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Connected Consumer Products Market Research Report

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Executive Summary

Background

The Northwest Energy Efficiency Alliance (NEEA) engaged Level 7 to conduct market research on behalf of its Retail Product Portfolio (RPP) Market Transformation Program. The Program works to improve the energy efficiency of home appliances (see Table 1) by: a) incentivizing mid-stream market actors to promote and maintain an assortment of specific energy efficient products through a nationally scaled program, b) providing data and information to inform voluntary specification and federal standard development, c) identifying and coordinating the improvement of test procedures that provide better real-world energy usage data for appliances, and d) engaging with market actors to align along better energy efficiency in products. The ultimate goal of the program is that through these activities, manufacturers will ultimately be influenced to create more energy efficient home appliance products.

It is important to the RPP Program strategy to better understand and explore how the increased availability of connected consumer products[1] may intersect with RPP products and provide opportunities for increased energy efficiency. Further, this research will inform decisions about which products to incentivize and strategy for voluntary specification and federal standard influence opportunities that address products' connected capabilities.

This report summarizes findings from Level 7 Market Research's 2024 Connected Consumer Products Study. The study was designed to support three research objectives:

> RO1. Assess current levels of consumer awareness of, understanding of, and interest in using connected consumer products (CCPs).
>
> RO2. Assess the experiences of consumers who are actively using CCPs, including how consumers are connecting to and engaging with CCPs and what benefits and challenges they report.
>
> RO3. Explore what characteristics, if any, differentiate consumers with varying perspectives ranging from 'eager to adopt' to 'unlikely to ever adopt' when it comes to using CCP devices in their homes. If possible, provide profiles of consumers with varying levels of interest in engaging with CCPs.

Table 1. Key connected appliance categories studied in this research

Key Connected Appliances
Connected TV
Connected clothes dryer
Connected clothes washer
Connected freezer
Connected refrigerator
Connected room air cleaner/purifier
Connected room air conditioner

Note: These seven product categories currently of interest to the RPP Program were focused on for this study.

[1] ENERGY STAR® defines CCPs as those that "provide energy reporting, consumer amenity, and grid services through connection to other systems inside and outside the home."

Learning Objectives

The NEEA team identified the following detailed learning goals for this study:

- The levels of consumer awareness and understanding of CCPs
- Purchase interest by product type
- Drivers of interest
- How CCPs are currently used in the home
- Factors driving model selection, including connected features
- Which connected features[2] were being used
- How consumers connected with their devices and how devices connected to the internet
- Satisfaction with connected capabilities
- CCP benefits and challenges
- Openness to utilities accessing CCPs in homes
- Interest in smart home systems
- Profile of CCP acceptors

Research Activities

To address these objectives, Level 7 Market Research designed a multi-phase custom research approach. The approach was implemented so that learning from each phase informed and fine-tuned the instruments for the next.

- **Literature review:** Secondary research of studies previously conducted by NEEA, as well as within the public realm. This review provided foundational understanding for the project and ensured no duplication of what was already known.
- **Quantitative survey**: Online questionnaire conducted among a statistically robust sample of 2,001 category consumers[3] provided sizing of issues. That is, comparative percentages of respondents who responded in different ways to the questions.
- **Qualitative conversations**: Online focus groups and bulletin boards provided contextual learning as to the "whys" behind behaviors and attitudes.

As shown in Table 1, "Connected appliances" was defined for all study participants as televisions, clothes dryers, clothes washers, freezers, refrigerators, room air cleaners/purifiers, and room air conditioners, as these product categories were supported through the RPP Program at the time of the study. This context provided guardrails for all subsequent questions and answers.

[2] This exercise was open-ended; that is, responses were not aided with a choice list, allowing respondents to list whichever features were top-of-mind to them.

[3] "Category consumers": those who qualified for this study by meeting all screening criteria, specifically: age 21 or older, reside in Idaho, Montana, Oregon, or Washington, reliable internet in the home, Wi-Fi in the home, and decision-maker or co-decision maker for home appliance purchases.

Summary of Key Insights

1. **Current Ownership**: Ownership of connected home appliances is currently low, with televisions being the only exception. Twenty-four percent own any of the seven types, yet only 11% own any other than a television. Consumers who own CCPs typically have only one or two such appliances.
2. **Awareness and Interest**: Despite low ownership, there is widespread awareness of CCPs (91% "heard of"). Many consumers are interested in purchasing what would be their first connected appliance, with connected televisions generating the most interest (60% top-two-box).
3. **Attraction Factors**: Prospective buyers are drawn to CCPs for their potential to lower energy bills (62% rank this among their top three motivations to purchase) and control energy usage (40% top three ranked). The convenience of remote operation and time savings are other substantial attractions.
4. **Perceived Barriers**: There is a common perception that CCPs are more expensive than non-connected alternatives, which deters some consumers (56% "too expensive to buy"). Concerns about data privacy and cybersecurity also pose hurdles for some potential buyers (each cited by 30% as a purchase barrier).
5. **Demographic Insights**: High purchase potential is associated with new home owners[4], urban residents, higher-income households (over $87,000, and especially those over $100,000), and Millennials.
6. **Utility Program Participation**: Many consumers are open to participating in utility programs for CCPs, particularly when they understand the financial benefits and are assured of minimal impact on convenience and privacy. Those most likely to buy CCPs are also the most open to participating in utility demand response programs[5], with 65% of this population open to utility "control" of CCPs.
7. **Customer Satisfaction**: There is room for improvement in customer satisfaction among CCP owners. Most (81%) are not totally satisfied with their connected appliance.
8. **Connected Feature Usage**: Most owners do not regularly use the connected features, especially beyond televisions ("regularly" use: 53% of TV owners, 33% of other CCP owners). Paying for unused features is a major concern to prospective buyers, with 50% anticipating this would be the case.
9. **Energy Savings**: Few owners (27%) are confident they are realizing energy savings. Among these, just 17% know the exact amount saved. Whether this is an actual lack of savings or a knowledge gap, low confidence in energy savings may be impacting customer satisfaction, since lower energy bills are a top reason for purchasing (as discussed in Key Insight 3).

[4] The new homeowner study segment is comprised of individuals living in a residence built within the last three years or planning to build within the next three years.

[5] Customers who enroll in demand response programs "…shift [their] electricity usage during peak periods in response to time-based rates or other forms of financial incentives." (DOE, 2024)

1 Introduction

As residential consumer appliance technologies continue to evolve and more connected consumer products (CCPs) are available on the market, NEEA is interested in better understanding consumers' perceptions of and interest in CCPs. ENERGY STAR® defines CCPs as those that "provide energy reporting, consumer amenity, and grid services through connection to other systems inside and outside the home."[6]

The research objectives of this study were to:

- *Research Objective 1*: Assess current levels of consumer awareness of, understanding of, and interest in using connected consumer products (CCPs).
- *Research Objective 2:* Assess the experiences of consumers who are actively using CCPs, including how consumers are connecting to and engaging with CCPs and what benefits and challenges they report.
- *Research Objective 3:* Explore what characteristics, if any, differentiate consumers with varying perspectives ranging from 'eager to adopt' to 'unlikely to ever adopt' when it comes to using CCP devices in their homes. If possible, provide profiles of consumers with varying levels of interest in engaging with CCPs.

2 Research Methods

Level 7 Market Research designed a two-phase research approach to address NEEA's learning objectives. The study was comprised of primary quantitative research followed by qualitative research, specifically online focus groups and online bulletin boards. See Appendix A: Detailed Methodology. This report summarizes the insights from this study inclusive of all its research components.

Table 2. Study sample sizes by research phase

Study Phase	Study Population (n)
Quantitative research	**2,001**
Qualitative research	
Online focus groups - total	**28**
Early Adopters	13
Followers	15
Online bulletin boards - total	**34**
Early Adopters	16
Followers	18

Note: Study definitions for Early Adopters and Followers are shown on Table 7Table 6. Understanding of connected features of owned appliance/s comparison

Level of feature understanding	Total	Innovators/ Early Adopters	Early Majority	Late Majority	Laggards

[6] ENERGY STAR. *Connected Criteria for ENERGY STAR Products* [Website]. Accessed 11/19/2024 from https://www.energystar.gov/products/spec/connected_criteria_energy_star_products_pd

Base: connected appliance owners	*478*	*150*	*138*	*141*	*49*
Top-2-box (net)	86%	92%	86%	88%	61%
Completely	36%	55%	38%	23%	12%
Somewhat	49%	37%	48%	65%	49%
Bottom-2-box (net)	14%	8%	14%	12%	39%
Not very	12%	5%	14%	11%	27%
Not at all	3%	3%	1%	1%	12%

Q22: "How well do you understand the connected features of your home appliances and how to use them?"
Note: Due to low base size (n<50), Laggard-Owners should be interpreted with caution.

Table 7.

3 Findings

This section presents the detailed findings from this research, organized by research objective. Key insights are synthesized in the Conclusions section that follows. Both qualitative and quantitative research informed each research objective, as noted.

3.1 RO 1: Consumer awareness, understanding, and interest in CCPs.

Consumer awareness of the connected home appliance category is near ubiquitous.

In the Northwest[7] region surveyed, consumer awareness of connected home appliances is almost universal. As shown in Table 3, in total, over nine in ten consumers indicate that they have heard of home appliances that can connect to the internet. Awareness increases along with household income, although even the lowest earners have high awareness (83%).

Table 3. Aware of home appliances that connect to the internet

		Annual Household Income				
Aware	**Total**	<$35,000	$35,000 - $59,000	$60,000 - $99,000	$100,000 - $149,000	$150,000+
Base: total	2001	*517*	*425*	*490*	*301*	*231*
Yes	91%	83%	90%	93%	96%	96%
No	7%	11%	8%	5%	4%	3%
Not sure	3%	6%	2%	2%	1%	1%

Q12: "Have you heard of home appliances that can connect to the internet?"

"Smart" is by far the most-used consumer term for "appliances that connect to the internet." As shown on Table 4, smart is used over ten times more than "connected." Use of other terms is rare.

Table 4. Name used for appliances that connect to the internet

Name used	Total
Base: total	*2001*
Smart appliances	82%
Connected appliances	6%
Use/like both names	8%
Don't use/like either name	3%
Other	1%

Q13: "What would you call appliances that connect to the internet?"

Qualitatively, opinions varied on whether a "connected" appliance and a "smart" appliance were the same. Some saw them as synonymous while others felt that "smart" implies the ability to learn and adjust to user behavior, and generally to perform more complex and autonomous tasks than appliances that are simply "connected."

[7] "Northwest" consists of Idaho, Montana, Oregon, and Washington throughout this report.

Within the smart appliance category, consumers have less product-specific knowledge. When asked to name as many currently available home appliances that can connect to the internet as possible, the average consumer listed three or four specific products. (The exercise was open-ended, meaning responses were not aided with a choice list.)

As shown in Table 5, the most commonly named connectable appliance was the refrigerator, cited by 66% out of 2,001 respondents. Refrigerators are the only product mentioned by the majority, receiving nearly twice as many mentions as the second most known product, clothes washers (34% out of 2,001).

Of the other key connected appliances (Table 1), dryers and televisions were each mentioned by approximately three in ten people (29% and 31%, respectively). For this unaided question, televisions might not have been considered an appliance by some. Just a handful mentioned freezers (5%). Air purifiers received negligible mentions (<0.5%).

