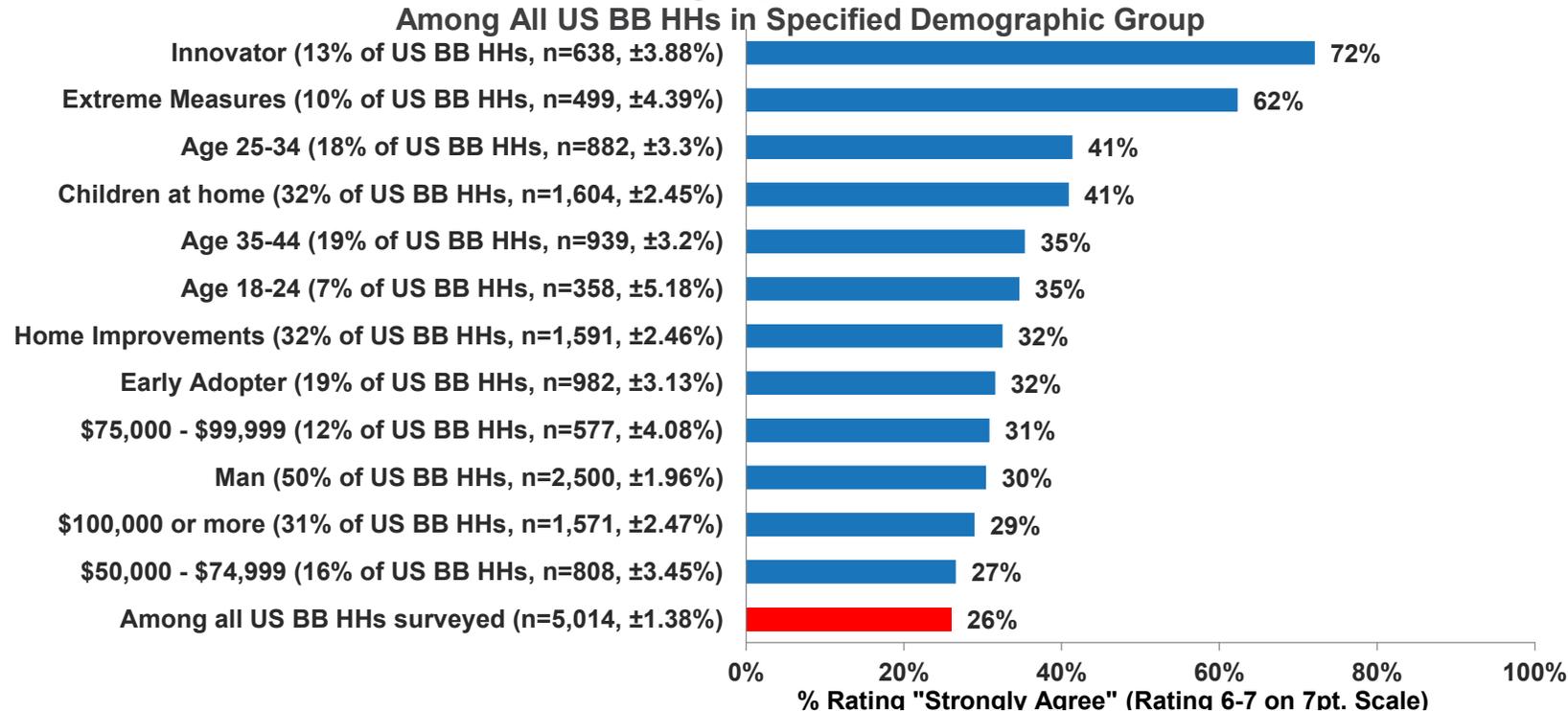
Among All US BB HHs Surveyed, n = 5,014, ±1.38%



"Q7850. Please rate your level of agreement with the following statements.  
- I prefer to live in a community that is powered by solar energy." | Asked of a Subgroup of 5,014 US BB HHs |  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Innovators and those consumers who take extreme energy-saving measures are most likely to report preference for living in communities powered by solar energy.

## Agreement on Living in a Community Powered by Solar Energy by Demographics (Q4/19)



The following consumers are also good targets for community solar:

1. Younger consumers
2. Consumers with higher incomes
3. Consumers with children at home
4. Consumers who live in urban areas

"Q7850. Please rate your level of agreement with the following statements.  
 - I prefer to live in a community that is powered by solar energy." | Asked of a Subgroup of 5,014 US BB HHs |  
 Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Consumer Demand for Smart Energy Solutions

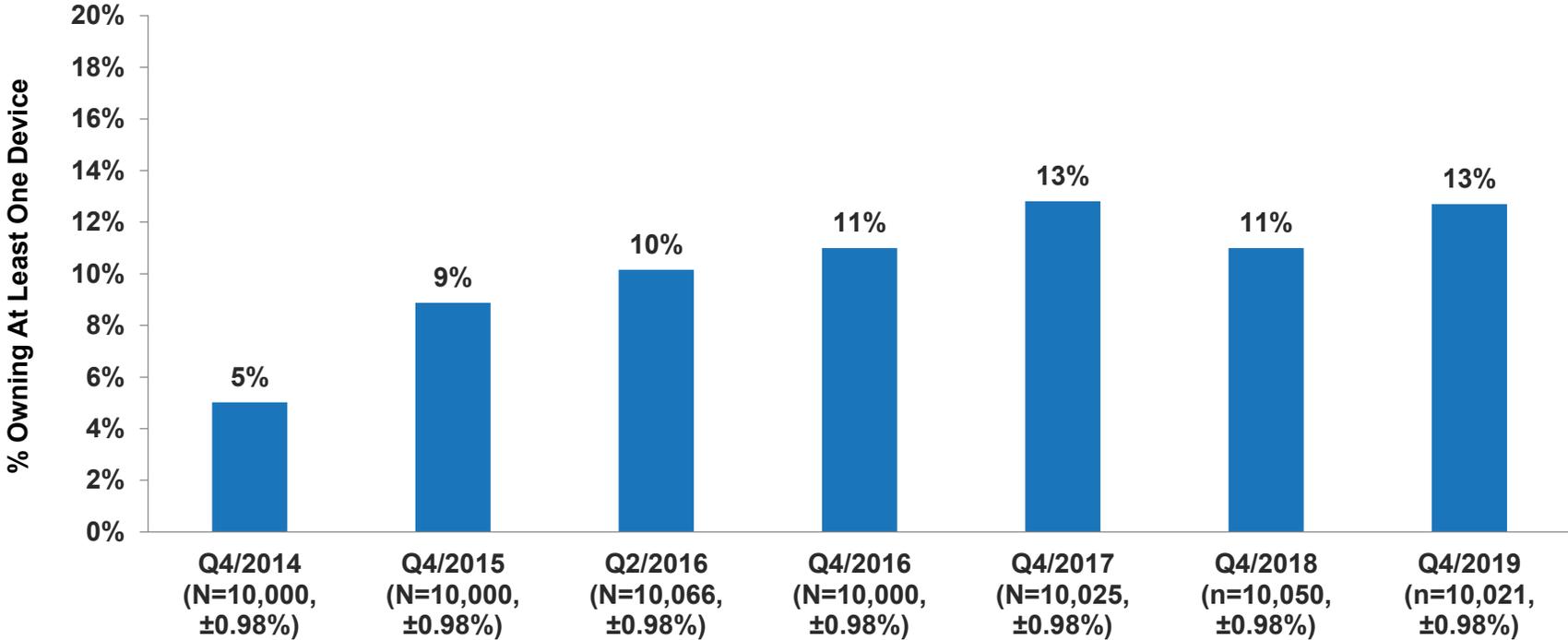
## Smart Energy Products

[Back to Table of Contents](#)

# 13% of US broadband households report owning a smart thermostat.

## Smart Thermostat Ownership (2014 - 2019)

Among All US BB HHs



"ST2601. How many of the following does your home currently have? - Smart programmable thermostat"  
Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

Thermostats have the highest adoption among smart home devices.

Ownership of smart thermostat increased by 30% over the past five years—from 10% in 2016 to 13% in 2019.

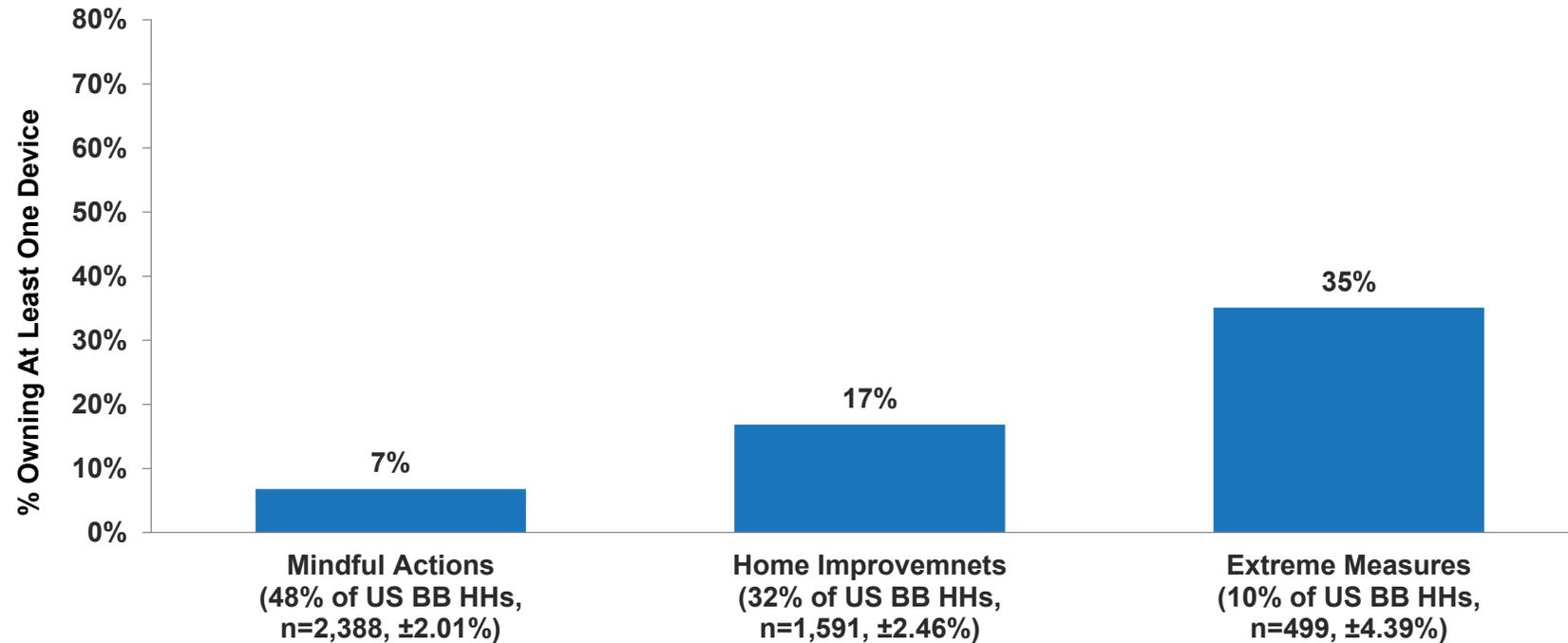
Thermostat adoption among US broadband households was partly driven by co-marketing efforts among device manufacturers and energy providers that integrated the devices in their energy efficiency and demand response (DR) programs.

