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Consumer Messaging for Ductless Heat Pumps and Heat Pump Water Heaters

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2. EXECUTIVE SUMMARY

This report summarizes the findings from the Ductless Heat Pump (DHP) and Heat Pump Water Heater (HPWH) message testing study conducted by ILLUME Advising LLC on behalf of the Northwest Energy Efficiency Alliance (NEEA). NEEA is a nonprofit alliance of more than 100 Northwest utilities and energy efficiency organizations working on behalf of more than 13 million energy customers to use the “market power of the region to accelerate the innovation and adoption of energy-efficient products, services and practices.”¹

NEEA launched the Northwest Ductless Heat Pump Project in 2008 as a pilot that set out to demonstrate DHPs as a viable technology to displace electric resistance heat in existing homes. While market progress is being made, as indicated by the 2013 Market Progress Evaluation completed by Evergreen Economics,² there are still a number of barriers to the adoption of the technology in the market. These: (1) installation costs, (2) customer awareness and understanding of the technology, and (3) aesthetic concerns. The DHP initiative was developed to help transform the market by overcoming these and other market barriers.

In 2012, NEEA began the Smart Water Heat initiative, which is focused on promoting market development and consumer education and adoption of heat-pump water heating technology in the Northwest. According to the 2013 Market Test Assessment,³ two main factors have been responsible for the slow increase in HPWH market adoption; (1) the complexity of the technology and (2) consumer purchase patterns for water heaters. Consumers do not typically differentiate between types of water heaters. The HPWH initiative was developed to help overcome these market barriers.

While NEEA recognizes the first cost, aesthetics, purchase patterns and broader technology barriers for the DHP and HPWH technologies must be acknowledged through the initiatives, they identified customer awareness and perceptions around the technologies as a key and addressable barrier to further deployment. As such NEEA contracted with ILLUME Advising to conduct consumer messaging research. The results of this study will help inform NEEA in its messaging and marketing approach for DHP and HPWH technologies.

Key findings from the message testing study follow:

- 1. Consumers are somewhat aware of DHP and HPWH technologies.** Despite NEEA promoting DHPs since 2008, less than half (41%) of survey respondents were aware of the technology. This may seem low when compared to HPWHs, which have a 45%

¹ www.neea.org

² Evergreen Economics. 2014. *Northwest Ductless Heat Pump Initiative Market Progress Evaluation Report #3*. Portland OR: Northwest Energy Efficiency Alliance. Retrieved from <http://neea.org/docs/default-source/reports/northwest-ductless-heat-pump-initiative--market-progress-evaluation-report-3.pdf?sfvrsn=4>

³ Evergreen Economics. 2013. *Northwest Heat Pump Water Heater Market Test Assessment*. Portland OR: Northwest Energy Efficiency Alliance. Retrieved from <http://neea.org/docs/default-source/reports/northwest-heat-pump-water-heater-market-test-assessment.pdf?sfvrsn=6>

awareness, and have only been promoted by NEEA since 2012.⁴ About a quarter of survey respondents who claimed to be aware of DHP technology characterized themselves as “familiar” with it. Similarly, only about a quarter of respondents who claimed to be aware of HPWH technology characterized themselves as familiar with it, and very few have ever seen one.

2. **Despite being unfamiliar, almost all consumers are open to learning more about DHP and HPWH technologies and ultimately purchasing them.** Through the surveys, respondents indicated that they were very receptive to DHPs and HPWHs when considering a heating system or new hot water heater purchase.
3. **For DHPs, upfront cost (58%), concerns about improper installation (57%), and ease of self-install (41%) were the primary barriers noted by respondents.** While a lesser concern, respondents were also apprehensive that DHPs are an unfamiliar technology.
4. **For HPWHs, upfront cost, lack of familiarity and ease of self-install were the primary barriers noted by respondents.** While a lesser concern, respondents were also apprehensive that HPWHs may not be offered by all contractors.
5. **Aesthetic concerns were a barrier (21%) to adoption for DHPs, but the other benefits can help offset those concerns about the technology.** Focus group participants had more concerns about technology aesthetics, with women in particular expressing concerns. That noted, there were benefits that seemed to help quell customer concerns, including the ability to install in different rooms, and features such as safety and comfort.
6. **Consumers intend to purchase a heating system or water heater only when their current heating system breaks down.** This could be a significant barrier to DHPs given the very long life of standard electric heating systems—particularly radiant baseboard units. The aesthetic challenge and installation timeline suggests that part of the “messaging” is to get people to both think about, and install, DHPs sooner than they would in absence of the technology. For HPWHs, given that failure usually requires immediate replacement, ensuring that HPWHs are available at retail or through contractors is critical to market adoption.
7. **Participants indicated that they would seek out contractors for more DHP information (79%).** This ranked well above the next most cited source of information (family and friends at 36%).
8. **While participants indicated that contractors are a key source of information for both technologies,** they also clearly indicate that online ratings and reviews from other customers were very important to the decision-making process. Their utility company, contractors, and friends and family were also influential when making purchase decisions.