Air conditioner mentions were either non-specific (for example, "*air cond*"), or more commonly, within a system description ("*HVAC,*" "*Heating and cooling systems*"). Since no respondents specified "room air conditioners," it is not possible to isolate this appliance's awareness. However, the commonly used system language likely implies that in many cases the actual smart component is a thermostat controlling a furnace and/or air conditioner. For all these reasons, air conditioner mentions are included within the umbrella code "thermostat/HVAC" (27%).

For some, connected devices came to mind rather than appliances. For example, 8% mentioned smart speakers as a type of connected appliance, 6% smartphones/computers/peripherals, and 3% home entertainment devices (for example, "*PlayStation 5,*" "*music devices*").

Eight percent could not name any specific connectable products. Comments among this group show that some are unaware of the specifics by choice, due to a general lack of interest in the category ("*I have no idea as I am not interested in that feature*").

Table 5. Respondent-listed appliances that can connect to the internet

Verbatim comments	Total
Base: total	*2001*
Named any (net)	**92%**
Major Appliances	
Refrigerator	66%
Washer	34%
Dryer	29%
Range/cooktop/oven	29%
Dishwasher	13%
Freezer	5%
Portable Appliances	
Television	31%
Microwave	9%
Coffee maker	7%
Small kitchen appliances (toaster, air fryer, etc.)	6%
Vacuum cleaner	5%
Grill/Smoker	2%
Other	
Thermostat/HVAC	27%
Security/cameras/doorbell	17%
Lights	12%
Smart speaker/voice assistant	8%
Smartphones, computers, peripherals	6%
Keyless entry (locks, garage door opener, etc.)	5%
Other home entertainment (game consoles, stereos, etc.)	3%
Mean number of products named	***3.24***

Q14: "What kinds of home appliances are being sold right now that can connect to the internet? List as many as you can think of." (open-ended responses)
Note: mentions receiving ≥1.5% are shown.

The large majority of connected appliance owners report at least some understanding of their appliance's connected features.

Most owners say that they understand their appliance's connected features and how to use them. Overall, 86% of owners rate their understanding level in the top-2-box on a four-point scale, as shown in Table 6. Just one in seven (14%) describes themself as not understanding.

Respondents who shared that they "completely" understand their appliances' connected features tend to be Innovators/Early Adopters, the subgroup at the forefront of the technology adoption curve (33% of all respondents, as shown on Table 7). Table 6 illustrates the direct relationship between complete connected feature understanding and the technology adoption curve. That is, the slower an individual perceives themselves to be at adopting technology in general, the less understanding that individual has of connected features, even on owned devices.

Table 6. Understanding of connected features of owned appliance/s comparison

Level of feature understanding	Total	Innovators/ Early Adopters	Early Majority	Late Majority	Laggards
Base: connected appliance owners	*478*	*150*	*138*	*141*	*49*
Top-2-box (net)	86%	92%	86%	88%	61%
Completely	36%	55%	38%	23%	12%
Somewhat	49%	37%	48%	65%	49%
Bottom-2-box (net)	14%	8%	14%	12%	39%
Not very	12%	5%	14%	11%	27%
Not at all	3%	3%	1%	1%	12%

Q22: "How well do you understand the connected features of your home appliances and how to use them?"
Note: Due to low base size (n<50), Laggard-Owners should be interpreted with caution.

Table 7. Technology adoption with segments[8]

Technology adoption	Total	Segment	Base size: Total	Base size: CCP Owners
Base: total	*2001*		*n*	*n*
I like to be one of the first people to have new technology products	13%	Innovators/ Early Adopters 33%	660	150
I'm not usually the first to buy a new technology product, but I tend to buy before most others	20%			
I prefer for other people to try new technology before I buy it myself	30%	Early Majority	601	138
I prefer to wait until the price drops before buying new technology	26%	Late Majority	524	141
I'm usually one of the last people I know to buy new technology products	11%	Laggards	216	49

Q10: "Which of the following describes you best?"

While age is related to feature understanding, the data shows it is not an unsurmountable hurdle. Table 8 shows that compared with all younger segments, fewer Boomers (age ≥ 60) say they understand connected features. Furthermore, Boomers have a strong tendency to characterize their understanding as somewhat rather than complete. Still, well over three times as many Boomers understand the connected features on owned devices as do not (78% versus 22%).

Note that the Boomer and Laggard segments are correlated, which accounts for some of these groups' common perspectives. Most Laggards (51%) are Boomers.

[8] This consumer technology adoption curve was developed by Rogers for his seminal book published in 1962. Its explanation of the adoption curve and segments remains the accepted model today.
Everett M. Rogers, "Diffusion of Innovations" (New York: Free Press, 2003), 5th ed.

Table 8. Understanding of connected features of owned appliance comparison

Level of feature understanding	Gen Z (21–27)	Millennials (28–43)	Gen X (44–59)	Boomers (60+)
Base: connected appliance owners	*76*	*142*	*117*	*143*
Top-2-box (net)	**89%**	**89%**	**89%**	**78%**
Completely	39%	44%	42%	22%
Somewhat	50%	44%	47%	56%
Bottom-2-box (net)	**11%**	**11%**	**11%**	**22%**
Not very	8%	9%	9%	18%
Not at all	3%	2%	2%	3%

Q22: "How well do you understand the connected features of your home appliances and how to use them?"

Connected features appear somewhat more challenging for consumers to master than other home technology products. Complete comfort with connected appliance features is substantially lower than for tech products in general (36% CCPs versus 47% general home technology products, as shown in Table 9).

Table 9. Understanding of types of technology products comparison

Level of understanding	Connected Appliance Features	Home Technology Products
Base: owners, total	*478*	*2001*
Top-2-box (net)	**86%**	**90%**
Completely	36%	47%
Somewhat	49%	43%
Bottom-2-box (net)	**14%**	**10%**
Not very	12%	8%
Not at all	3%	1%

Q22: "How well do you understand the connected features of your home appliances and how to use them?"
Q11: "How comfortable are you in using technology products for the home?"

Most consumers are positive toward buying CCPs.

Most consumers are positive to purchasing what would be their first key connected appliance (Table 1). That is, they are "extremely" or "very" interested in buying (the top-two points of the five-point scale). Among the 76% who are currently non-owners, 68% say they are extremely or very interested in purchasing one or more, as shown in Table 10.

Positive purchase interest is lower among owners. Among the 24% who already own a connected appliance, 39% are positive to buying one or more additional ones. (The average owner has 1.7 key connected appliances in their home.) One hypothesis as to what is behind their lower interest is that these consumers already own the desired appliance, where non-owners, by definition, do not.

Substantially more in both of these populations are "open" to purchase, which also considers the middle box ("slightly interested"). More owners have the neutral perspective to further buying. Among non-owners, purchase openness reaches nearly nine in ten (88%).

Table 10. Key connected appliance purchase interest comparison

Key connected appliance purchase intent	Key Connected Appliance Non-Owners	Key Connected Appliance Owners
Base: total	*1523*	*478*
Positive to buying any (top-2-box)	68%	39%
Open to buying any (top-3-box)	88%	68%

Q15: "How interested are you in purchasing each of the following?"
Note: An additional five owners, or 1% of the owner population, already own all categories and therefore were excluded from the buying interest calculation.

Consumer interest in CCPs varies considerably by product, with televisions by far the most desirable purchase.

Televisions stand out from the other types of connected appliances. Consumers are much more likely to own connected televisions than any other appliance (shown in Table 13), and non-owners are much more interested in buying one. As shown in Table 11, positive purchase interest toward TVs is roughly twice that of most other appliances.

After televisions, there is a considerable interest gap before the appliance with the next highest interest, room air conditioners (32%). Air conditioners have similar purchase appeal as refrigerators (30%), even though virtually every US residence has a refrigerator while significantly fewer have air conditioning (WA 53%, MT 65%, OR 76%, ID 81%, including room and central air).[9] This may be because smart air conditioner functionality is particularly compelling, or high interest exists for air conditioners in general, or both.

However, interest in five out of seven products is modest, and little differentiated, with positive interest varying only six percentage points from top to bottom of the range. Only freezers (20%) stand out with comparatively lower interest.

Qualitatively, televisions were considered a must have for their connectivity, given the many streaming services in usage. Room air conditioners were also frequently mentioned as an appliance that "makes sense" to buy connected. Many participants had personally experienced or could easily relate to a scenario in which controlling the temperature while away from home could provide convenience and comfort benefits. However, for freezers, refrigerators, washers, and dryers, many struggled to see a clear and compelling reason to buy a connected version.

- Some saw the convenience of washers and dryers being run just before arriving home or sending an alert via an app when a load is done, but most felt that because they must be present to manage the clothes anyway, there was little value in remote control.
- The best-known connected refrigerator feature was being able to display personal digital photos, and many felt that this was not a necessity and therefore not a reason to purchase.

[9] U.S. Energy Information Administration. *2020 Residential Energy Consumption Survey/Dashboard* [Website]. Washington, D.C. Accessed 11/21/2024 from https://experience.arcgis.com/experience/cbf6875974554a74823232f84f563253

Certain segments show greater interest in connected appliances. The new home owner segment is comprised of individuals living in a residence built within the last three years or planning to build within the next three years. This group appears highly focused on filling their new space as they are dramatically more positive about all appliances, but particularly refrigerators (+38 percentage points, or more than twice the average interest, shown in Table 11).

Table 11. Positive purchase interest by key connected appliance type comparison

Positive purchase intent by appliance types	Total	New Home Owners
Base: non-owners	*1587-1964*	*192-233*
Connected:		
TV	60%	80%
Room air conditioner	32%	62%
Refrigerator	30%	68%
Room air cleaner/purifier	28%	58%
Clothes washer	27%	59%
Clothes dryer	26%	60%
Freezer	20%	54%

Q15: "How interested are you in purchasing each of the following?"

Purchase interest moves directly with the technology adoption curve, with segments shown in Table 12. Across appliance types, Innovators/Early Adopters are most positive to purchasing and Laggards the least. However, Table 13 shows that it is uncommon for even Innovators/Early Adopters to currently own any connected appliances. Looking at those who do own, tech segment differences are small for any specific appliance. However, Innovators/Early Adopters are the group most likely to own anything other than a television, with net ownership of one in seven.

Table 12. Positive purchase interest by key connected appliance type comparison

Positive purchase intent by appliance type	Innovators/ Early Adopters	Early Majority	Late Majority	Laggards
Base: non-owners	*533-638*	*476-594*	*402-520*	*176-213*
Connected:				
TV	79%	59%	51%	31%
Refrigerator	56%	23%	15%	9%
Room air conditioner	55%	26%	20%	10%
Clothes washer	52%	20%	11%	7%
Clothes dryer	51%	19%	11%	7%
Room air cleaner/purifier	50%	20%	15%	10%
Freezer	42%	13%	8%	5%

Q15: "How interested are you in purchasing each of the following?"

Table 13. Key connected appliance ownership comparison

Ownership	Total	Innovators/ Early Adopters	Early Majority	Late Majority	Laggards
Base: total	*2001*	*660*	*601*	*524*	*216*
Own any	24%	23%	23%	27%	23%
Own any other than television	11%	14%	8%	10%	7%
Own connected:					
TV	21%	19%	21%	23%	19%
Clothes washer	4%	7%	3%	4%	3%
Room air conditioner	4%	7%	3%	3%	3%
Clothes dryer	4%	6%	3%	4%	2%
Refrigerator	4%	6%	2%	4%	2%
Room air cleaner/purifier	2%	3%	1%	2%	2%
Freezer	2%	3%	1%	1%	1%

Q15: "How interested are you in purchasing each of the following?"