# 35% of consumers who take extreme energy-saving measures own smart thermostats.

Consumers who are in the Extreme Measures category are five times more likely to own a smart thermostat than those in the Mindful Actions category.

## Smart Thermostat Ownership by Energy Segments (Q4/19)

Among US BB HHs in Specified Group



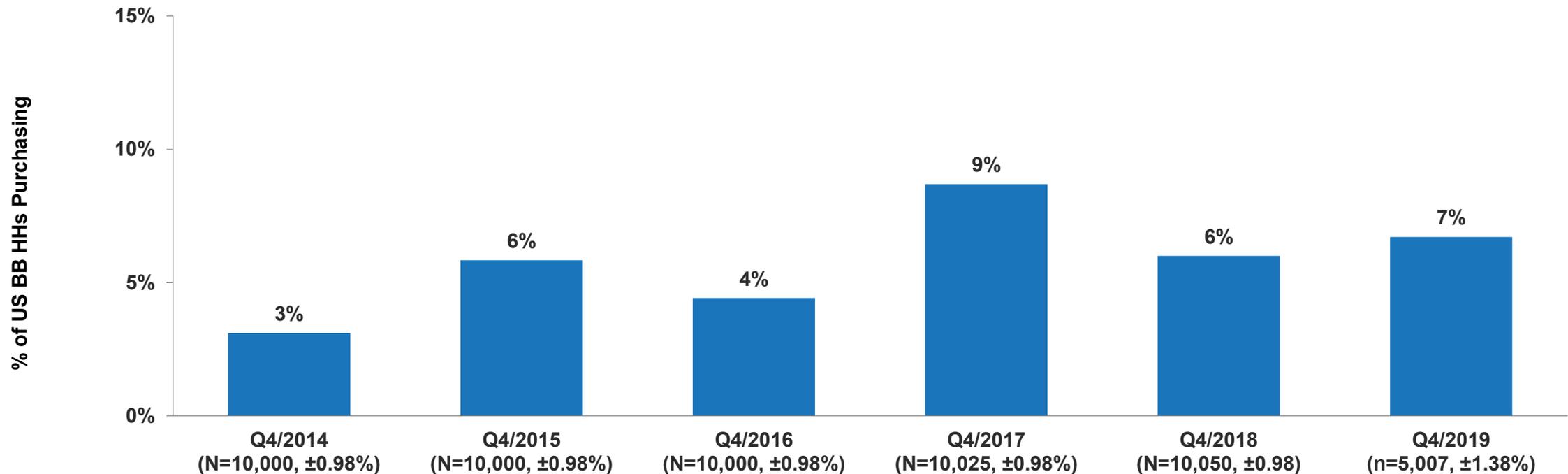
"ST2601. How many of the following does your home currently have? - Smart programmable thermostat" | "Q7510a/Q7510b. Which of these energy-saving actions have you or your household members taken over the past 12 months?" | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# 7% of US broadband households report purchasing a smart thermostat in the past twelve months.

The year-over-year purchase rate for smart thermostats has fluctuated over the past six years.

## Smart Thermostat Purchases (2014 - 2019)

Among All US BB HHs

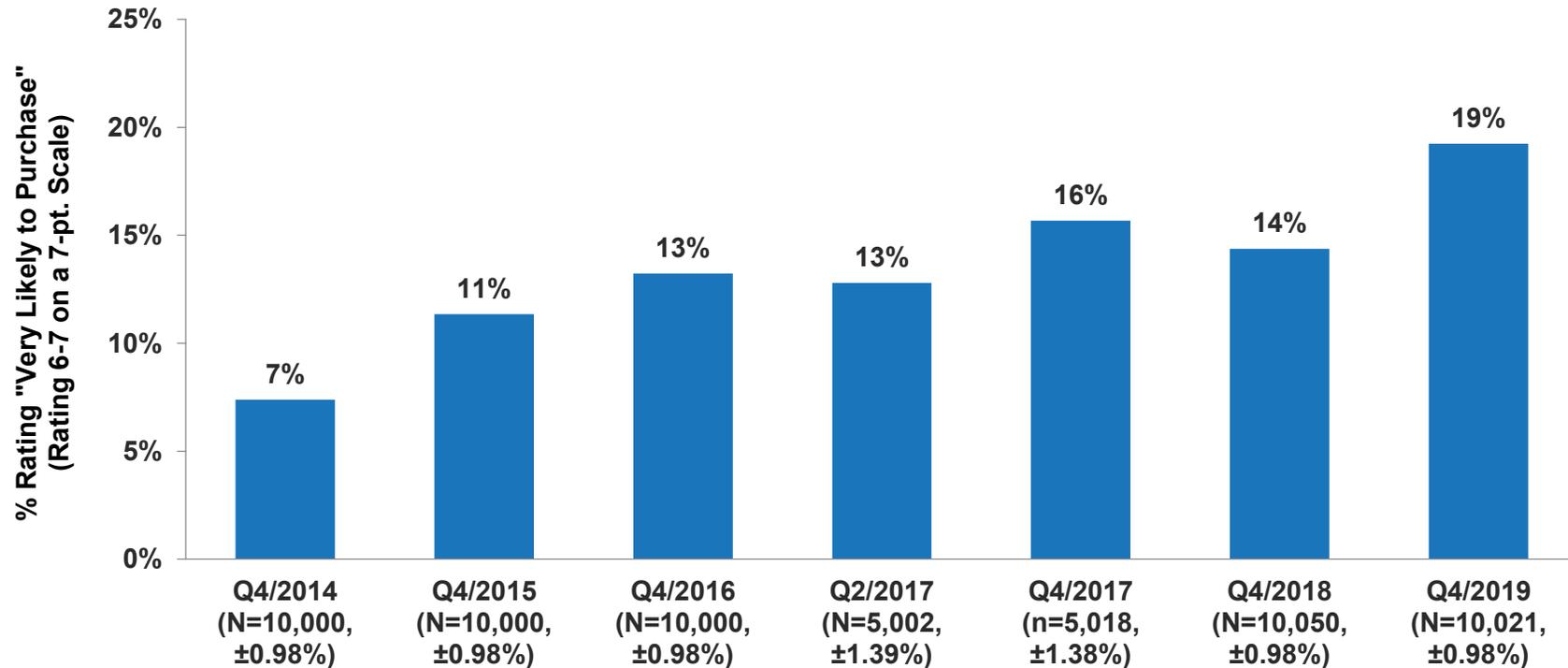


"Q2645. Please tell us how many of each of the following home products your household purchased or received in the last year?"  
Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

# Purchase intentions for smart thermostats have grown consistently over past six years.

## Smart Thermostat: High Purchase Intention (2014 - 2019)

Among All US BB HHs



"ST2815/2675. Over the next 12 months, how likely are you to purchase products of the following types that can be monitored or controlled from a smartphone, tablet, or computer?" | Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

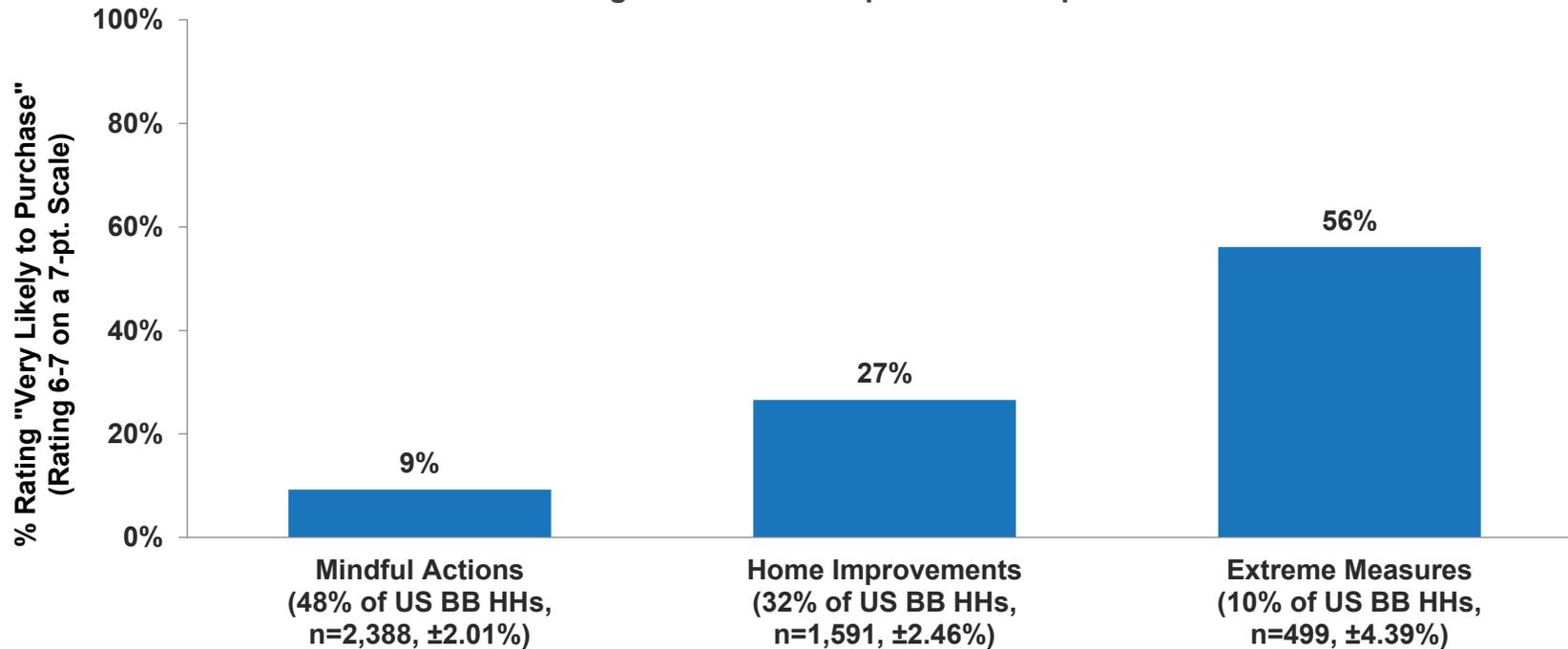
Growth in purchase intentions outweighs growth in ownership. Purchase intentions for smart thermostats among US broadband households has increased by 73% since 2015. However, growth in ownership has only increased by 45% (eight percentage points) over the period.