⁴ The HPWH awareness may be leaning on the high side because participants may have been confusing the technology with standard tank water heating technologies.

- 9. For both technologies, saving money on energy bills was the message identified as most motivating by participants.** This was followed by saving energy, which most participants described as synonymous with saving money. For DHPs, safety (73%) and ease of operation (68%) were also compelling. Smaller size and “smart” technology were the least motivating. For HPWHs, high-quality investment, including the features of durability and a longer life, were also compelling—but significantly less so than saving money.

1. GOALS AND OBJECTIVES

The Northwest Energy Efficiency Alliance (NEEA) and their partner utilities have been leaders in piloting and promoting programs for Heat Pump Water Heaters (HPWH) and Ductless Heat Pumps (DHPs) in their program portfolio. Seeking to increase market penetration within the region (Idaho, Montana, Oregon, and Washington), NEEA identified that customer awareness and perceptions around these technologies are a key addressable barrier to further deployment. NEEA contracted with ILLUME Advising LLC (ILLUME) to conduct consumer messaging research around DHP technology to address these barriers. This report details findings from that research.

Table 1. Researchable Issues

| Researchable Issues | |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Customer awareness of the available efficiency levels of and general availability of the technology |
| 2 | Customer perceptions of the technologies |
| 3 | Customer barriers to the technology |
| 4 | Customer purchase intentions |
| 5 | The role of installing contractors in helping to message and promote the technology |
| 6 | Delivery vehicles for this type of messaging |
| 7 | The messaging that is most motivating to consumers including the role of installing contractors in helping to message and promote the technology |

2. METHODOLOGY

This study was conducted by email survey followed up with focus groups that were designed to gather deeper insights into those factors and messages that would motivate consumers to purchase a DHP or a HPWH. The research effort targeted single-family homeowners who had

lived in their homes for at least two years; the DHP survey included homeowners who had an electric heating system that was at least ten years old, and the HPWH survey targeted respondents who had an electric water heater that is at least ten years old. Customer representation was sought from the states of Idaho, Montana, Oregon, and Washington.

The survey sample was drawn to reflect a representation of consumers from across the region, and obtaining a representative sample relative to the population of consumers in the region—including those consumers in urban and rural populations. The survey sample also aimed to provide sufficient representation from different climate zones (including climate zones 4, 5, and 6) in order to understand any unique challenges associated with cooler environments. In total, there were 574 respondents to the survey, with 282 respondents for the DHP survey and 292 respondents for the HPWH survey.

Five focus groups were conducted for the effort: three focus groups discussed DHP, including one in Portland, Oregon and two in Spokane, Washington; and two focus groups were conducted for HPWH, including one in Portland, Oregon and one in Spokane, Washington. Focus groups were set up to target single-family homeowners who had lived in their homes for at least two years and had electric heat (DHP) or an electric water heater that is at least ten years old (HPWH).

The focus groups were designed to achieve a mix of participants across rural and urban homeowners, as well as across age, income levels, and ethnicities. Participants were offered an honorarium of \$100 for participating in the focus groups. Twelve participants were recruited for each focus group, seating eight people.⁵ Focus group demographics can be found in Appendix B.

3. FINDINGS

This section of the report presents the key findings from both the DHP and HPWH surveys and focus groups. Qualitative data from the focus groups are presented in conjunction with quantitative data from the survey to illustrate a clearer, more nuanced understanding of the data. As appropriate, significant and meaningful differences across key segments, including climate zone, state, and demographic characteristics, are presented in each section.