Energy savings and lower energy bills are among the largest drivers of consumer interest.

Table 15 shows that consumers value the convenience of remote operation and time savings that would come with purchasing a connected appliance, along with reduced energy use.

Qualitatively, however, energy efficiency was not top-of-mind when preparing to purchase a new appliance, nor was it considered the most important consideration. Other concerns like ratings, price, quality, and aesthetics were more important. If a new appliance happens to reduce energy use, that was considered more of a bonus, not a decision driver.

Those qualitative participants living in areas where energy is inexpensive or plentiful did not value an energy saving benefit as much as those seeking to reduce energy costs or reduce usage for the benefit of the community.

Table 14. Reason/s interested in owning connected appliances

Reasons	Total
Base: open to purchasing any of the products	*1667*
Operate/monitor my home remotely	50%
Save time	46%
Reduce energy use	46%
To automate tasks	43%
Optimize product performance	38%
Save money	31%
I want the latest advanced features	19%

Q18: "Which of these are reasons why you, personally, are interested in owning connected home appliances. Specifically, a connected TV, clothes dryer, clothes washer, freezer, refrigerator, room air cleaner/purifier, and /or room air conditioner. Select all that apply."

Not all qualitative participants were convinced that a connected appliance could have any significant impact on a single household's energy usage without compromising performance, especially given the prevailing sentiment that appliances are similar with respect to energy use. Both Early Adopter and Follower focus groups believed that the appliances of today offer similar energy efficiency, and that any differences that do exist are probably minimal. There was consensus that reduced energy consumption should save money, but the extent of the financial benefit depends on numerous factors such as energy rates and upfront and down-the-road (maintenance) costs.

However, if that assumption of sameness can be shown to be incorrect, the potential for lower energy bills is an enticing driver of interest. For most (62%, as shown in Table 15), the prospect of lower energy bills would be sufficient inducement to at least consider a connected appliance. Rounding out the top three drivers are "controlling my energy usage" and "a smart system that learns how to best save me money." As even controlled energy usage carries connotation of saving on bills, the top three purchase drivers all have financial benefit as a common thread.

Table 15. Connected appliance purchase drivers (top three)

Purchase drivers	Total
Base: total	*2001*
Lowering my energy bills	62%
Controlling my energy usage	40%
A smart system that learns how to best save me money	38%
The comfort and luxury the products can provide	24%
Voice activated controls	23%
Health monitoring (for example air quality)	23%
Reducing my carbon footprint	21%
Increased market appeal for my home	11%

Q32: "Connected appliances can do many things. Which of the following would cause you to consider a connected home appliance for your next purchase? Specifically, a TV, clothes dryer, clothes washer, freezer, refrigerator, room air cleaner/purifier, and /or room air conditioner. Please choose your top 3. "

However, many consumers perceive that connected appliances are too expensive. Most cite this as a reason against purchasing (56%, shown in Table 16). Half expect that they would be paying for unused features (50%, shown in Table 17). Approximately one in four (26%) expects that money saved through reduced energy use would be less than desired.

Qualitatively, there was also the general assumption that CCPs are more expensive than those that are not connected because the technology is relatively new. Like many consumer technology products, the assumption is that prices will eventually come down.

Three in ten mention data concerns as a reason against purchase. Data privacy (for instance, utility and/or manufacturer monitoring) and cyber security are equal concerns (30%, shown in Table 16). But nearly as many (28%) do not perceive any user benefits that align with their needs.

Concerns about data security and privacy were also recurring themes across the qualitative research, regardless of the participant's interest in owning a connected appliance. Other barriers shared during qualitative research include the potential for:

- Bandwidth issues
- Manufacturers to monitor appliance usage
- Appliances to become obsolete more quickly
- More complex set-up and maintenance including having to reconnect after a Wi-Fi outage
- Higher lifetime cost (higher appliance price + higher repair costs)
- The reluctance of having to manage yet another product with new technology

While appliance break down was of minor concern in quantitative survey data, qualitative participants were divided. Some believed that connected home appliances break down more often, while others expected similar reliability as the same appliance that does not connect to the internet.

Table 16. Reason/s for lack of purchase interest

Reasons	Total
Base: not very/at all interested in any of the products	*1389*
Too expensive to buy	56%
Lack of data privacy	30%
Cybersecurity risks	30%
Don't bring the benefits I need	28%
I don't want to give control of my appliances to utility companies	25%
Don't really understand what connected appliances can do	20%
Connected appliances break down (specifically:)	13%
The connection features	4%
The basic appliance features	2%
All features less reliable	7%
Must be tech savvy to use	12%
Don't need/want/no benefits (a write-in response)	5%

Q16: "Which of the following best describe(s) why you have less interest in buying a connected appliance? Specifically connected TVs, clothes dryers, clothes washers, freezers, refrigerators, room air cleaner/purifiers, and /or room air conditioners. Please select all that apply." Q17: "You mentioned that connected consumer products break down. Is that because….?"

Table 17. Expected challenges of connected appliances

Challenges	Total
Base: total	*2001*
Expensive to purchase	58%
Paying for features I don't use	50%
I worry about data privacy	42%
I worry about security of my home network	38%
Complicated to connect/set up	33%
Device doesn't work as promised	30%
Complicated to use	30%
Doesn't save as much energy/money in operating as expected	26%
Much of the process is still manual	16%
None	9%

Q31: "What challenges would you expect, (or have you experienced), in owning connected appliances? Specifically, a connected TV, clothes dryer, clothes washer, freezer, refrigerator, room air cleaner/purifier, and /or room air conditioner. Please select all that apply."

Price as a purchase barrier has an inverse relationship with household income, with a dividing line of around $100,000. As shown in Table 18, most consumers in households earning less than $100,000 expect connected appliances to be too expensive. Above $100,000 expense becomes a minority concern.

Table 18. Reason/s for lack of purchase interest comparison

Reasons	<$35,000	$35,000 - $59,000	$60,000 - $99,000	$100,000 - $149,000	$150,000+
Base: not very/at all interested in any of the products	*387*	*308*	*349*	*176*	*138*
Too expensive to buy	64%	59%	55%	47%	35%

Q16: "Which of the following best describe(s) why you have less interest in buying a connected appliance? Specifically connected TVs, clothes dryers, clothes washers, freezers, refrigerators, room air cleaner/purifiers, and /or room air conditioners. Please select all that apply."

Expected ownership challenges are not limited to those further down on the adoption curve. Even some Innovators/Early Adopters foresee challenges, chief among these being purchase cost (48%, as shown in Table 19). Still, the general picture is that fewer Innovators/Early Adopters expect any listed challenge, with the other three adoption groups sharing a similar, more pessimistic outlook. A noteworthy exception is that more Laggards think these appliances will be complicated to use.

Table 19 shows that there is only one challenge that more Innovators/Early Adopters anticipate compared with the other groups. That is, even with connected appliances, much of the usage process "is still manual."

Table 19. Expected challenges of connected appliances comparison

Challenges	Innovators/ Early Adopters	Early Majority	Late Majority	Laggards
Base: total	*660*	*601*	*524*	*216*
Expensive to purchase	48%	62%	65%	58%
Paying for features I don't use	39%	50%	63%	51%
I worry about data privacy	36%	45%	47%	45%
I worry about security of my home network	31%	41%	43%	43%
Device doesn't work as promised	29%	31%	31%	27%
Complicated to connect/set up	28%	33%	37%	39%
Complicated to use	23%	30%	32%	44%
Doesn't save as much energy/ money in operating as expected	19%	29%	30%	28%
Much of the process is still manual	19%	14%	17%	12%
None	11%	6%	7%	16%

Q31: "What challenges would you expect, (or have you experienced), in owning connected appliances? Specifically, a connected TV, clothes dryer, clothes washer, freezer, refrigerator, room air cleaner/purifier, and /or room air conditioner. Please select all that apply."

Utility feedback is an acceptable interaction, utility control less so.

Most consumers are open to utilities accessing connected products in their homes, although acceptance varies greatly depending on the type of access. As shown in Table 20, utility feedback has the most acceptance among the overall population (79% top-2) and control the least (53% top-2).

Those consumers who are most positive to buying are also most open to utility—appliance interaction across the board. Thus, it is the negative purchase intenders who are depressing the averages for each type of utility interaction. There are a few possible hypotheses about what is behind this. Positive consumers may see more upside to utility interactions, providing benefits that are relevant to them. Or they may be viewing these interactions as a tradeoff they are willing to make because of other compelling CCP ownership benefits.

In all cases, consumers are "somewhat" rather than "very" open. In consumer marketing research, this is often the respondents' way of saying that there are unknown details that will matter in their decision.

Table 20. Openness to utility/connected appliance interactions comparison

Utility/appliance interaction openness	Total	Positive Purchase Interest (to any)
Base: total	*2001*	*1215*
Getting **feedback** from your utility on how to optimize your energy savings		
Top-2-box (net)	**79%**	**89%**
Very open	35%	47%
Somewhat open	44%	42%
Not very open	12%	7%
Not at all open	9%	4%
Allowing your utility to **monitor** energy usage of appliances in your home		
Top-2-box (net)	**65%**	**77%**
Very open	26%	37%
Somewhat open	39%	40%
Not very open	20%	15%
Not at all open	16%	8%
Allowing your utility the ability to **control** connected appliances at peak times, as long as you can opt out		
Top-2-box (net)	**53%**	**65%**
Very open	20%	29%
Somewhat open	33%	36%
Not very open	22%	19%
Not at all open	25%	15%

Q19: "In terms of the connected appliances listed above, how open are you to:"

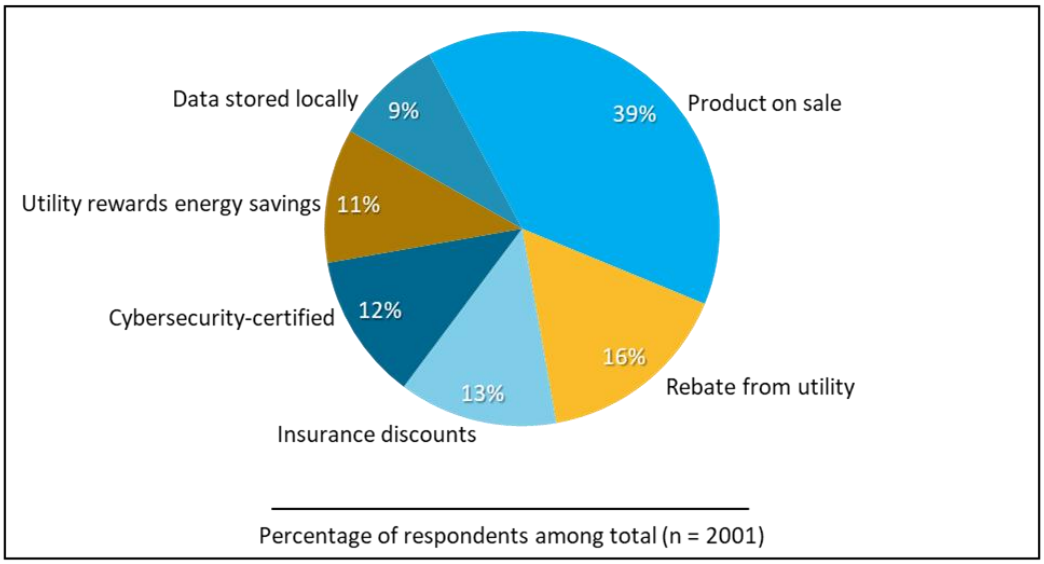

Figure 1. Most influential factor in selecting a connected over an unconnected appliance to purchase
Q33: "In terms of purchasing a connected home appliance, please rank the following on how influential they would be for you to choose a connected appliance over an unconnected appliance of the same type."
Note: Labels truncated for charting purposes. The full choice wording: Product is on sale, Rebate programs from my utility/energy provider, Enrolling in a program with utility/energy provider to receive periodic rewards for energy savings, Homeowners/renters insurance discounts, Product stores data locally and not with the manufacturer or utility, Product is cybersecurity-certified by an independent testing lab.