Several factors serve as barriers to intention for smart home devices including the following:

1. Poor perception of product value.
2. Concerns about security and privacy.
3. Concerns about technical issue such as difficulty setting up products.

# More than one-half of consumers in the Extreme Measures energy-saving category report high intention to purchase a smart thermostat.

## High Intention to Purchase a Smart Thermostat by Energy Segments (Q4/19) Among US BB HHs in Specified Group



"ST2675. How likely are you to purchase any of the following smart home devices in the next 12 months?" | "Q7510a/Q7510b. Which of these energy-saving actions have you or your household members taken over the past 12 months?" | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

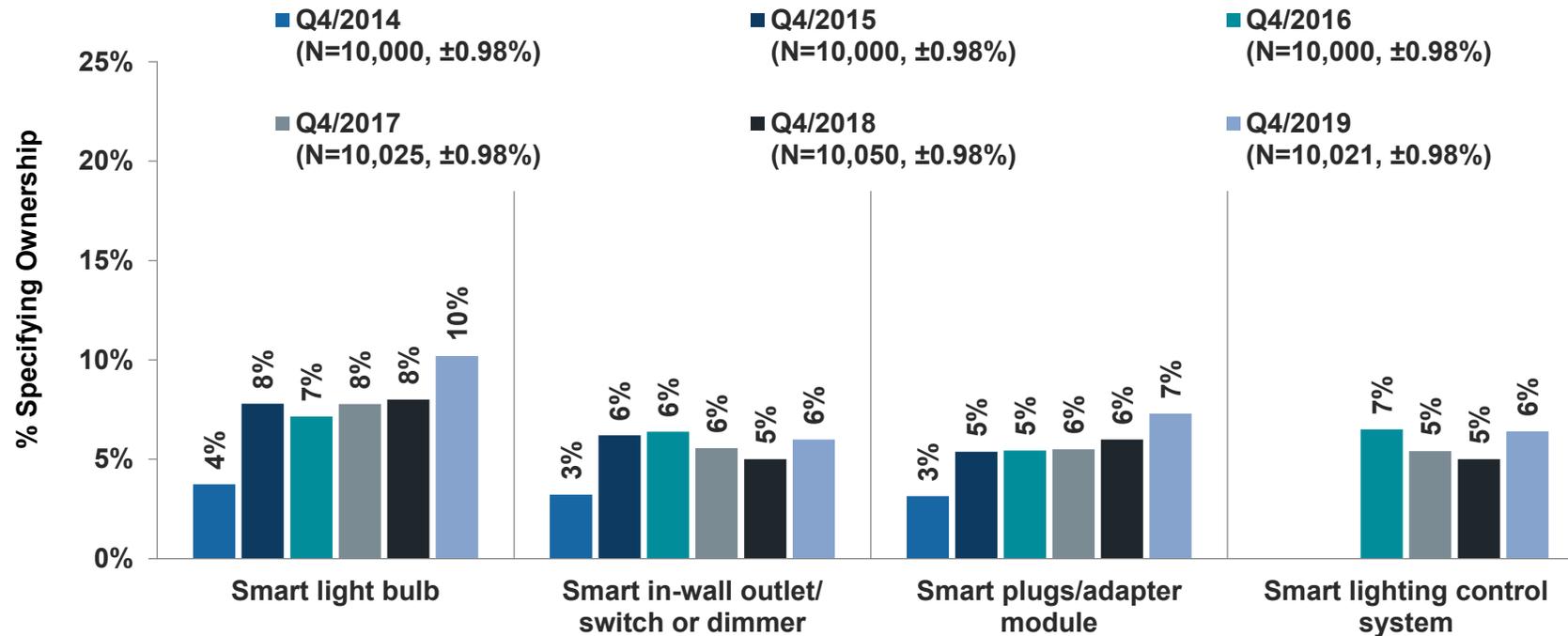
Several factors influence smart thermostat purchase intentions. These include age, home size, and area of residence. Consumers in the 25-34 age range, those with home size 3,500+ square ft., and those in urban areas are most likely to report high intentions to purchase smart thermostats.

Gender, income, and region had less significant influence on smart thermostat purchase intentions.

# Ownership of smart lighting devices and smart plugs has remained fairly consistent over the past five years. Smart light bulbs are the exception.

## Smart Lighting/Power Devices Ownership (2014 - 2019)

Among All US Broadband Households



Adoption of smart light bulbs grew by 20% over the past year.

Light bulbs have relatively high adoption among smart home devices. Approximately 10% of US broadband households report owning a smart light bulb. Relative affordability and easy installation has helped drive light bulb adoption. However, the adoption rate is still fairly low. Pragmatic feature sets such as those that help with energy management and those that support restful sleep may help to further drive mass market appeal.

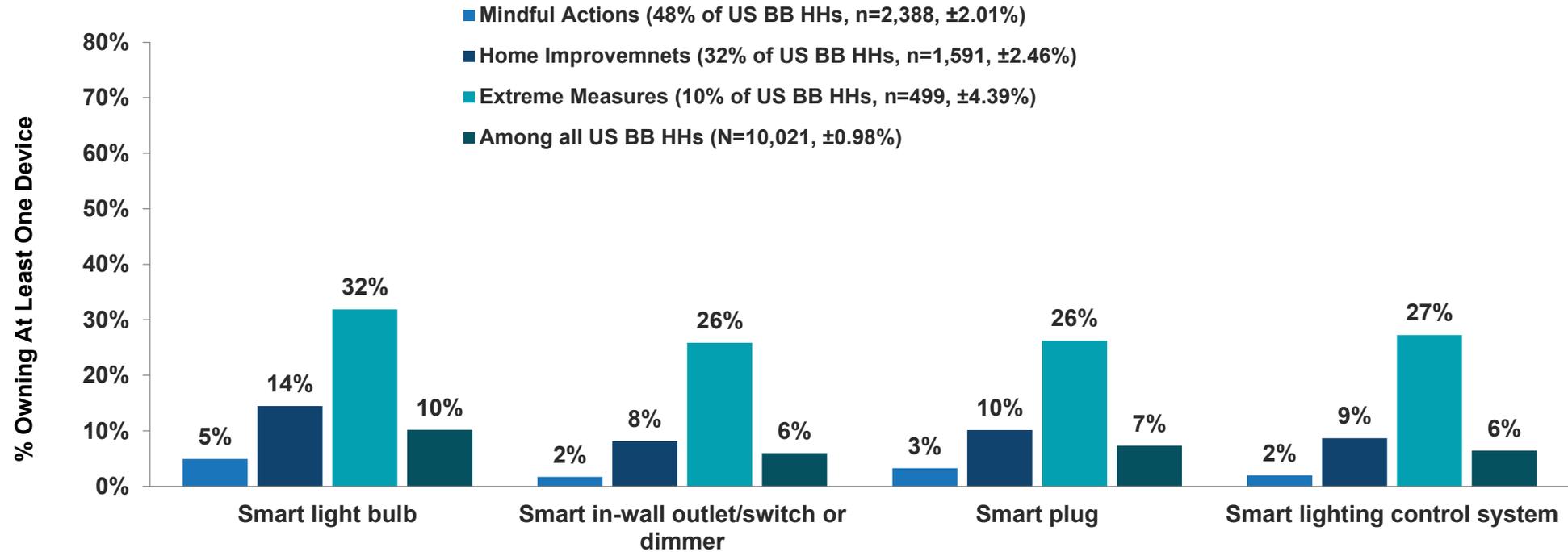
"Q2601. How many of the following does your home currently have?"

Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

Not surprisingly, consumers in the Extreme Measures energy-saving category are significantly more likely to own a smart lighting device than those in other groups.

## Smart Lighting/Power Devices Ownership by Energy Segments (Q4/19)

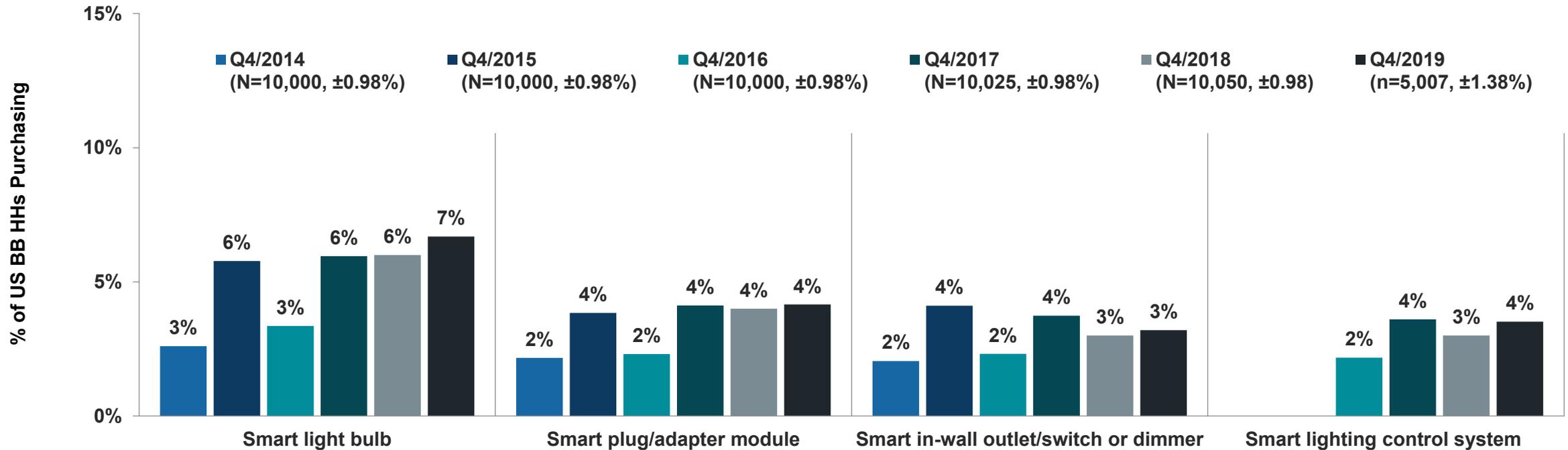
Among US BB HHs in Specified Group



"ST2601. How many of the following does your home currently have? - Smart lighting devices" | "Q7510a/Q7510b. Which of these energy-saving actions have you or your household members taken over the past 12 months?" | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

Purchase rates for smart lighting devices and smart plugs have remained fairly consistent since 2017.