This section is divided into seven subsections. The subsections correspond to the seven researchable issues outlined in Table 1 (above), beginning with a discussion of consumer awareness of DHP and HPWH technologies, and ending with subsections addressing delivery vehicles (preferred methods of communications) and messaging prompts. Additionally, figures and tables associated with DHP technology are shown in orange, and figures and tables associated with the HPWH are shown in teal.

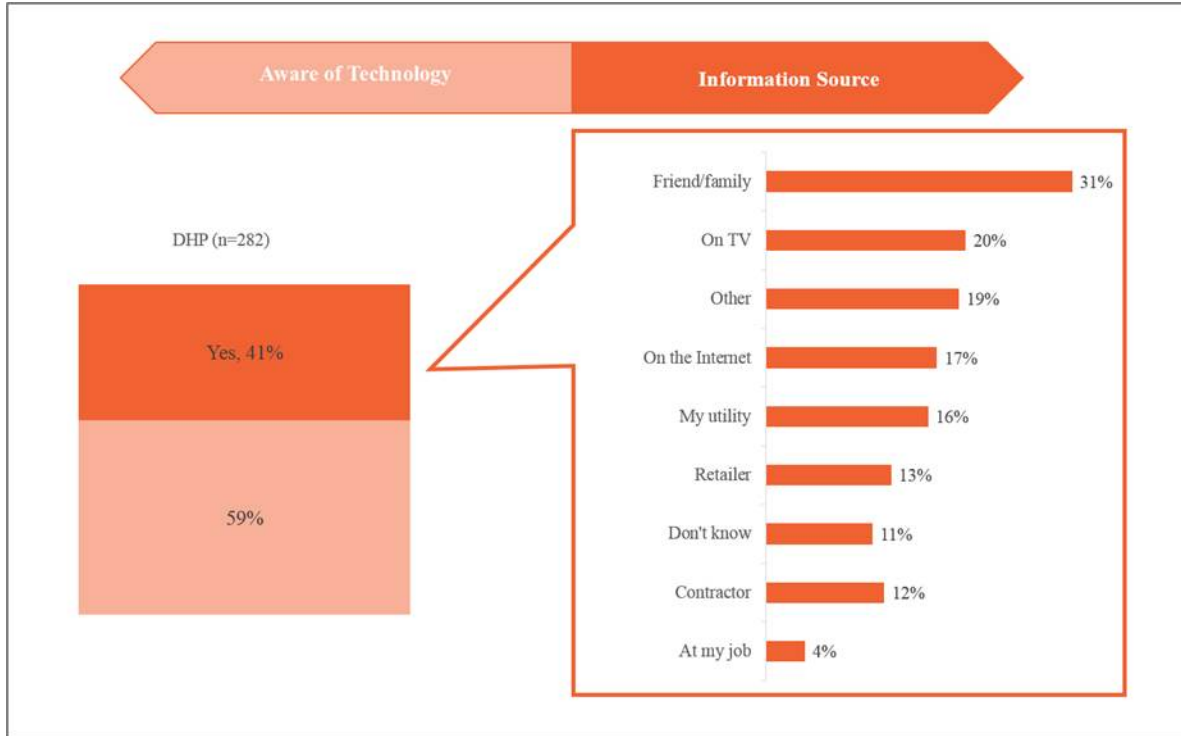
⁵ The first DHP focus group in Spokane, Washington only had four participants as a result a third group was conducted at a later date to achieve the target of seating eight participants.

1.1 AWARENESS

Overall, respondents were somewhat aware of both DHP and HPWH technologies. However, their experience with, and knowledge of, the technologies is limited.

Just over 40% of respondents were aware of DHPs (41% aware, Figure 1). Of the 125 respondents that stated they were “aware” of the technology, only 18% characterized themselves as “familiar” with it.

Figure 1. DHP awareness of technology and sources of information



AWAR1. “Have you heard of a ductless heat pump (sometimes called a mini split)?”

Base: All Respondents, n=282.

AWAR3. “How did you learn about ductless heat pumps? (Please check all that apply)”

Base: Respondents who have heard of ductless heat pumps, n=125.