Figure 1 shows that utility/energy provider programs with periodic rewards for energy savings are not very motivational. However, qualitative exploration indicates that the motivational power of such programs can be maximized depending on financial incentives, privacy guarantees, and opt-out details.

Qualitative participants were presented with a hypothetical "Energy Savings Program" and asked about their level of interest, and why. The details shown to participants appear in Appendix D page xx. Reactions to the program ran the gamut from cautious interest to outright rejection.

Reactions suggest that the financial reward and ease/convenience of opting out are key positive aspects of the program. Those who were interested felt the $25 incentive per event was very appealing. The potential to save money was an important and motivating message for cost-conscious participants.

Others felt the program benefits did not outweigh the potential intrusiveness or inconvenience. They had concerns about privacy and were uncomfortable with the loss of control, even with the ability to opt-out before each event. This was true of both Early Adopters and Followers.

- For example, several participants emphasized their need for flexibility in managing their laundry routines because of work schedules, children, sports, etc.
- Many were reluctant to inhibit or constrain in any way when they did laundry. Just the idea that they may not be able to run their washer/dryer at certain times was perceived by some as overreach.
- Some felt that this type of interaction with a utility was too much of an intimate intrusion into their life.
- Participants shared many examples of emergency situations when doing an immediate load of laundry was imperative, regardless of if they had previously opted in or out.

Some participants did not consider it their responsibility to help the utility save energy during peak usage. Participants who had experienced rolling brownouts, water restrictions, and/or other utility-led energy conservation programs were more open to participating in an energy savings program than those who had never experienced those types of limitations.

Although opinions varied greatly, the decision to participate in a similar energy savings program largely hinged on participants' personal cost-benefit analysis as well as their degree of comfort with relinquishing control. Details about the program's conditions and how it works would be critical for participants to understand before they could decide whether to participate, specifically:

- How privacy is maintained
- Any limitations on financial incentives
- Data that shows actual cost savings realized by other participants
- How easy it is to opt out of the program without penalty.
    - There were questions about the time and effort it would take to opt out.
    - The perception is that having to opt-in or out for every event is yet another task to pay attention to and manage.

For those who would consider participating, consensus was for clear and simple incentives that provide tangible and immediate financial benefits. Saving money was a motivator to consider participating, depending on the level and type of compensation being offered. Tax credits, insurance discounts, and points programs were mentioned as potentially appealing incentives. Some participants suggested discounts on connected appliances.

Other participation drivers included testimonials from current program users and access to clear data on individual consumer savings and energy conservation benefits.

Single system and connected appliance systems are primarily of niche appeal.

Overall, few consumers are interested in a connected appliance ecosystem. This was presented to the participants as home appliances "able to connect with other appliances."

Table 21 shows that 38% of total consumers are "extremely/very interested" in this ecosystem idea. Just one in six (16%) has top-box interest. Most (62%) are neutral or negative.

The ecosystem concept finds its niche with Innovators/Early Adopters. In fact, most Innovators/Early Adopters have broad interest (66% top-two), and one in three (33%) describes their interest as extreme. The minority who does not fall within the top-two mostly take a neutral position (24% "slightly"), with very few negative. In contrast, extreme interest is almost non-existent among Late Majority and Laggards.

Table 21. Interest in a connected ecosystem comparison

Interest rating	Total	Innovators/ Early Adopters	Early Majority	Late Majority	Laggards
Base: total	*2001*	*660*	*601*	*524*	*216*
Top-2-box (net)	**38%**	**66%**	**31%**	**22%**	**11%**
Extremely	16%	33%	9%	6%	4%
Very	22%	33%	21%	16%	7%
Slightly	34%	24%	43%	40%	24%
Bottom-2-box (net)	**28%**	**10%**	**27%**	**38%**	**65%**
Not very	16%	7%	16%	24%	26%
Not at all	12%	3%	10%	14%	39%

Q34: "How interested would you be to have connected home appliances be able to connect with other appliances in your home to create a smart system?"

After evaluating their interest in the ecosystem of appliances connecting with each other, participants were then asked about a different connection idea: all connected appliances working "on a single system."

Single system operation appeals to more consumers than does the ecosystem concept. While most Innovators/Early Adopters are positive to both, Early Majority, and especially Late Majority, have greater favorability to the single system. Table 22 shows that 44% of both groups agree a single system would be extremely or very important. However, these are still not high values in the absolute sense.

Laggards are also more positive for the latter concept, but the importance they place on single system operation is still very low. For both measures, low scores among Laggards are related to the facts that few own connected appliances (Table 13) and few want to purchase them (Table 12), making any type of system less applicable.

Qualitatively, there was agreement about the usefulness of being able to manage all connected appliances using a single app. There was nothing compelling, however, about the idea of appliances that could communicate with each other. Without information on why this would be beneficial, there was little to no value associated with interoperability beyond single app control.

Table 22. Importance of connected appliances working on a single system

Importance rating	Total	Innovators/ Early Adopters	Early Majority	Late Majority	Laggards
Base: total	*2001*	*660*	*601*	*524*	*216*
Top-2-box (net)	**51%**	**69%**	**44%**	**44%**	**32%**
Extremely	18%	30%	14%	11%	13%
Very	32%	39%	29%	33%	20%
Slightly	28%	22%	35%	29%	21%
Bottom-2-box (net)	**21%**	**9%**	**21%**	**28%**	**46%**
Not very	12%	5%	14%	17%	15%
Not at all	9%	3%	7%	11%	31%

Q35: "How important would it be for all of your connected appliances to work on a single system?"

3.2 RO 2: Consumer experience, connection and engagement with CCPs, including reported benefits and challenges.

Connected capabilities are the second largest consideration in model selection after price, although there are differences based on appliance type.

Connected features were the second largest consideration when CCP buyers selected their appliance model. As shown on Table 23, only purchase cost was weighed more heavily than connected features.

Table 23. Factors in purchase decision

Factors in decision	Total
Base: owner/purchase decision maker	*733*
Cost to purchase	62%
Connected features	**49%**
Dimensions	40%
Ease of installation/connecting	34%
Energy usage	31%
Style such as color or finish	18%
Cost to operate	17%

Q21: "What features factored into your decision to purchase your [CCP type]? Please select your top three."

The importance of connected features varies depending on appliance. Table 24 shows that when television owners made their purchase, connected features were the second most important consideration after price. About six in ten television owners (59%) took connectivity into account when making their choice.

Other than televisions, few own connected appliances. The small ownership base sizes mean that few statistical differences exist, even between proportions with large mathematical differences (see the note to Table 24 for interpretive help). The general picture is that purchase price was a key consideration for all appliances.

- **Refrigerator**: Connected features are as important as purchase cost and more important than operating cost. No differences exist between connected and other features.
- **Air conditioner:** Energy usage stands out as the largest factor. Connected features are of mid importance along with price, ease of installation/connecting, and cost to operate. Dimensions and style are less important.
- **Clothes washer and dryer**: Price stands out as most important. No meaningful differences exist between connected features and the other features.

Qualitatively, participants mentioned that specific ENERGY STAR certification or labeling was not considered a decision-making metric and would have little influence on purchase decisions.

Table 24. Factors in purchase decision comparison

	Connected				
Factors in decision	**TV**	**Dryer**	**Washer**	**Refrigerator**	**Air Conditioner**
Base: owner/purchase decision maker	*376*	*72*	*78*	*69*	*72*
Cost to purchase	69%	60%	65%	49%	44%
Connected features	**59%**	**40%**	**36%**	**41%**	**36%**
Dimensions	48%	26%	38%	45%	17%
Ease of installation/connecting	36%	28%	29%	28%	38%
Energy usage	14%	50%	47%	30%	64%
Style such as color or finish	9%	33%	24%	52%	6%
Cost to operate	9%	25%	27%	13%	40%

Q21: "What features factored into your decision to purchase your [CCP type]? Please select your top three."
Note: For each appliance, shaded boxes are statistically similar to connected features. Freezer and air purifier results not shown due to insufficient base of owners.

Most owners use their appliance's connected features at least occasionally, especially television owners.

As shown in Table 25, most owners use the connected features of their appliance at least occasionally. Connected television features are much more likely to be in regular use than other appliances. However, a considerable number of owners rarely or never use the connected features of any of these connected appliances, including televisions.

Qualitatively, most owners of CCPs were not fully utilizing the connected functionality. Reasons for this varied. Some connected their CCP initially, but did not reconnect it when needed. Others had no intention to connect in the first place, while still others tried to connect but gave up when the process became too challenging.

Table 25. Frequency of using connected features of owned appliance

Frequency of feature use	**Own connected TV only**	**Own other CCP only**
Base: connected appliance owners	*266*	*64*
Top-2-box (net)	**75%**	**67%**
Regularly	53%	33%
Occasionally	22%	34%
Rarely/never	25%	33%

Q23: "How often do you use the connected features of your home appliances?"
Note: "Own connected TV only" base: consumers who own a connected television but do not own any other key connected appliance. "Own other CCP only" base: consumers who own a washer, dryer, freezer, refrigerator, air purifier and/or air conditioner, but do not own a connected television.

Remote control is the most used connected feature outside of television streaming. Yet even this feature is only mentioned by one in seven (14%, shown in Table 26. The exercise was open-ended, meaning responses were not aided with a choice list). No other connected feature has more than a handful of mentions.

Table 26. Connected features being used

Verbatim comments	Total
Base: connected appliance owners	*478*
Streaming/TV/DVR	38%
Remote on-off/control/monitoring	14%
Thermostat (HVAC) control	6%
Get updates/notifications/alerts	5%
Connect to internet	4%
Voice control	4%
Schedule/automate run time	4%
Monitor security system/locks	3%
Lighting control	2%
Monitor/manage energy use	2%

Q24: "What connected features are you using?" (open-ended responses)
Note: 11% net comments not shown: Don't know, No response, Naming of the appliance owned ("washer"), Miscellaneous mentions.

A manufacturer's app is by far the most common means of communicating with a connected appliance.

Most owners, 60% as shown in Table 27, connect with their appliance via the manufacturer's app. Roughly one in five uses a smart speaker or smart home hub (24% and 19%, respectively). Use of utility company apps is uncommon.

Table 27. Ways of connecting with owned appliance

Ways of connecting with appliance	Total
Base: connected appliance owners	*478*
Manufacturer's app	60%
Smart speaker (for example, Alexa or Google Home)	24%
Smart home hub	19%
App from your utility company	9%
TV streaming stick/TV remote (write-in response)	3%
Wi-Fi (write-in response)	2%
Other	6%

Q25: "How do you connect with your connected appliances? Please select all that apply."
Note: "Other" write-in responses: Don't connect, Don't know, Smartphone, Miscellaneous mentions.