### Smart Lighting Device Purchases (2014 - 2019) Among All US BB HHs

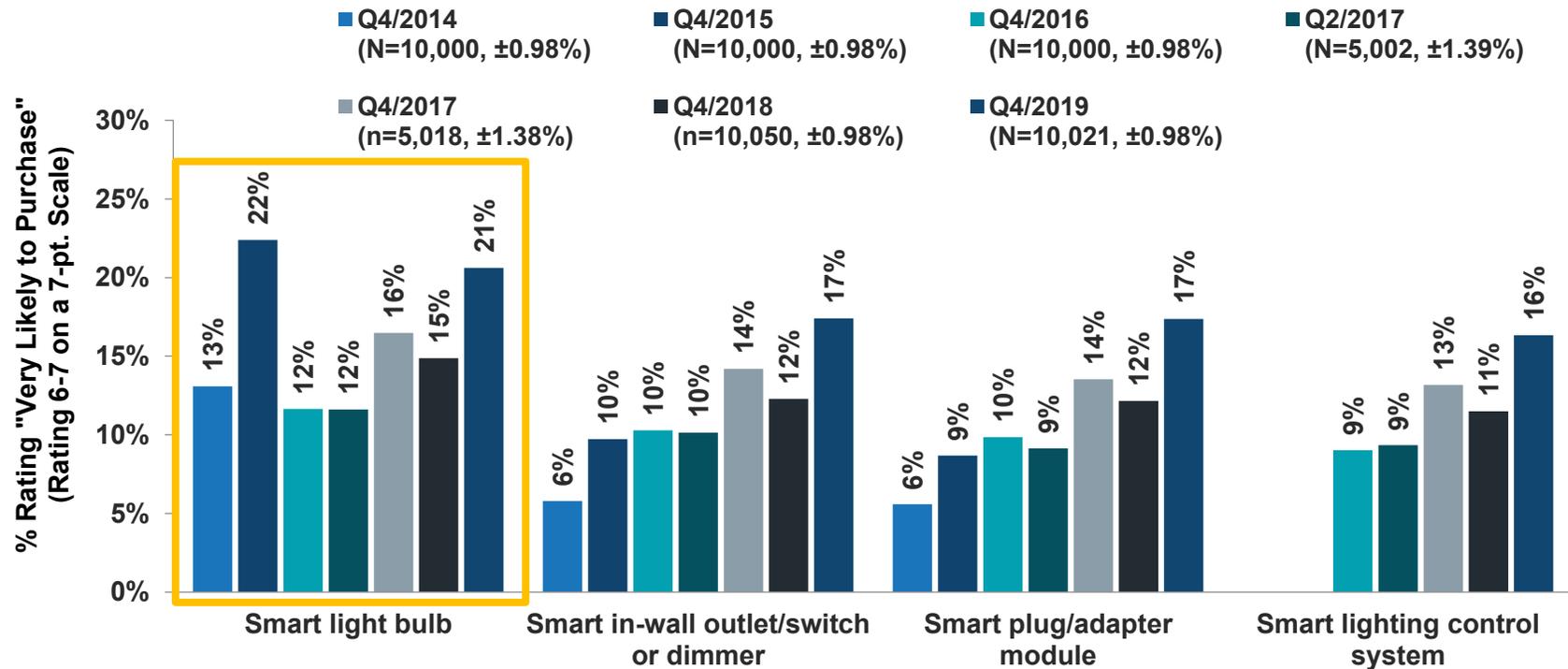


"Q2645. Please tell us how many of each of the following home products your household purchased or received in the last year?"  
Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

# Purchase intentions for smart lighting devices and smart plugs have increased significantly over the past six years.

## Smart Lighting Devices: High Purchase Intention (2014 - 2019)

Among All US BB HHs



Purchase intentions for smart light bulbs are higher than those for other devices. 21% of US broadband households report intention to purchase a smart light bulb.

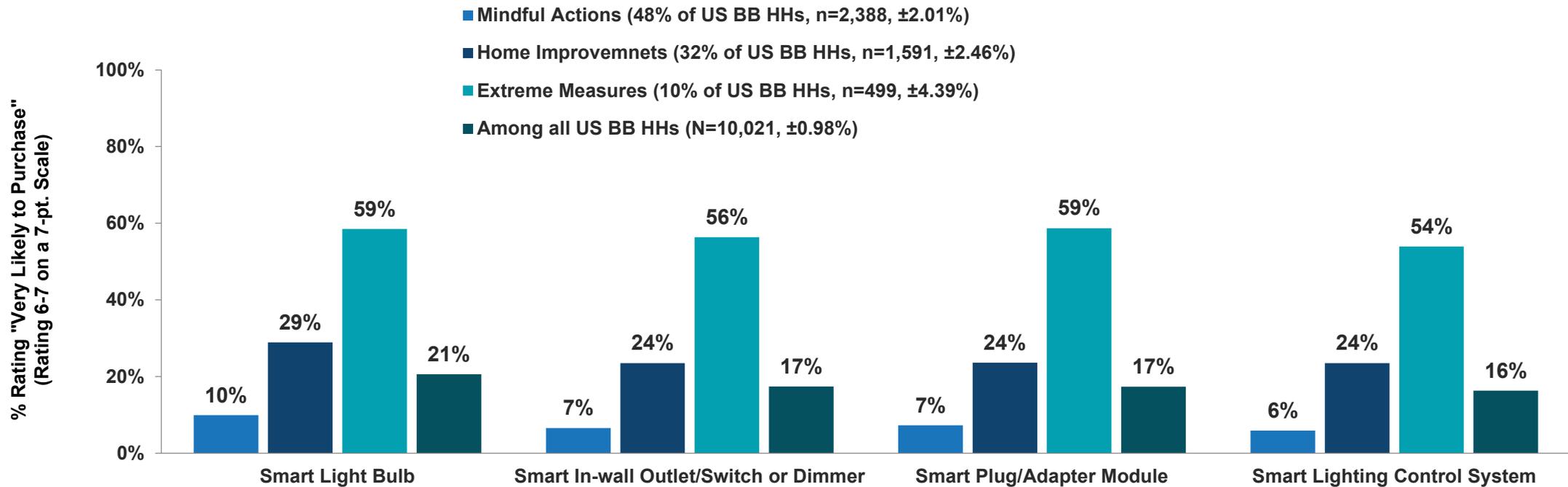
Similar to smart thermostat, age, home size, and area of residence influence purchase intentions for smart lighting devices and smart plugs. Consumers in the 25-34 age range, those with home size 3,500+ square ft., and those in urban areas are most likely to report high intentions to purchase these devices.

Gender, income, and region does not significantly influence purchase intentions for smart light bulbs.

"ST2815. Over the next 12 months, how likely are you to purchase products of the following types that can be monitored or controlled from a smartphone, tablet, or computer?" | Source: Multiple Surveys: American Broadband Households and Their Technologies | © 2020 Parks Associates

# Consumers in the Extreme Measures energy-saving category are significantly more likely to report high intentions to purchase smart lighting devices and smart plugs.

## High Intention to Purchase a Smart Lighting Device by Energy Segments (Q4/19) Among US BB HHs in Specified Group

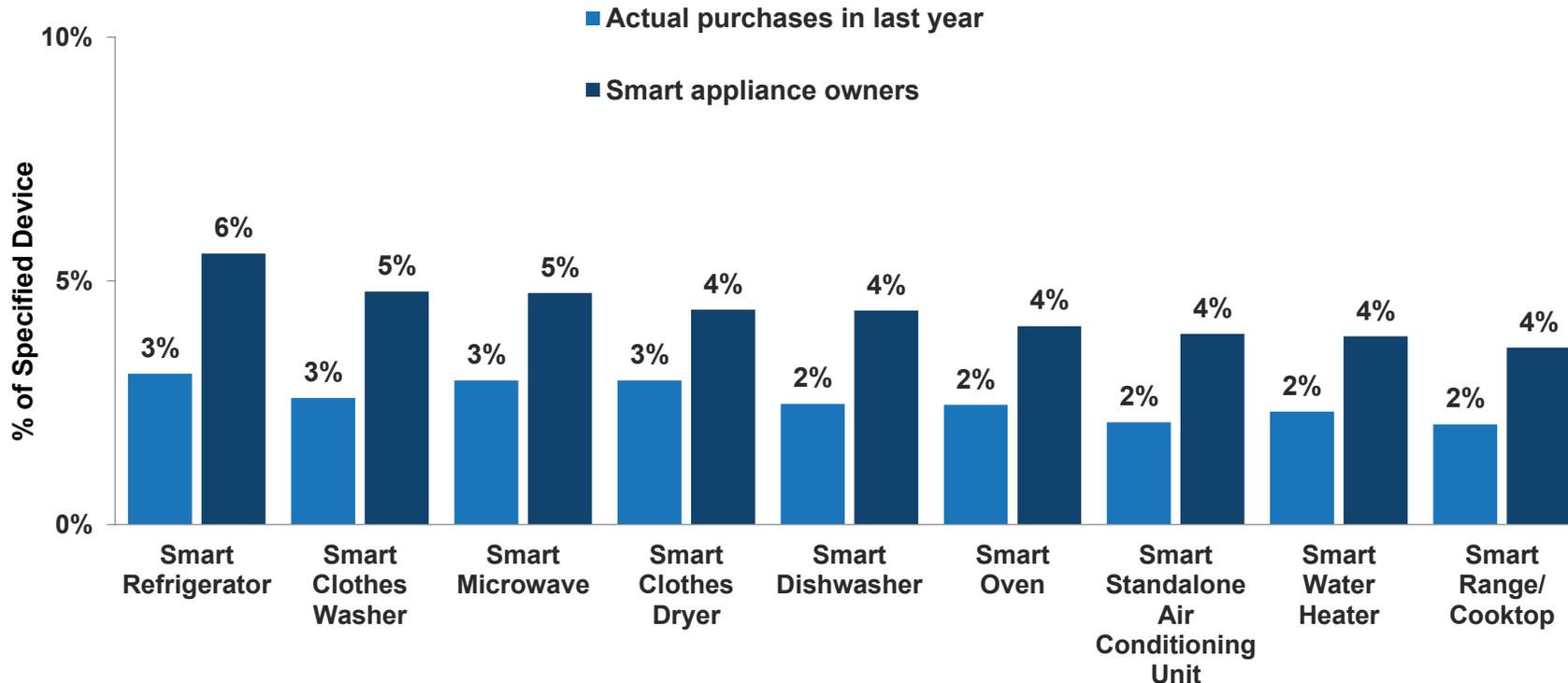


"ST2675. How likely are you to purchase any of the following smart home devices in the next 12 months?" | "Q7510a/Q7510b. Which of these energy-saving actions have you or your household members taken over the past 12 months?" | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Overall 11% of US broadband households report owning a smart appliance. Among smart appliances, smart refrigerators have highest adoption in US broadband households.