Wi-Fi is the dominant means of connecting an appliance to the internet.

Nearly nine in ten owners (88%, as shown in Table 28) connect their appliance to the web via Wi-Fi. Bluetooth is used by just over one in four (27%). Other connection scenarios, including hardwiring, are uncommon.

Table 28. Ways owned appliance connects to the web

Ways of connecting to web	Total
Base: connected appliance owners	*478*
Wi-Fi	88%
Bluetooth	27%
Directly connected to the network/hardwired	11%
Other	1%
Don't know	5%

Q26: "How do your connected appliances connect to the web? Please select all that apply."

There is room to improve connected feature satisfaction, as few owners are fully satisfied with their appliance's features.

Few owners are totally satisfied with their appliance's connected capabilities. Most rate their satisfaction toward the middle of the scale (75% very or somewhat, as shown in Table 29). Still, almost no owners are dissatisfied (6%).

Table 29. Satisfaction with owned appliance

Satisfaction rating	Total
Base: connected appliance owners	*478*
Top-2-box (net)	**63%**
Totally satisfied	19%
Very satisfied	44%
Somewhat satisfied	31%
Bottom-2-box (net)	**6%**
Not very satisfied	4%
Not at all satisfied	2%

Q29: "Overall, how satisfied are you with the connected capabilities of the appliances you own?"

Owners are divided on whether their appliance saves energy. Television owners tend to say their device does not save energy, while owners of other appliances tend to say they do. Table 30 shows that many in both groups are unsure.

Table 30. Whether owned appliance saves energy

Appliance saves energy	Total	Own connected TV only	Own other CCP only
Base: connected appliance owners	*478*	*266*	*64*
Yes	27%	15%	41%
No	29%	39%	20%
Not sure	44%	46%	39%

Q27: "Do your current connected appliances help you save energy in any way?"

Even owners who are certain their appliance saves energy do not typically know the amount saved, let alone with any precision. Table 31 shows one in six (17%) knows the exact energy savings, while in net 40% have at least a rough idea. The majority, 61%, do not know their savings even approximately.

Table 31. Whether amount of energy savings is known

Energy savings knowledge	Total
Base: owners who know appliance saves energy	*129*
Yes, I know (net)	**40%**
Yes, I know exactly	17%
Yes, I know about how much	22%
I'm certain I'm saving energy, but I don't know how much	43%
No, I don't know	18%

Q28: "Do you know how much energy you are saving because of using your connected appliance?"

Owners expect CCPs to deliver energy savings and convenience, although unused features and data control are worries.

Owners most expect that connected appliances will offer convenience through remote app-based controls, automation, and customization, shown on Table 32. Energy savings is also a top expectation, although very few expect the appliance to report their energy data. Energy savings has a low association with environmental benefit, based on their very different scores.

Qualitatively, the convenience of managing the appliance remotely via app was overwhelmingly considered the most meaningful potential benefit of a connected appliance. Other functions that were mentioned as conveniences were:

- Ability to troubleshoot
- Maintenance or operational reminders related to convenience (for example, add more soap) and safety (for example, change dryer filter)
- Automatic software updates
- Energy usage updates

The ability for connected appliances to provide energy data was not something qualitative participants had thought about or considered but was something they would potentially be interested in learning more about.

Table 32. Expected benefits of connected appliances

Benefits	Total	Connected appliance owners
Base: total	*2001*	*478*
Saves energy	47%	42%
Convenient to control products with app/assistant	39%	42%
I can customize my experience	37%	39%
The app makes it easy to use	34%	39%
Automates tasks	38%	38%
Optimizes the product's performance	36%	36%
Puts me in control	33%	34%
Sends useful reminders	33%	28%
Does everything I need	25%	27%
Costs less to operate	31%	26%
Better for the environment	23%	20%
Tells me my energy data	32%	19%
Makes my home look/feel modern	21%	19%
None	8%	9%

Q30: "What are the benefits you would expect to get from owning connected home appliances? Specifically, a connected TV, clothes dryer, clothes washer, freezer, refrigerator, room air cleaner/purifier, and /or room air conditioner. Please select all that apply."
Note: questions 30-31, owners were asked to think about all key connected appliances, owned or not.

To owners, the largest CCP challenge is paying for unused features. Data-related issues of privacy and home network security round out the top three mentions shown on Table 33. Compared with the average consumer, far fewer owners mention purchase cost (21% owners vs. 58% total participants).

Table 33. Expected challenges of connected appliances

Challenges	Total	Connected appliance owners
Base: total	*2001*	*478*
Paying for features I don't use	50%	45%
I worry about data privacy	42%	36%
I worry about security of my home network	38%	31%
Complicated to connect/set up	33%	26%
Complicated to use	30%	26%
Device doesn't work as promised	30%	23%
Expensive to purchase	58%	21%
Doesn't save as much energy/ money in operating as expected	26%	21%
Much of the process is still manual	16%	18%
None	9%	14%

Q31: "What challenges would you expect, (or have you experienced), in owning connected appliances? Specifically, a connected TV, clothes dryer, clothes washer, freezer, refrigerator, room air cleaner/purifier, and /or room air conditioner. Please select all that apply."

3.3 RO 3: Profile of CCP acceptors.

Certain demographic characteristics differentiate consumers who are positive to connected appliances. (The note to Table 34 provides the detailed definition of positive consumers for this analysis.) Positive consumers tend to be more affluent, averaging just over $87,000 in household income. They are younger, with greater representation among Millennials. Their age likely accounts for their higher household member size, as this age group often has children in the home. They over index slightly on Hispanics and males.

Table 34. Summary of key demographic differences

Demographics	Positives (Own or positive PI to any)	Non-Positives (Do not own and no positive PI to any)
Base: total	*1054*	*947*
Identification:		
Woman	56%	60%
Man	43%	37%
Age:		
21 – 27 (Gen Z)	19%	15%
28 – 43 (Millennials)	36%	20%
44 – 59 (Gen X)	25%	24%
60 or older (Boomers)	20%	41%
Mean age	44.0	51.3
Household size:		
Mean # household members	3.0	2.4
Household income:		
Mean income in thousands	$87.3	$68.3
Hispanic:		
Hispanic/Latino	13%	6%

Note: Qualification into the Positives segment is based on ownership or positive purchase intent toward one or more of the following connected appliances: refrigerator, room air conditioner, clothes washer, clothes dryer, room air cleaner/purifier, and/or freezer. Ownership and/or purchase intent exclusively toward connected television is excluded.

Positive consumers are far more likely to be new home owners compared with non-positives. Note that ownership of new homes is correlated with membership in the Millennial cohort, which accounts for some of these segments' common perspective. Positive consumers also have a greater tendency to reside in urban areas and in Washington state, as shown on Table 35.

Table 35. Summary of residence differences

Residence statistics	Positives (Own or positive PI to any)	Non-Positives (Do not own and no positive PI to any)
Base: total	*1054*	*947*
Population density:		
Suburban	42%	45%
Urban	33%	23%
Rural	24%	32%
State:		
Washington	38%	32%
Oregon	31%	28%
Idaho	20%	25%
Montana	10%	15%
New home owners:		
New home owner	19%	4%

Q41: "How would you describe the neighborhood you live in?" Q1: "In which US state do you live?"
Note: New home owners is a multi-variate segment with qualification via either building a residence within the past three years or planning to build within the next three years.

4 Conclusions

This research yielded several key insights that can help NEEA better understand consumer perceptions, interactions, and willingness to engage with connected home appliances and related utility programs.

Key Insights

- **Growing Adoption**: The adoption of connected home appliances is progressing along the technology adoption curve. Although current ownership levels are relatively low, awareness is exceptionally high. Ownership and the desire to own these appliances are most pronounced among residents of urban areas and Millennials. New home owners are especially interested in buying CCPs for their new space, particularly televisions, refrigerators, and room air conditioners. In general, interest is driven by the value consumers place on lower energy bills provided by these appliances.
- **Consumer Preferences**: The most popular connected appliance is televisions, with greater ownership than the other six key appliances combined. Television ownership is about five times as common as ownership of clothes washers, clothes dryers, room air conditioners and refrigerators, and ten times as common as room air cleaners and freezers.
  Consumers prioritize features such as remote control and energy savings. Integration into a larger smart home system is not a current feature demand. One likely reason is because current ownership is so low, particularly ownership of multiple appliances. Interest may increase when more households own multiple CCPs and interaction becomes applicable.
- **Barriers to Adoption**: Several barriers to mainstream adoption exist, including the widespread perception of high purchase cost and concerns about data privacy and cybersecurity. Addressing these perceptions will be crucial for uptake among the broader market.
- **Engaging with Utility Programs**: While there are some reservations, many consumers are open to participating in utility programs for connected home appliances, especially when they understand the financial benefits and are assured of minimal impact on their convenience and privacy. Consumers who are most enthusiastic about buying CCPs are also most accepting of associated utility programs.
- **Energy Efficiency:** Consumer expectations and prioritization of CCP energy efficiency are divided. “Reduce energy use” is a top motivator across many segments. Yet not even half expect CCPs to save energy. This, along with low agreement on other CCP advantages, indicates a lack of clear understanding, consistent with the fact that most do not own CCPs, especially outside of televisions. Demonstrating CCPs’ effectiveness in energy management attracts buyer interest, but far more compelling is making the explicit connection between CCPs and lower energy bills, which captures the interest of most potential buyers.

Next Steps

Ownership of CCP appliances remains limited; hence, the insights from this research are primarily based on perceptions, offering a foundation for future investigation. As adoption rates increase, it will become valuable to understand the drivers, benefits, and challenges associated with actual usage.

In addition, qualitative insights revealed in this study warrant quantitative measurement. These measurements could help identify consumers most likely to adopt CCP home appliances, and those most inclined to participate in relevant utility programs.

- **Resource Availability Geographies**: Qualitative data indicates that participants who have experienced resource restrictions, such as rolling brownouts or water limitations, showed a greater openness to participating in CCP utility demand response programs. In contrast, those living where energy is inexpensive or plentiful did not prioritize saving energy. Should these trends be validated quantitatively, it suggests higher CCP demand in areas where such restrictions are more common.
- **Utility Program Features**: Qualitative participants varied in their cost-benefit analysis of utility programs. Quantitative methodologies can prioritize specific program features and levels, such as incentives, permissions, and energy savings, to determine the optimal program combination that would attract the most CCP owners.
- **ENERGY STAR:** ENERGY STAR certification or labeling was not a significant factor in qualitative decision-making processes and had minimal influence on purchase decisions, partly due to inconsistent retailer information. Quantitative methodologies could ascertain the relative importance of ENERGY STAR in purchase decisions, assuming consistent communication of ENERGY STAR information.

Appendix A: Detailed Methodology

A.1 Quantitative Survey

A total of 2,001 respondents completed online questionnaires between July 15 and September 2, 2024. A representative opt-in market research panel provided the respondent sample. Respondents were not aware of the topic of interest until after qualification, and the research sponsor was anonymous. Qualified respondents met all the below criteria.

- Age 21 or older
- Reside in Idaho, Montana, Oregon, or Washington
- Reliable internet in the home
- Wi-Fi in the home
- Decision-maker or co-decision maker for home appliance purchases
- No sensitive industry household employment

The study population included the following subgroup representation (n=):

- New home owners: 236
- Generation cohorts: 344 Gen Z, 572 Millennials, 486 Gen X, and 599 Boomers
- State residents: 456 Idaho, 247 Montana, 590 Oregon, 708 Washington

The 12-minute questionnaire appears in Appendix B.

Results among the total study population have a margin of error of ± 2.19 at the .95 confidence level.

A.2 Online Focus Groups

Level 7 conducted four 90-minute online focus groups as part of the qualitative phase of this study. The focus groups were on October 28 and 29, 2024.

A total of 28 consumers participated in the focus groups. Thirteen participants were Early Adopters, and the remainder were Followers, as defined by the technology adoption scale shown in Table 2. Group composition was homogenous, with Early Adopters and Followers each comprising two groups.

Respondents either currently own a key connected appliance (Table 1) or gave a qualifying characterization of their interest in purchasing one, shown in Table 36.

Table 36. Connected appliance purchase interest levels qualifying for focus group segments

Response Option	Focus Group Segment
Extremely interested	Early Adopters
Very interested	Early Adopters
Slightly interested	Early Adopters and Followers
Not very interested	Not qualified for either segment
Not at all interested	Not qualified for either segment
Not sure/don't know enough	Early Adopters and Followers

Note: Question text: "Right now, there are several kinds of home appliances available that can connect to the internet. The next time you shop for home appliances, how interested are you in purchasing each of the following?"

The focus groups utilized a semi-structured conversational approach. The discussion guide aided the conversation and ensured each group addressed the key research questions, but the moderator also asked ad hoc follow-up probes when appropriate. The discussion guide appears in Appendix C.

A.3 Online Bulletin Boards

Unlike the online focus groups where everyone participated at the same time, the online bulletin boards provided a forum that allowed participants to share their thoughts and opinions at their own pace and convenience over four days. New question content was posted twice daily, morning and evening. The average participant engaged for a total of about 30 minutes per day answering all the questions.

This project included two boards that ran concurrently from November 4 to November 7, 2024. Sixteen consumers participated in the Early Adopters board and eighteen consumers participated in the Followers board, for a total of 34 participants. The boards were homogenous, with participant assignment based on their technology adoption segment.

- Board 1—Early Adopters
- Board 2—Followers

The bulletin boards utilized a semi-structured conversational approach. While a question-and-answer format was the basis for the boards, participants also asked questions and commented on each other's posts. A moderator facilitated the boards, ensuring in-depth insights through interactive dialogue. Key topics were CCP awareness, interest, benefits and barriers, and utility program evaluations. The discussion guide appears in Appendix D.

Appendix B: Quantitative Questionnaire

The following questionnaire was programmed and administered online in Alchemer. Programming and logic instructions (colored font) were not displayed to respondents.

Qualifying Questions

1. In which US state do you live? (Qualifying: Idaho, Montana, Oregon, Washington; others TERMINATE.) (Drop down list of all 50 states)
   - ○ None/I live outside the US (TERMINATE)

2. This research calls for us to speak with people in different occupations. Are you or any household member employed in any of the following? Select all that apply. (RANDOMIZE)
   - ☐ Market research company or department
   - ☐ Advertising agency
   - ☐ A utility company supplying electricity or natural gas
   - ☐ A manufacturer or retailer of household appliances
   - ☐ Appliance service/repair
   - ☐ A manufacturer or retailer of household technology products
   - ☐ None of the above (Anchor, exclusive – must be selected to continue)

3. This research calls for us to speak with people of all different ages. Which of the below groups includes your age?
   - ○ Under 21 (TERMINATE)
   - ○ 21 – 27 (Gen Z)
   - ○ 28 – 43 (Millennial)
   - ○ 44 – 59 (Gen X)
   - ○ 60 or older (Boomers)

4. Do you have reliable internet at home?
   - ○ Yes
   - ○ No home internet (TERMINATE)
   - ○ Don't know (TERMINATE)

5. Do you currently have **Wi-Fi** in your home? In homes with internet, Wi-Fi is how the internet connects with smart devices in your home. For example, if you have a TV that streams movies, the TV will have Wi-Fi that communicates with your router (where your internet comes into your home) and then on to the internet.
   - ○ Yes
   - ○ No (TERMINATE)
   - ○ Don't know (TERMINATE)

6. Do you currently own or rent your primary residence? (RANDOMIZE)
   - ○ Rent

- ○ Own

7. (LOGIC: If Owner, then ask) Was your residence built within the **past 3 years**?
   - ○ Yes, my home was built in past 3 years
   - ○ No

8. (LOGIC: If responded "yes" to previous q, skip this q; otherwise include for all respondents) When, if ever, do you plan on building a **new construction** home?
   - ○ Currently in the process
   - ○ Within the next 2 or 3 years
   - ○ I will in the future, but further out than 3 years
   - ○ Never
   - ○ Not sure

(To count toward New Construction quota, participant must either: Live in new construction (Q7=#1) or be planning new construction within the next 3 years (Q8=#1 or #2)

9. Think about the appliances in your home. If you needed to purchase or replace the below appliances, who would decide which product to purchase?

RANDOMIZE	I would decide	I and someone else would decide	Someone else would decide	This is not something I would have in my home
TV	○	○	○	○
Clothes dryer	○	○	○	○
Clothes washer	○	○	○	○
Freezer	○	○	○	○
Refrigerator	○	○	○	○
Room air cleaner/purifier	○	○	○	○
Room air conditioner	○	○	○	○

(Participant must decide or equally decide for at least one appliance to qualify, if not TERMINATE.)

Main Questionnaire

10. Which of the following describes you best?
    - ○ I like to be one of the first people to have new technology products
    - ○ I'm not usually the first to buy a new technology product, but I tend to buy before most others
    - ○ I prefer for other people to try new technology, before I buy it myself
    - ○ I prefer to wait until the price drops before buying new technology
    - ○ I'm usually one of the last people I know to buy new technology products

11. How comfortable are you in using technology products for the home?
    - ○ Completely comfortable
    - ○ Somewhat comfortable
    - ○ Not very comfortable
    - ○ Not at all comfortable

12. Have you heard of home appliances that can connect to the internet?
    - ○ Yes
    - ○ No
    - ○ Not sure

13. What would ***you*** call appliances that connect to the internet?
    - ☐ Smart appliances
    - ☐ Connected appliances
    - ☐ Either one
    - ☐ Neither one
    - ☐ Other _____

14. For the rest of this survey, whenever we call something a "connected appliance", think of a home appliance that can connect to the internet.

    What kinds of home appliances are being sold right now that can connect to the internet? List as many as you can think of.

15. Right now, there are several kinds of connected home appliances available. How interested are you in purchasing each of the following?

RANDOMIZE	**Extremely Interested in buying**	**Very Interested in buying**	**Slightly Interested in buying**	**Not Very Interested in buying**	**Not at All Interested in buying**	**I already own this connected appliance**
Connected TV	○	○	○	○	○	○
Connected clothes dryer	○	○	○	○	○	○
Connected clothes washer	○	○	○	○	○	○
Connected freezer	○	○	○	○	○	○
Connected refrigerator	○	○	○	○	○	○
Connected room air cleaner/purifier	○	○	○	○	○	○
Connected room air conditioner	○	○	○	○	○	○

16. Which of the following best describe(s) why you have less interest in buying a connected appliance? Specifically connected TVs, clothes dryers, clothes washers, freezers, refrigerators, room air cleaner/purifiers, and /or room air conditioners. Please select all that apply. (RANDOMIZE)
    - Connected appliances break down
    - Cybersecurity risks
    - Don't really understand what connected appliances can do
    - Giving control of my home to utility companies
    - Don't bring the benefits I need
    - Lack of data privacy
    - Must be tech savvy to use
    - Too expensive to buy
    - Other _____
    - None

17. (DISPLAY IF INTERESTED IN Q16 = "Connected consumer products breakdown") You mentioned that connected consumer products break down. Is that because….?
    - ○ The connection features would break down
    - ○ The basic appliance features would break down (e.g. cooling, heating, etc.)
    - ○ All features would be less reliable

18. (DISPLAY IF Q15 INTERESTED IN ANY) Which of these are reasons why you, personally, are interested in owning connected home appliances? **Specifically, a connected TV, clothes dryer, clothes washer, freezer, refrigerator, room air cleaner/purifier, and /or room air conditioner.** Please select all that apply. (RANDOMIZE)
    - I want the latest advanced features
    - Operate/monitor my home remotely
    - Optimize product performance
    - Reduce energy use
    - Save money
    - Save time
    - To automate tasks
    - Other _____
    - None of the above

19. In terms of the connected appliances listed above, how open are you to:

RANDOMIZE	**Very open**	**Somewhat open**	**Not very open**	**Not at all open**
Allowing your utility to monitor energy usage of appliances in your home	○	○	○	○
Getting feedback from your utility on how to optimize your energy savings	○	○	○	○
Allowing your utility the ability to control connected appliances at peak times, as long as you can opt out	○	○	○	○

QUALIFY AS CCP OWNER IF ANY RESPONSE IN Q15 = I already own this connected consumer product. Otherwise GO TO Q30

20. (CCP OWNER) You mentioned owning the connected appliances listed below. What was your role in purchasing each of these? (PIPE IN OWNED RESPONSES FROM Q15)

	I bought it	Someone else bought it, but I helped decide	Someone else bought it; I had no role in the decision
Owned connected appliance from Q15	○	○	○
Owned connected appliance from Q15	○	○	○
Etc.	○	○	○

21. (CCP OWNER) What features factored into your decision to purchase this specific product? Please select your top 3. (RANDOMIZE) (DISPLAY FOR EACH PRODUCT FROM Q15)

Connected features
Cost to operate
Cost to purchase
Dimensions
Ease of installation/connecting
Energy usage
Style such as color or finish
Other _____

22. (CCP OWNER) How well do you understand the connected features of your home appliances and how to use them?

○ Completely understand
○ Somewhat understand
○ Not very well
○ Not at all

23. (CCP OWNER) How often do you use the connected features of your home appliances?

○ Regularly
○ Occasionally
○ Rarely/Never (GO TO Q25)

24. (CCP OWNER) What connected features are you using? _____

25. (CCP OWNER) How do you connect with your connected appliances? Please select all that apply.

☐ The manufacturer's app
☐ An app from your utility company
☐ Smart home hub
☐ Smart speaker (for example Alexa or Google Home)
☐ Other _____

26. (CCP OWNER) How do your connected appliances connect to the web?