## Smart Appliances: Ownership and Purchase Rates (Q4/19)

Among All US BB HHs, N=10,021, ±0.98%



"Q2645. Please tell us how many of each of the following home products your household purchased or received in the last year?" "ST2601. How many of the following does your home currently have?"

Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

7% of US broadband households report purchasing at least one smart appliance in the past year.

Smart appliances have started to emerge in US broadband households.

Large appliance manufacturers such as Samsung, LG, and GE have been adding smart features to their household appliances for over five years. Maytag and Sharp started offering smart products in 2019.

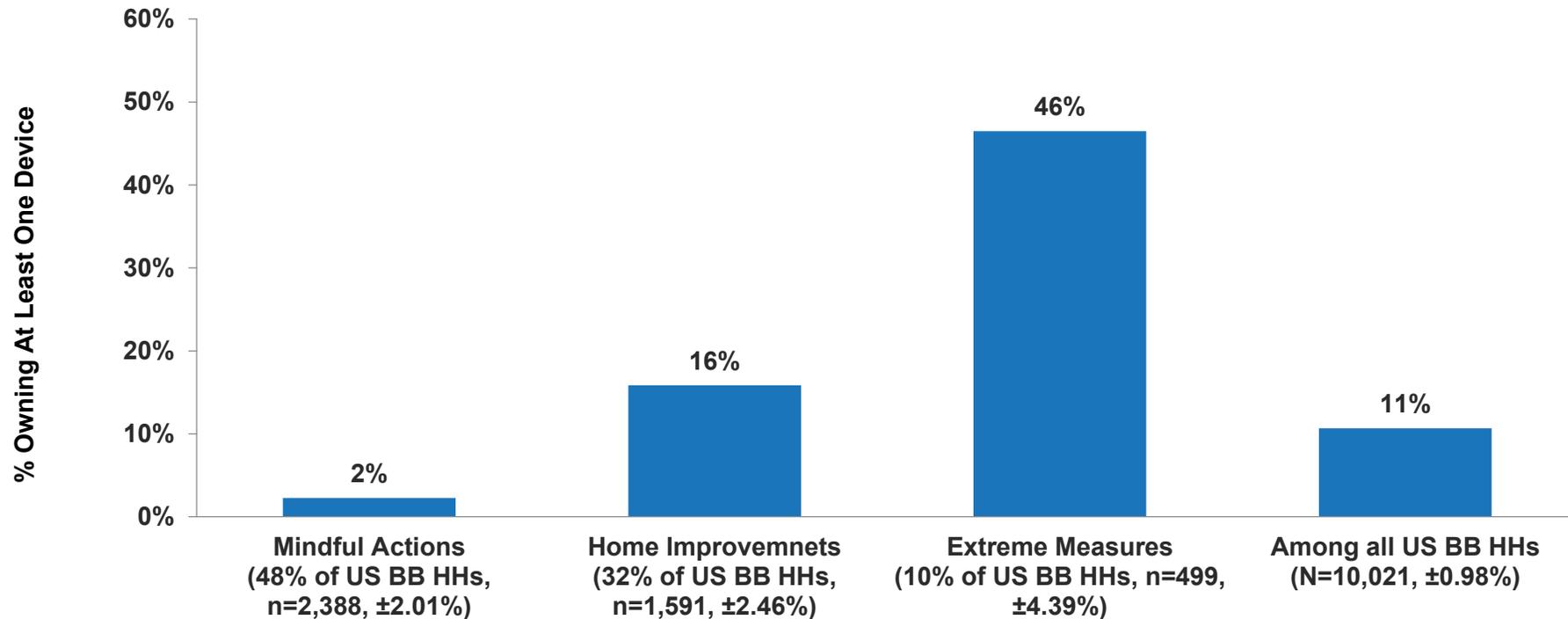
Smart appliances can potentially be important assets for energy provider DR programs since they typically consume large amounts of energy. Appliance manufacturers also increasingly apply features to smart appliances that use automation to help consumers manage energy consumption.

# Only 2% of consumers in the Mindful Actions segment report owning a smart appliance.

By comparison, nearly one-half of those in the Extreme Measures category own a smart appliance.

## Smart Appliances Ownership by Energy Segments (Q4/19)

Among US BB HHs in Specified Group



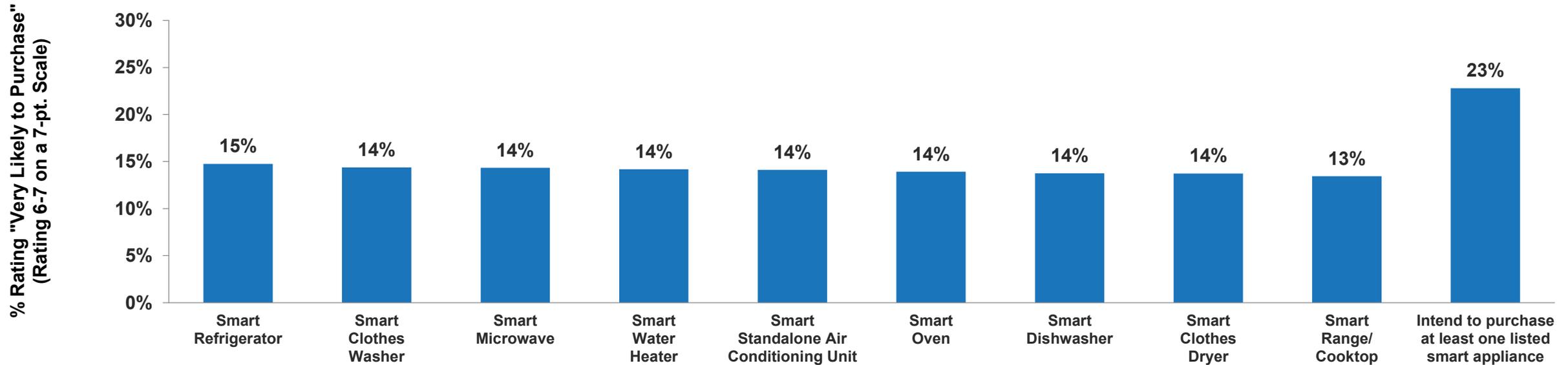
"ST2601. How many of the following does your home currently have?" | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Nearly one-quarter of US broadband households report “very high” intention to purchase at least one smart appliance in the next 12 months.

Purchase intentions are nearly equal for all types of appliances.

## Smart Appliances: High Purchase Intention (Q4/19)

Among All US BB HHs, N = 10,021, ±0.98



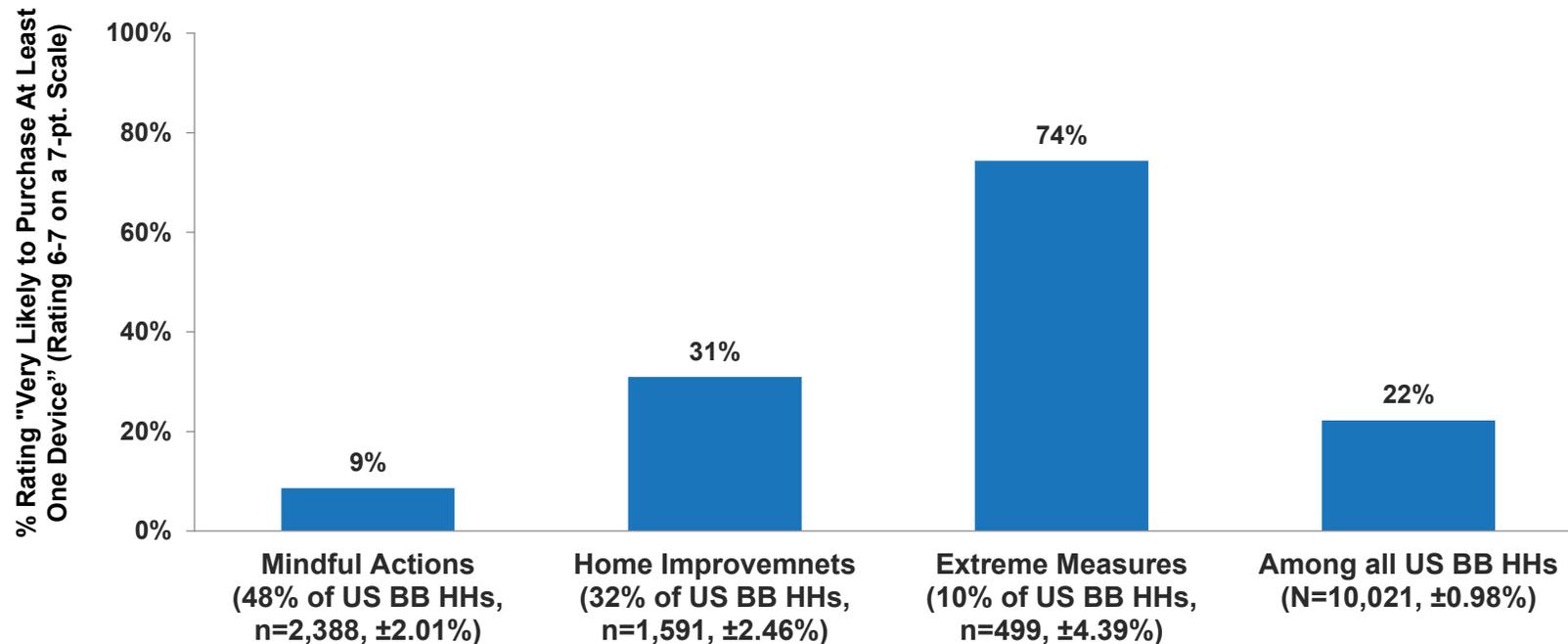
"ST2675. How likely are you to purchase any of the following smart home devices in the next 12 months?"

Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# 74% of consumers in the Extreme Measures energy-saving category report high intention to purchase a smart appliance.

## High Intention to Purchase a Smart Appliance by Energy Segments (Q4/19)

Among US BB HHs in Specified Group



Consumers in the Extreme Measures energy-saving category are also more likely to participate in energy programs such load control programs and energy monitoring and management programs.

This further drives the possibility that smart appliance market growth will create DR opportunities for energy providers.

"ST2675. How likely are you to purchase any of the following smart home devices in the next 12 months?" | "Q7510a/Q7510b. Which of these energy-saving actions have you or your household members taken over the past 12 months?" | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Consumer Demand for Smart Energy Solutions

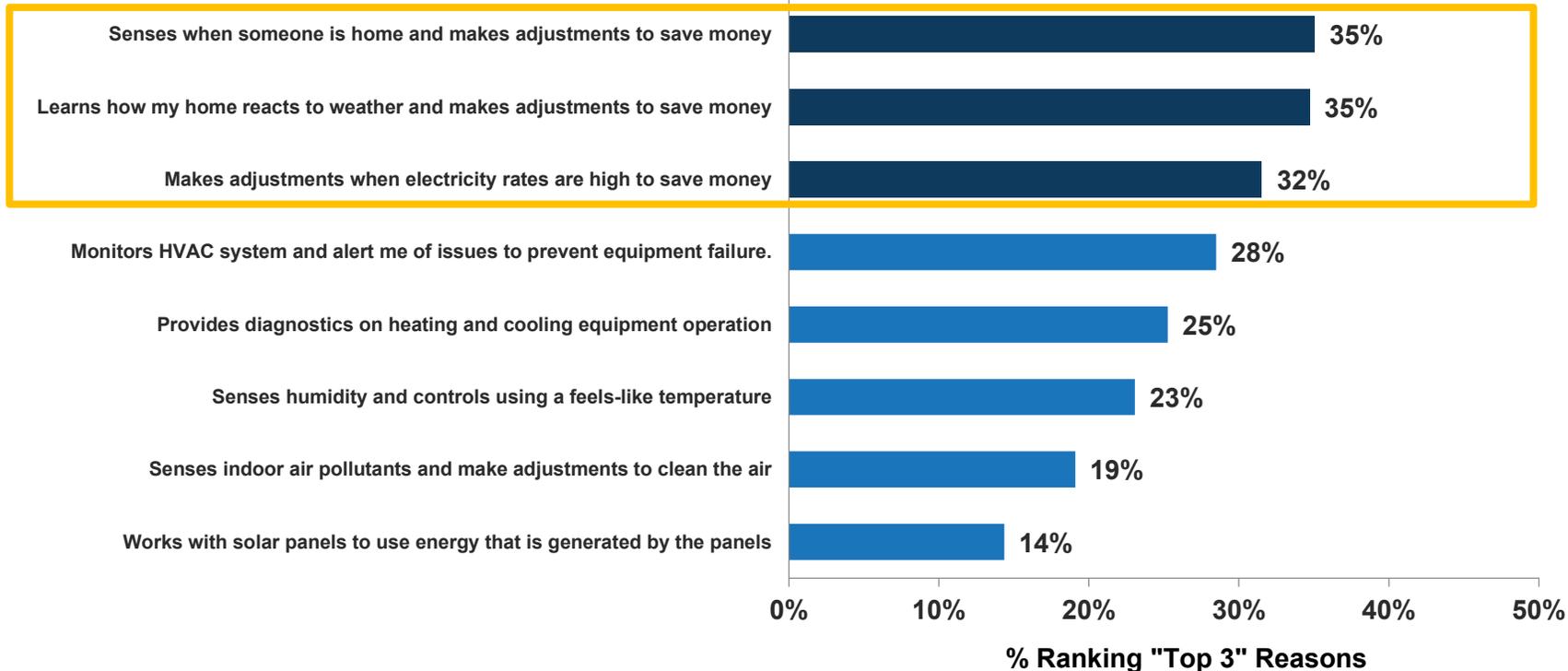
## Smart Products - Importance of Energy Management Features

[Back to Table of Contents](#)

# Features related to energy-savings are most important to consumers when purchasing a smart thermostat.

## Features Influencing Purchase of Smart Thermostat (Q4/19)

Among 34% US BB HHs Owning or Intending to Purchase a Smart Thermostat, n = 1,734, ±2.35%



HVAC systems account for approximately 50% of a home's electricity use and consumers prioritize smart thermostat features that drive energy-savings.

Smart thermostat features that monitor HVAC equipment to identify issues and prevent system failure follow energy-savings.

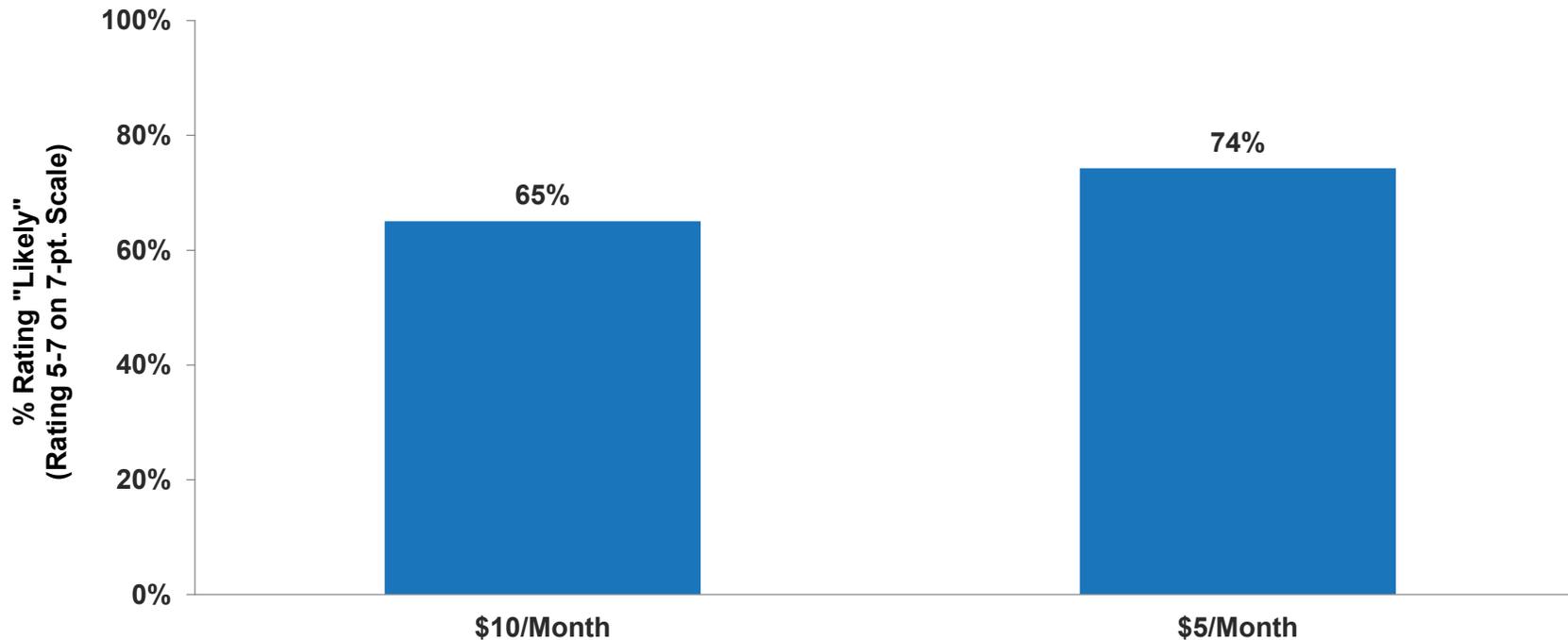
Features that improve the overall atmosphere (humidity, temperature, air quality) rank lower in importance.

"Q2750. When considering the purchase of a smart thermostat, which three features are most important? Please use a "1" for the Most Important feature, a "2" for the Second Most Important feature and so on. " | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Smart thermostat owners and intenders are willing to pay for energy management and monitoring capabilities.

## Likelihood of Paying for Energy Monitoring Service (Q4/19)

Among the 34% of US BB HHs Owning or Intending to Purchase a Smart Thermostat, n = 1,734, ±2.35%



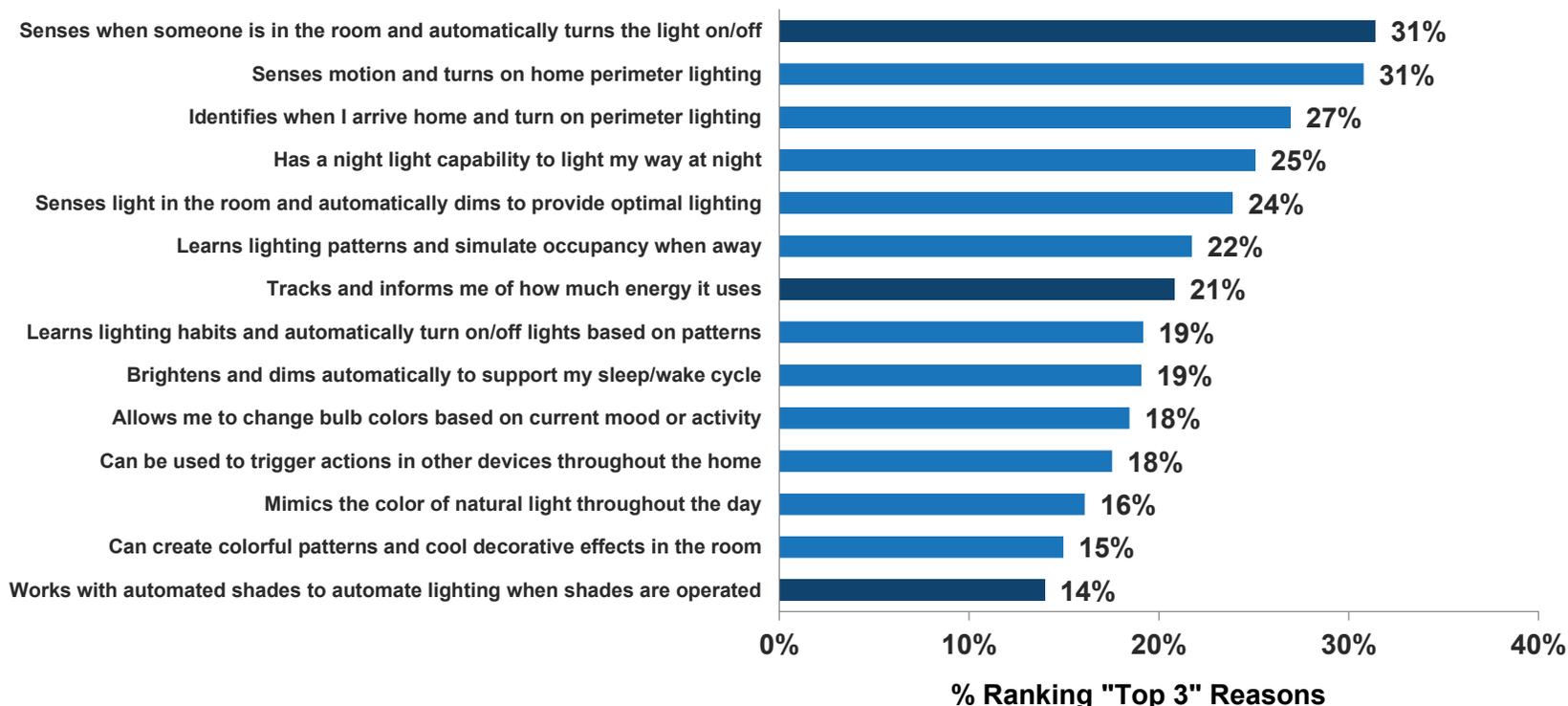
65% indicate a likelihood to pay \$10 per month for an energy monitoring service that makes suggestions on how to reduce energy consumption and 74% indicate a willingness to pay \$5 per month.