☐ WIFI
☐ Bluetooth
☐ Directly connected to the network/hardwired
☐ Other _____

☐ I don't know

27. (CCP OWNER) Do your current connected appliances help you save energy in any way?
    - ○ Yes
    - ○ No
    - ○ Unsure

28. (CCP OWNER; If yes to previous) Do you know how much energy you are saving because of using your connected appliance?
    - ○ Yes, I know exactly
    - ○ Yes, I know about how much
    - ○ I'm certain I'm saving energy, but I don't know how much
    - ○ No, I don't know

29. (CCP OWNER) Overall, how satisfied are you with the connected capabilities of the appliances you own?
    - ○ Totally satisfied
    - ○ Very satisfied
    - ○ Somewhat satisfied
    - ○ Not very satisfied
    - ○ Not at all satisfied

30. What are the benefits you would expect to get from owning connected home appliances? Specifically, a connected TV, clothes dryer, clothes washer, freezer, refrigerator, room air cleaner/purifier, and /or room air conditioner. Please select all that apply. (RANDOMIZE)
    - Automate tasks
    - Better for the environment
    - Convenient to control products with app/assistant
    - Costs less to operate
    - Does everything I need
    - I can customize my experience
    - Makes my home look/feel modern
    - Optimizes the product's performance
    - Puts me in control
    - Saves energy
    - Sends useful reminders
    - Tells me my energy data
    - The app makes it easy to use
    - Other _____
    - None of the above

31. What challenges would you expect, (or have you experienced), in owning connected appliances? Specifically, a connected TV, clothes dryer, clothes washer, freezer, refrigerator, room air cleaner/purifier, and /or room air conditioner. Please select all that apply. (RANDOMIZE)
    - Complicated to connect/set up
    - Complicated to use

Device doesn't work as promised
Doesn't save as much energy/money in operating as expected
Expensive to purchase
I worry about data privacy
I worry about security of my home network
Much of the process is still manual
Paying for features I don't use
Other _____
None of the above

32. Connected appliances can do many things. Which of the following would cause you to consider a connected home appliance for your next purchase? **Specifically, a TV, clothes dryer, clothes washer, freezer, refrigerator, room air cleaner/purifier, and /or room air conditioner.** Please choose your top 3. (RANDOMIZE)
    A smart system that learns how to best save me money
    Controlling my energy usage
    Health monitoring (for example air quality)
    Increased market appeal for my home
    Lowering my energy bills
    Reducing my carbon footprint
    The comfort and luxury the products can provide
    Voice activated controls
    Other _____

33. In terms of purchasing a connected home appliance, please rank the following on how influential they would be for you to choose a connected appliance over an unconnected appliance of the same type. (DROP AND DRAG RANKING)
    Product is on sale
    Rebate programs from my utility/energy provider
    Enrolling in a program with utility/energy provider to receive periodic rewards for energy savings
    Homeowners/renters insurance discounts
    Product stores data locally and not with the manufacturer or utility
    Product is cybersecurity-certified by an independent testing lab

34. How interested would you be to have connected home appliances be able to connect with other appliances in your home to create a smart system?
    - ○ Extremely interested
    - ○ Very interested
    - ○ Slightly interested
    - ○ Not very interested
    - ○ Not at all interested

35. How important would it be for all of your connected appliances to work on a single system?
    - ○ Extremely important
    - ○ Very important
    - ○ Slightly important
    - ○ Not very important
    - ○ Not at all important

The last few questions help us better understand what communities may have more excitements or hesitancies about connected appliances in general. They also help us to understand if we have gaps in our data – in other words, if we are missing some audiences that we may need to work harder to hear from in the future. Thank you for taking the time to answer these.

36. How do you identify? Please select all that apply.
    - ○ Woman
    - ○ Man
    - ○ Non-binary
    - ○ Gender(s) not listed here
    - ○ Prefer not to say

37. What best describes your current work status? Please select all that apply.
    - ☐ Employed full-time
    - ☐ Employed part-time
    - ☐ Self-employed
    - ☐ Contract worker
    - ☐ Not employed just now
    - ☐ Retired
    - ☐ Full-time parent or caregiver
    - ☐ Other (please tell us more)_____
    - ☐ Prefer not to say (EXCLUSIVE)

38. Including yourself, how many people live in your household? (Scale 1 to "8 or more")

39. What was your total household income in 2023 before taxes? Your best guess is fine.
    - ○ Less than $25,000
    - ○ $25,000 - $34,999
    - ○ $35,000 - $44,999
    - ○ $45,000 - $59,999
    - ○ $60,000 - $74,999
    - ○ $75,000 - $99,999
    - ○ $100,000 - $149,999
    - ○ $150,000 - $199,999
    - ○ $200,000 - $250,000
    - ○ More than $250,000
    - ○ Don't know / not sure

40. What was the last grade of school you completed?
    - ○ Some high school
    - ○ High school graduate
    - ○ Some college
    - ○ Completed a 2-year college
    - ○ Completed a 4-year college
    - ○ Graduate / professional / post graduate work

41. How would you describe the neighborhood you live in?
    - ○ Urban
    - ○ Suburban
    - ○ Rural

42. What is your ethnicity?
    - ○ Hispanic/Latino
    - ○ Not Hispanic/Latino
    - ○ Not Sure

43. What is your race? Please check all that apply.
    - ☐ White
    - ☐ Black or African American
    - ☐ American Indian or Alaskan Native
    - ☐ Asian
    - ☐ Native Hawaiian or Other Pacific Islander

Appendix C: Online Focus Groups Discussion Guide

The online focus groups utilized the following discussion guide.

INTRODUCTION — 10 MINUTES

- Introduction of Level 7 moderators. (research colleagues viewing remotely) (Independent researchers – don't work for any appliance company)
- Explanation of purpose of the research (Gather opinions and perceptions of connected home appliances)
- Explanation of research process – (Session will be approximately 1.5 hours; no cell phones, mute your mic if there is a distraction in the background)
- Will be video recording (assists with report writing, comments will not be associated with anyone in particular)
- Rules of conduct (No wrong answers, just opinion; be completely candid; all don't have to agree; everyone participate, have fun!)
- The group of people participating in this discussion are all from the Northwest – one of 4 states Washington, Oregon, Montana, Idaho.
- Respondent introductions & icebreaker question. [Display icebreaker question]

WARM UP — 10 MINUTES

Today we're talking about home appliances.

For the duration of our discussion, when I say home appliances, I'd like you to think about 7 appliances in particular: **Washers, Dryers, Refrigerators, Freezers, TVs, Room air conditioners, and Room air cleaners/purifiers ONLY**. [Display slide w/list]

- Has anyone purchased any of these appliances in the past year or so?
  - Anyone planning to buy one of those appliances in the near future?
- Let's say you were in the market to purchase any of these home appliances. What kinds of things would you be thinking about, to decide what to buy?
  - (When price is mentioned - share Price Range slide …

Lowest Price				**Middle Price**				**Highest Price**
Basic Features				**More Features**				**Most Features**

  - Let's talk about Price for a minute. And I'd like you to look at this scale (read scale). If you think about a scenario where you're in the market to purchase any of the appliances we're talking about today, where do you see yourself in and why? (What kind of shopper are you?)
  - Would you do any homework or research? Describe how you would go about narrowing down your options.

    - Is this a purchase you would consider making 100% online?
        - Or would you eventually head to a local store?
- How about Energy Efficiency (Probe if not brought up) –
    - Is this something you would take into consideration? Why or why not?
        - What specifically would you be looking for?
    - How about an ENERGY STAR rating?
        - Is ENERGY STAR important? Why or why not?
        - How would you get this information? (Probe on whether they'd investigate it before heading to the store, or by looking at the yellow sticker at the store)

CONNECTED APPLIANCES 15 MINUTES

How many of you have heard of 'connected' home appliances? (show of hands)

- What does the term 'connected home appliance' mean?
    - Is there anything else beyond using an app to control the appliance?
- Here's one definition for connected home appliances that I'd like you to keep in mind as we discuss this topic:

> *Connected home appliances…*
>
> *can connect to the internet, Wi-Fi networks and other devices. Thus, they can be controlled or monitored remotely through an app. They can also provide ongoing usage data.*

Given that definition:

- What do you know about appliances that can connect to the internet?
    - (Probe **expensive** if not mentioned) Do you think connected home appliances are generally more expensive than those that don't connect to the internet?
        - What makes you think that? (ASSUMPTION vs EXPERIENCE)
- Does anyone have any of the 7 home appliances that can connect to the internet? If yes,
    - Are they connected to the internet? If no, why not?
    - Did you connect it yourself or did someone else help out?
    - Were there any issues connecting?
    - Are you seeing any benefits? (Meeting expectations?)
- How interested are you in having a home appliance that can connect to the internet? Why or why not?
    - Is it useful? Why or why not?
    - Is it a good idea? Why or why not?
- What benefits can you think of for connecting any of the home appliances on our list, to the internet?
- Can you think of any drawbacks to connecting home appliances to the internet?

FEATURES AND POTENTIAL DRAWBACKS 20 MINUTES

Now let's discuss some specific features that are possible with connected home appliances. (Reminder - only thinking about 7 appliances)

- (**CONNECTED TO WIFI**) Most connected appliances connect to the internet using your home's WIFI network. What are your thoughts on this?
  - Any benefits or drawbacks connecting to the internet via WIFI?
  - What questions do you have about this type of feature?
  - Why/why not?
- **(REMOTE OPERATION)** Connected appliances can be managed/operated through an app. (can still operate manually) What are your thoughts on this?
  - Any benefits or drawbacks to using an app to manage/operate your appliance?
  - What questions do you have about this type of feature?
- **(PERFORMANCE OPTIMIZATION)** Connected appliances can provide you with feedback regarding energy usage, and even provide suggestions on how to optimize performance that will save you money as a result. What are your thoughts on this?
  - Is this a benefit?
  - Any concerns or potential drawbacks about this?
  - What questions do you have about this type of feature?
- **(INTEROPERABILITY)** In the future, home appliances may be able to communicate with each other – the same way Alexa can turn the TV on or off or turn the thermostat up or down. The idea is to create a single home system and simplify how you interact with it.
  - What are your general thoughts on this?
  - Any benefits or drawbacks to a single system versus each appliance as a stand-alone?
  - What questions do you have about this type of setup?

UTILITY PROGRAM DISCUSSION 20 MINUTES

Now I'd like your thoughts on a scenario...

Let's say you're in the market for a new washer and dryer. And you find out that your utility company has a program for customers with connected washer/dryers.

[Display slide with mock utility program elements]

> **As our demand for energy grows, this can sometimes put stress on the electrical grid. On days when demand is forecasted to peak, utility companies are beginning to offer ways that residential customers can be a part of the solution. Here is an example of one such program your utility might offer:**

Energy Savings Program:

- **Customers must have a connected washer and/or dryer.**
- **Customers agree to allow the utility company to access their washer/dryer remotely.**
- **The utility can delay loads of laundry during peak demand surges and run loads when energy demand subsides, and rates are lower.**

    - **You can opt out**
    - **Asked beforehand**
    - **If you agree to delay, you receive $25 per event**
- **These programs usually have some financial benefit for consumers, for example in the form of a bill credit or cost savings by flexing energy use to when rates are lower.**

How interested would you be in a program like this?

Before we discuss as a group….

[POLL – Bring up poll question before discussing as a group. Vote on the following]

- Very Interested
- Moderately Interested
- Slightly Interested
- Not at All Interested
- Not Sure/Don't Know Enough

[Display Poll results]

- Let's start with those who are Not Sure/Don't Know Enough?
    - Please share your thoughts on why you're NOT SURE.
- How about those Not at All Interested?
    - Please share your thoughts on why you WOULDN'T be interested.
- For those who are Very, Moderately or Slightly Interested?
    - Please share your thoughts on why you WOULD BE interested.
- Is there anything missing that would make a program like this more enticing?
- Regarding financial benefits for consumers - Are there other financial incentives that would interest you more than a bill credit or lower overall rates?
    - Would a rebate offer from the utility, or an insurance discount change anything for you? Why / why not?

SUMMARY & WRAP UP 5-10 MINUTES

We've talked a lot about the pros and cons of connected home appliances and the ability for them to communicate with your utility.

- If you were a utility and wanted to encourage customers to participate in your connected appliance program:
    - What are the most compelling messages you think would be important for consumers to hear?

Last question…

- Thinking about the future and what could be possible with connected appliances…. what would be your ideal vision for the future with connected appliances?

GALLERY QUESTIONS?