"Q2755A/B. How likely are you to pay \$10/\$5 per month for the following services? - A heating and cooling system dealer remotely monitors my electricity consumption patterns and makes suggestions to reduce overall energy consumption." | Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Smart lighting features that promote energy management vary in importance for consumers considering smart lighting device purchases.

## Features Influencing Purchase of Smart Lighting Device (Q4/19)

Among 39% US BB HHs Owning or Intending to Purchase a Smart Lighting Device, n = 1,945, ±2.22%



"Q2741A. When considering the purchase of smart lighting products, which three features are most important to you? Please use a "1" for the Most Important feature, "2" for the Second Most Important and so on. " | Asked of a Subgroup of 5,014 US BB HHs

Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

31% of consumers rank lights turning on/off automatically when someone enters/leaves a room as most important, compared to 21% that rank features that track how much energy their lighting device uses as most important.

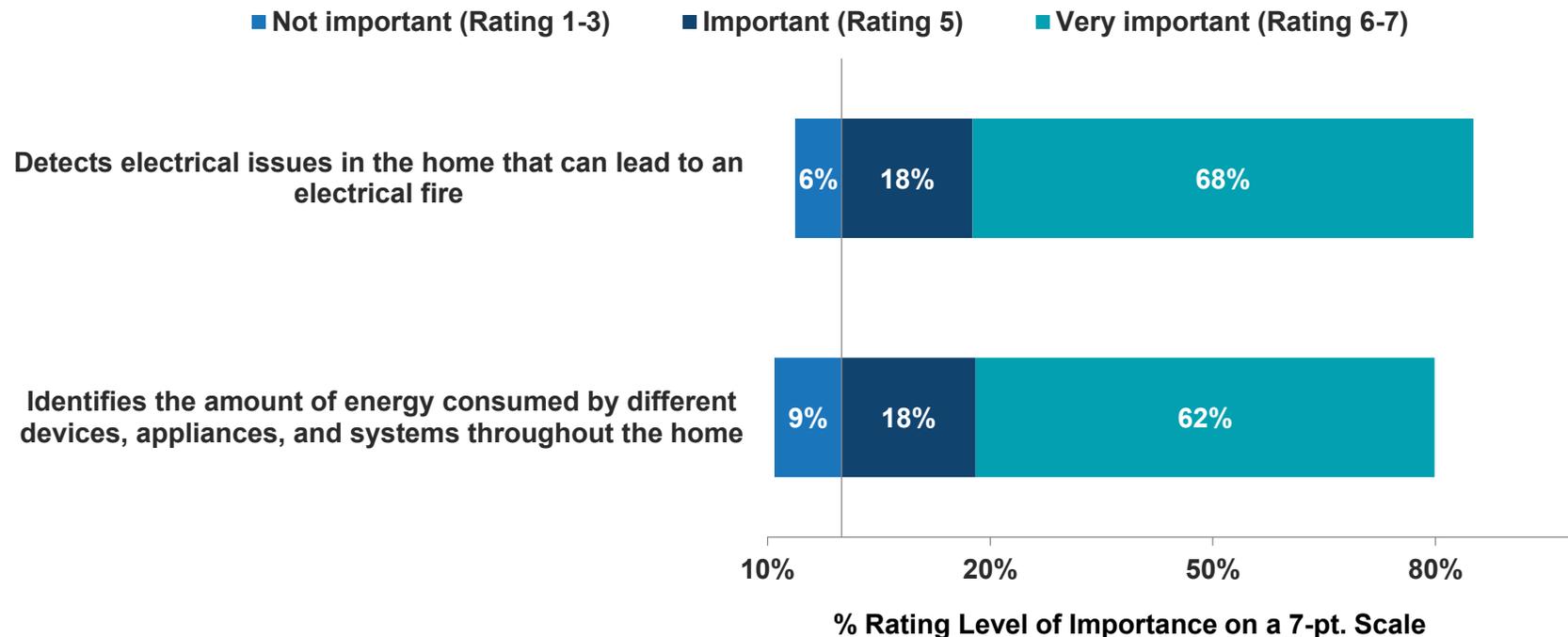
Lighting devices generally consume only a marginal amount of energy, making energy-saving features less important in purchase decisions for these devices, compared to other factors.

Lighting device features that promote physical home security rank high in importance, compared to other features—including those that improve aesthetics. For example, features that automatically turn on home perimeter lights, when necessary, rank higher than those that create colorful patterns and cool decorative effects.

**62% of smart plug owners and purchase intenders rate a smart plug feature that identifies the amount of energy consumed by devices and appliances throughout the home as very important.**

### Important Purchase Drivers for Smart Plug/Adapter Module (Q4/19)

Among the 29% US BB HHs Owning or Intending to Purchase a Smart Plug/Adapter Module, n = 1,431, ±2.59%



"Q2748B. When purchasing a smart plug/adapter module, how important is it that the device...." Asked of a Subgroup of 5,014 US BB HHs  
Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

The market for smart plugs is increasingly competitive. It features a combination of startups entering the market and established smart home companies expanding their product lines to include smart plugs.

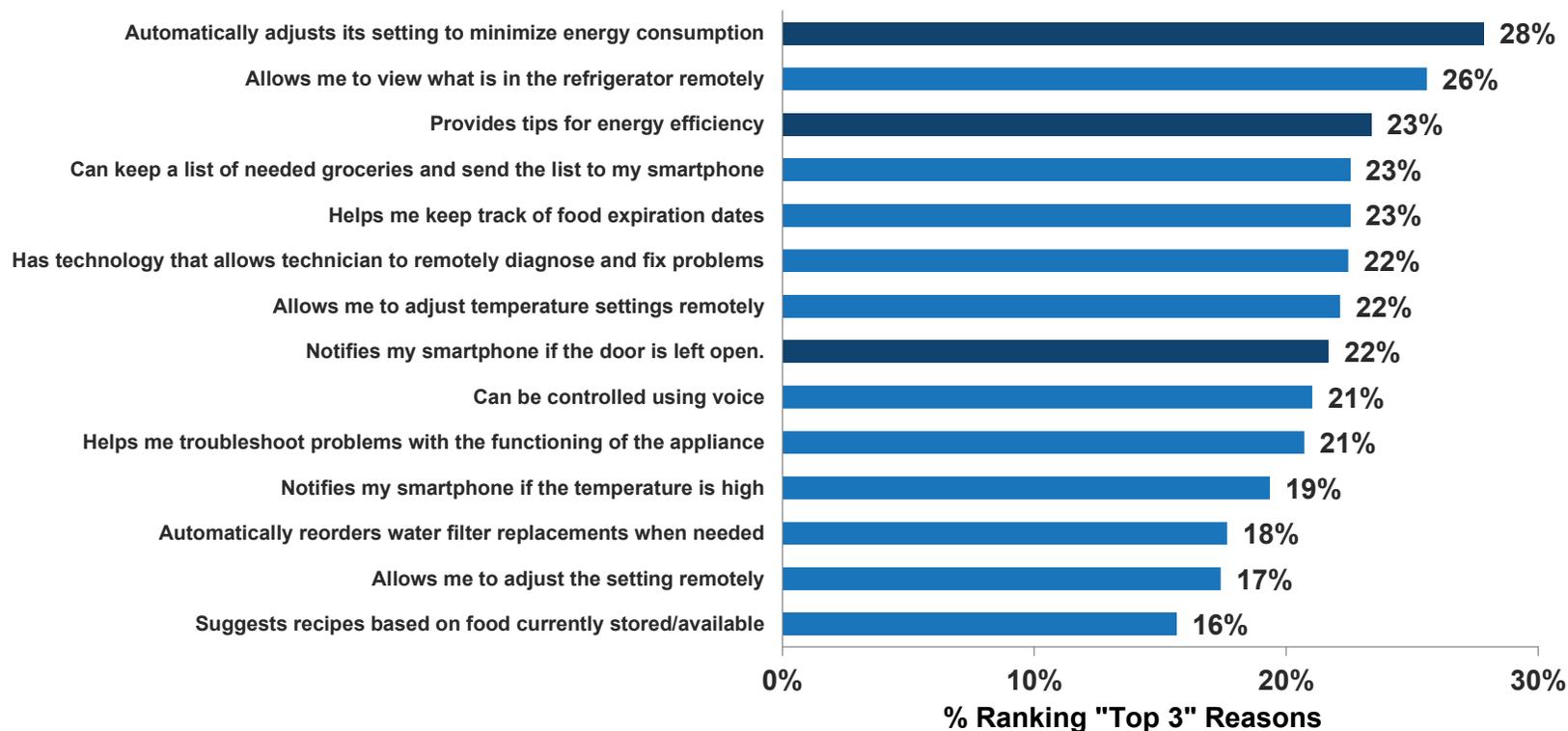
Competition in the space is driving product differentiation. Emerging smart plugs are often designed with energy-saving and energy management capabilities, along with electrical and fire prevention features.

These features provide smart plug manufacturers competitive advantage and help to drive mass market appeal of smart plugs, which can be leveraged for utility energy management programs.

# 28% of smart refrigerator owners and purchase intenders rank automated energy-saving features among their most appealing smart refrigerator features.

## Most Appealing Features of Smart Refrigerator (Q4/19)

Among 31% US BB HHs Owning or Intending to Purchase a Smart Appliance, n = 1,540, ±2.50%



Energy saving tips are also appealing to this group. Notifications on whether or not the door is left open is highly appealing to fewer consumers.

Most smart refrigerator brands including LG, GE, Dacor, and Kenmore promote the energy-saving feature of alerting consumers when the door is left open. Some like LG and Dacor also offer a “Vacation Mode” feature that minimizes energy consumption from the appliance when owners are away from home for an extended period.

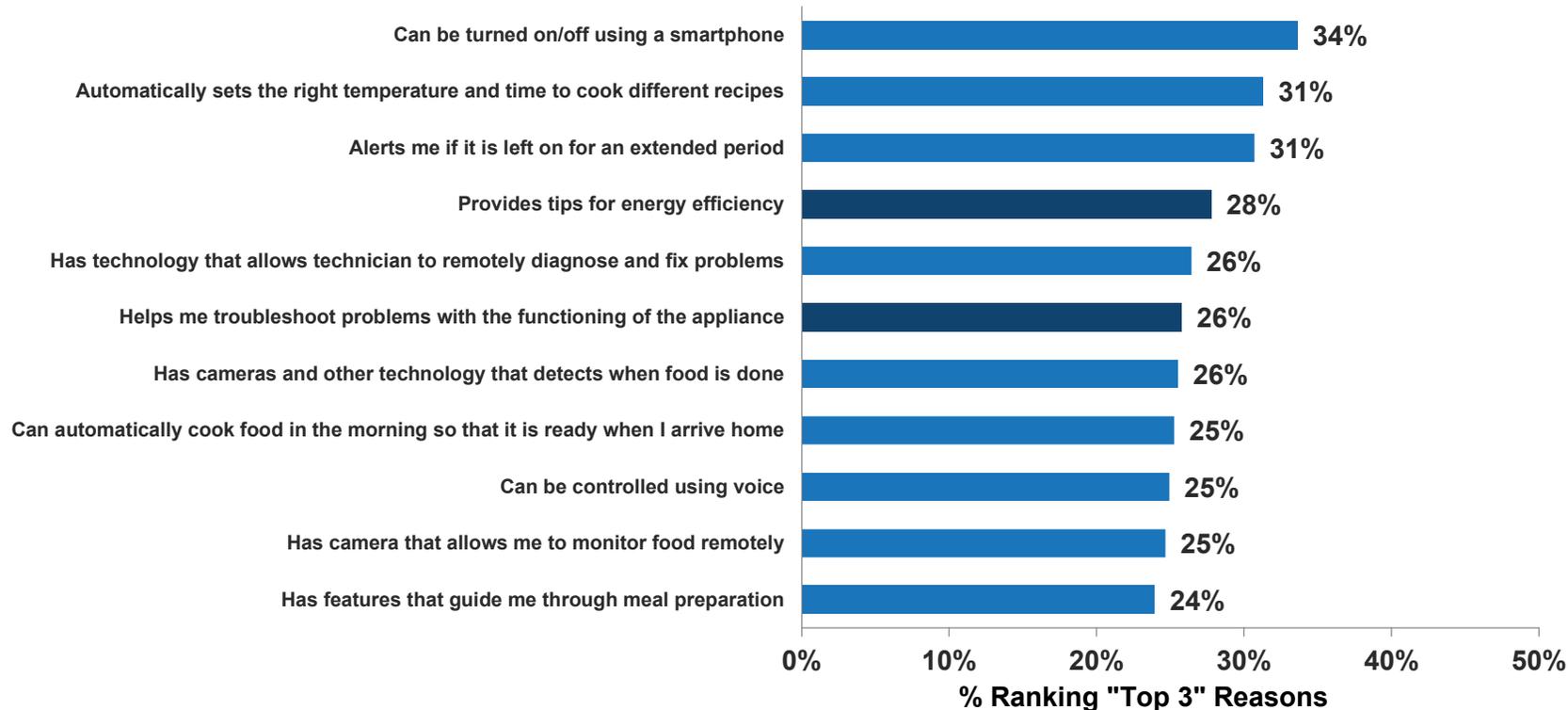
The high-value of energy-saving features for smart refrigerators suggest the opportunity for co-marketing partnerships between energy providers and smart refrigerator manufacturers and retailers.

"Q2665A. Please rank the 3 most appealing features of a smart refrigerator. Please use a “1” for Most Appealing, a “2” for Second Most Appealing and so on." | Asked of a Subgroup of 5,007 US BB HHs | Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Smart oven owners and purchase intenders find the ability to turn on/off the appliance using a smartphone as the most appealing appliance feature.

## Most Appealing Features of Smart Oven/Cooktop (Q4/19)

Among 31% US BB HHs Owning or Intending to Purchase a Smart Appliance, n = 1,540, ±2.50%



While energy-saving capacities are not the top-ranked features for smart ovens and cooktops, these features are among the most appealing for 28% of smart oven owners and purchase intenders.

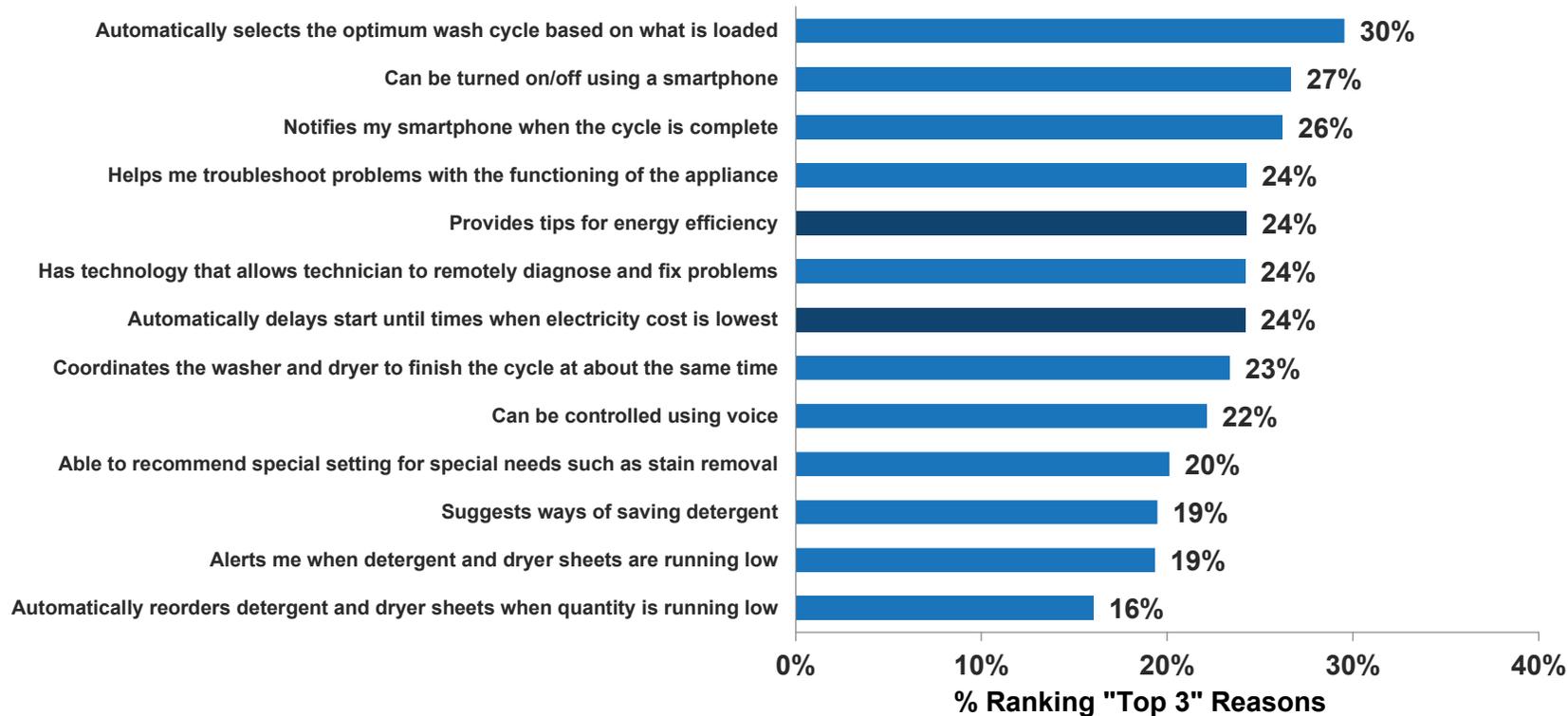
Remote control, automatic temperature selection, and alerts if the oven/cooktop is left on for an extended period are the most appealing features for smart oven/cooktops.

"Q2665B. Please rank the 3 most appealing features of a smart oven or range/cooktop. Please use a "1" for Most Appealing, a "2" for Second Most Appealing and so on." | Asked of a Subgroup of 5,007 US BB HHs | Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

# Owners and purchase intenders for smart clothes washers and dryers find a feature that selects the optimal wash cycle for each load most appealing.

## Most Appealing Features of Smart Washer/Dryer (Q4/19)

Among 31% US BB HHs Owning or Intending to Purchase a Smart Appliance, n = 1,540, ±2.50%



"Q2665c. Please rank the 3 most appealing features of a smart washer/dryer. Please use a "1" for Most Appealing, a "2" for Second Most Appealing and so on." | Asked of a Subgroup of 5,007 US BB HHs | Source: American Broadband Households and Their Technologies Q4 2019 | N=10,021, ±0.98% | © 2020 Parks Associates

24% of smart clothes washer/dryer owners and intenders find tips for energy savings among the most appealing appliance features.

Similarly, 24% find delay of start times until electricity costs are lowest appealing. This feature is beneficial for energy providers' load control endeavors. It also helps consumers save money with little effort.

Features such as these must be integrated in product architecture. Energy providers must start partnering with device manufactures to integrate such features in the product design. Ultimately feature like these will help improve long term grid stability with less effort than demand response events and energy efficiency actions.

# Consumer Demand for Smart Energy Solutions

## Appendix

[Back to Table of Contents](#)

# Attribution

## Project Leaders



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## Published by Parks Associates

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EE	EP 03.04.2020
Analyst	PS 03.03.2020

# Additional Research from Parks Associates

## Consumer Analytics Research

360 Deep Dive: Winning Opportunities in Smart Home (Q4/19)

360 Deep Dive: Transforming Home Insurance and Creating Consumer Value (Q4/19)

360 Deep Dive: DIY Disruption Smart Products and Home Security (Q4/19)

360 View: Energy Management, Smart Home, and Utilities (Q1/19)

## Smart Product Market Assessments

Video Doorbell Market Assessment (Q2/19)

Networked Camera Market Assessment (Q3/19)

Smart Speaker Market Assessment (Q3/18)

Smart Thermostat Market Assessment (Q3/19)

## Industry Reports

Trends in Smart Home Data Security and Privacy (Q4/19)

The Future of Residential Security in Europe (Q4/19)

Home Security: Market Sizing and Forecasts (Q4/19)

Residential Security Dealers: Trends and Disruptions (Q3/19)

Smart Home: Multi-dwelling Unit Opportunities (Q3/19)

Smart Home Adjacencies: Building the Ecosystem (Q2/19)

Battle for the Front Door: The Access Control Ecosystem (Q2/19)

## Industry Trackers

Quarterly Smart Home Industry Tracker

Bi-Annual Smart Home Market Sizing

# We Want to Hear from You!

The Consumer Analytics team provides quantitative market intelligence that guides strategic business decisions. We explain market trends, predict how consumers will react to innovations, and recommend strategies for thriving in a changing business environment. We also welcome any direct comments to the author of the report or to Jennifer Kent, Senior Director, at [Jennifer.kent@parksassociates.com](mailto:Jennifer.kent@parksassociates.com).

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