CLOSE

Thank you for your responses!

On behalf of Level 7, thank you so much for your participation in this discussion.

Appendix D: Online Bulletin Board Discussion Guide

The following discussion guide was used as prompts for the qualitative online bulletin boards. Programming instructions (colored font) were not displayed to respondents.

DAY 1 – A.M. SESSION – INTRODUCTIONS, GENERAL BACKGROUND + RAPPORT BUILDING

INTRODUCTION:

Good morning!

First, I'd like to thank you for participating in this important research! While the people taking part in this discussion are from different walks of life, the thing you have in common is that everyone lives in the Northwest - in Idaho, Montana, Oregon or Washington.

I'm anticipating a lively and fun discussion, and hope you enjoy the experience!

1. Let's start off with some introductions. Please introduce yourself to the group and consider sharing something about yourself - maybe a favorite hobby, what you do for work, your guilty pleasure TV show or anything else you feel comfortable sharing.
   I'll start – My name is Kathleen and I'm a researcher at Level 7 Market Research. I spent the majority of my career conducting user research at Eastman Kodak Company before starting Level 7 Market Research with my business partners almost 10 years ago. I live in Upstate New York with my husband and Goldendoodle, Willow. I've always enjoyed talking with people about their opinions and perceptions, and I'm looking forward to chatting with each one of you.

2. In terms of the following statements, how would you describe yourself?
   When it comes to technology….
   - I like to be one of the first people to have new tech products
   - I'm not usually the first to buy a new tech product, but I tend to buy before most others
   - I prefer other people to try new technology before I buy it myself
   - I prefer to wait until the price drops before buying new technology
   - I'm usually one of the last people I know to buy new tech products

Please elaborate on how you feel about adopting new technology:

As you know, over the next few days we're going to be discussing home appliances.

For the remainder of our discussion, when I mention home appliances or ask you to think about home appliances, I will only be referring to these 7 specific appliances.

3. If you were in the market to purchase a new washer, dryer or other appliance on the list, what types of things would you take into consideration when deciding what to buy?
   - Which of those things would be the most influential to your purchase decision and why?

4. How would you go about gathering the information to help you decide what to buy? What resources would you rely on?

5. When considering a new home appliance purchase, how influential are the opinions of others? Place each of the items in order from the most influential to least influential.
    - Consumer and trade reviews (Google, manufacturers' website, etc.)
    - Consumer advocate organization reviews (Consumer Reports, Popular Mechanics, Better Homes & Gardens, etc.)
    - Friends/Family
    - Sales staff at retail outlet
    - Personal experience with same/similar brand

Please elaborate on the one that is most influential, and why:

DAY 1 SESSION 2 (P.M.) AWARENESS, ASSUMPTIONS AND INTEREST

Welcome back!

As a reminder, when you think about home appliances please think only about these seven specific appliances: (Table 1)

1. Have you heard of 'connected' home appliances?
    - What does the term 'connected appliance' mean to you? If you're not sure, your best guess is fine.
    - Would you consider a 'Smart' appliance and a 'Connected' appliance the same thing? If not, how do they differ?

2. Connected appliances are home appliances that connect to the internet. In general, what are your thoughts about home appliances that can connect to the internet?

3. Do you think connected home appliances are generally more expensive than those that don't connect to the internet?
    - Please elaborate on why you think that.

4. Do you think connected home appliances generally break down more often, less often, or about the same as appliances that do not connect to the internet? (Insert choices)
    - Please elaborate on why you think that.

5. Do you currently have any of the 7 home appliances that are able to be connected to the internet? If yes,
    - What appliance is it?
    - Have you connected it to your WIFI network? Why or why not?
    - Did you connect it yourself or did someone else help out?
    - Were there any issues connecting?
    - Are you seeing any benefits?

    If no,
    - Would you consider buying a connected appliance when the time comes to replace a current appliance? Why or why not?

6. Please use the scale to indicate how interested you are in owning home appliances that can connect to the internet? Please elaborate on why you are interested/not interested.

- Insert scale: Extremely Interested, Very Interested, Slightly Interested, Not Very Interested, Not Sure/Don't Know Enough

DAY 2 SESSION 1 (A.M.) BENEFITS AND BARRIERS

Today we'll be discussing the benefits and drawbacks of connecting home appliances to the internet.

Here is one definition of connected home appliances:

- **Connected home appliances can connect to the internet, Wi-Fi networks and other devices. Thus, they can be controlled or monitored remotely through an app. They can also provide ongoing usage data.**

1. What benefits would you expect to get from an appliance that is connected to the internet?

2. Describe a scenario (or two) where it would be beneficial for a home appliance to be connected to the internet.

3. There are pros and cons to everything. Are there reasons or situations where having a home appliance connected to the internet is not something you would welcome? Please explain.

4. Are there any additional benefits or drawbacks to connecting home appliances to the internet?
   - Pros:
   - Cons:

5. If you were considering buying one of the connected home appliances on our list, what questions would you need answered before making a final decision?

6. What types of features do you expect connected home appliances to have? Please elaborate on what these expectations are based on.

7. Some connected home appliances can help consumers reduce their energy consumption. Is that an important benefit to you? Why or why not?

8. In general, do you believe that reducing the energy consumption of appliances saves you money? Please elaborate on your response.

DAY 2 SESSION 2 (P.M.) SPECIFIC FEATURES

This afternoon I'd like to discuss some specific features that are possible with connected home appliances.

1. Most connected appliances connect to the internet using your home's WIFI network. What are your general thoughts on this?
   - Any benefits or drawbacks connecting a home appliance to the internet via WIFI?
   - What questions do you have about this type of feature?

2. Connected appliances can be managed / operated remotely, through an app.
   What are your general thoughts on this?
   - Any benefits or drawbacks to using an app to connect to a home appliance?
   - What questions do you have about this type of feature?

3. Connected appliances can provide feedback regarding the amount of energy the appliance is using, and even provide maintenance and other information on how to optimize performance.
   - What are your general thoughts on this?
   - Any benefits or drawbacks to getting efficiency and maintenance information?
   - What questions do you have about this type of feature?

4. In the future, home appliances may be able to communicate with each other – the same way Alexa can turn the TV on or off, or turn the thermostat up or down. The idea is for all of the connected appliances in a home to form a single networked system that will simplify how you interact with them. The alternative is for each connected appliance to remain a stand-alone.
   - What are your general thoughts on this?
   - Any benefits or drawbacks to a single system versus each appliance operating as a stand-alone?
   - What questions do you have about this type of setup?

DAY 3 SESSION 1 (A.M.) UTILITY PROGRAM

Good morning!

This morning I'd like you to imagine that you are considering buying a new washer and dryer. And you find out that your utility company has a program for customers with connected appliances.

Please review the following program information carefully and then respond to the follow-up questions.

As our demand for energy grows, this can sometimes put stress on the electrical grid. On days when demand is forecasted to peak, utility companies are beginning to offer ways that residential customers can be a part of the solution. Here is an example of one such program your utility might offer:

Energy Savings Program:

- **Customers must have a connected washer and/or dryer.**
- **Customers agree to allow the utility company to access their washer/dryer remotely.**
- **The utility can delay loads of laundry during peak demand surges and run loads when energy demand subsides, and rates are lower.**
  - **You can opt out**
  - **Asked beforehand**
  - **If you agree to delay, you receive $25 per event**
- **These programs usually have some financial benefit for consumers, for example in the form of a bill credit or cost savings by flexing energy use to when rates are lower.**

1. How interested would you be in a program like this? Please elaborate on your answer.

2. Would the availability of a program like this influence whether you buy a connected washer/dryer? Why/why not? In what ways?

3. What would you need to know about the program to make you feel comfortable enough to participate?

4. Is there anything missing that would make a program like this more enticing?

5. Regarding financial benefits for consumers - Are there other financial incentives that would interest you more than a bill credit or lower overall rates? Would a rebate offer from the utility, or an insurance discount change anything for you? Why / why not?

DAY 3 SESSION 2 (P.M.) MESSAGING & WRAP UP

Good afternoon!

I'd like you to think about the Utility Program we discussed earlier:

As our demand for energy grows, this can sometimes put stress on the electrical grid. On days when demand is forecasted to peak, utility companies are beginning to offer ways that residential customers can be a part of the solution. Here is an example of one such program your utility might offer:

Energy Savings Program:

- **Customers must have a connected washer and/or dryer.**
- **Customers agree to allow the utility company to access their washer/dryer remotely.**
- **The utility can delay loads of laundry during peak demand surges and run loads when energy demand subsides, and rates are lower.**
    - **You can opt out**
    - **Asked beforehand**
    - **If you agree to delay, you receive $25 per event**
- **These programs usually have some financial benefit for consumers, for example in the form of a bill credit or cost savings by flexing energy use to when rates are lower.**

1. What is the most compelling message you could hear regarding a program like this?

2. Thinking about the future and what could be possible with connected appliances, please describe your ideal vision for the future with connected appliances?
   Please take a moment to summarize your thoughts about connected appliances, including:
    - Your interest in incorporating them into your home, and
    - Your interest in working with your utility to reduce your energy consumption to save money.

3. Are there any additional comments you would like to make regarding any of the topics discussed over the past few days?

That completes all of the questions in this study! Please double-check to be sure you've answered all of the follow-up questions before you sign off. Thank you for your responses, it was a pleasure meeting everyone!

Appendix E: Demographic Tables

Table 37. Gender

Gender	Total
Base: total answering	*1987*
Woman	58%
Man	40%
Non-binary	2%
Gender/s not listed	0%

Table 38. Work status

Work status	Total
Base: total answering	*1972*
Employed full-time	38%
Retired	26%
Employed part-time	11%
Self-employed	9%
Not employed now	9%
Full-time parent/caregiver	6%
Contract worker	1%
Other	4%

Table 39. Household size

Number of people living in household	Total
Base: total	*2001*
1	19%
2	36%
3	17%
4	16%
5 or more (net)	11%
Mean	*2.7*

Table 40. Household income

Income	Total
Base: total answering	*1964*
Less than $35,000	26%
$35,000–$59,999	22%
$60,000–$99,999	25%
$100,000–$149,999	15%
$150,000 or more (net)	12%
Mean	*$79,801*

Table 41. Education

Education	Total
Base: total	*2001*
Some high school	3%
High school graduate	18%
Some college	24%
Completed a 2-year college	12%
Completed a 4-year college	25%
Graduate / professional / post graduate work	18%

Table 42. Residence population density

Population density	Total
Base: total	*2001*
Urban	28%
Suburban	43%
Rural	28%

Table 43. Hispanic/Latino

Hispanic/Latino	Total
Base: total answering	*1857*
Hispanic/Latino	10%
Not Hispanic/Latino	90%

Table 44. Race

Race	Total
Base: total	*2001*
White only	84%
Black or African American only	3%
Asian only	3%
American Indian or Alaskan Native only	2%
Native Hawaiian or Pacific Islander only	1%
Another race only	3%
Multi-racial	4%

Table 45. State of residence

State	Total
Base: total	*2001*
Washington	35%
Oregon	29%
Idaho	23%
Montana	12%

Table 46. Age

Age	Total
Base: total	*2001*
21–27 (Gen Z)	17%
28–43 (Millennials)	29%
44–59 (Gen X)	24%
60 or older (Boomers)	30%
Mean	*47.4*

Table 47. Homeownership status

Status	Total
Base: total	*2001*
Own	60%
Rent	40%