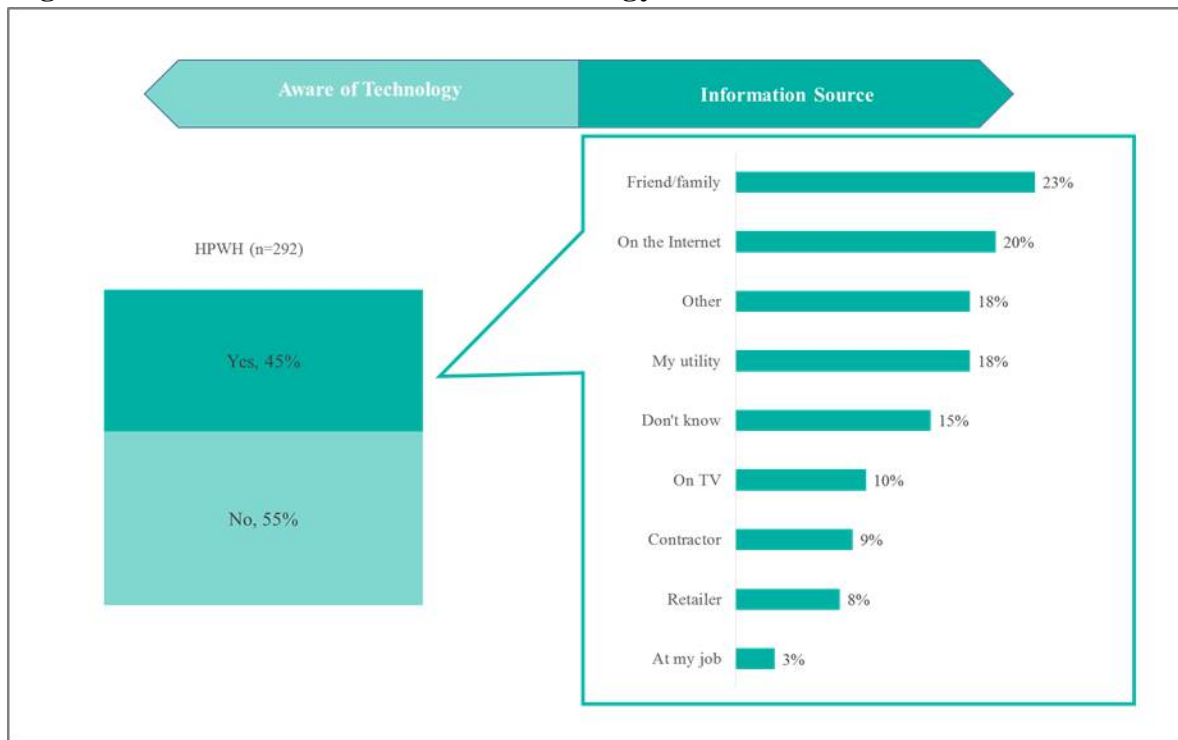
Slightly less than one-half of respondents were “aware” of HPWHs (45% aware, Figure 2), yet only about a quarter of respondents that stated they were “aware” of HPWHs characterized themselves as “familiar” with it, and very few (9% of aware respondents) have ever seen one.

In the focus groups, about half of the participants per group raised their hands when asked if they were aware of DHPs. A number of participants indicated they were familiar only once they realized the technology was the same as a “mini-split.” In the HPWH focus groups, two to three participants per group at most, were aware of HPWHs by name.

“I don’t know anyone who has one.”

“(I heard about it) through media sources... probably This Old House.”

Figure 2. HPWH awareness of technology and sources of information



AWAR1. “Have you heard of a heat pump water heater?”

Base: All Respondents, n=292.

AWAR3. “How did you learn about heat pump water heaters? (Please check all that apply)”

Base: Respondents who have heard of heat pump water heaters, n=134.

In the focus groups about half of the customers per group raised their hand when asked if they were aware of DHPs. A number of participant noted they were only familiar once they realized the technology was the same as a “mini-split.” In the HPWH focus groups, at most, two to three customers per group were aware of HPWHs by name.

“I don’t know anyone who has one.”

“(I heard about it) through media sources... probably This Old House.”

While nearly half of participants were aware of DHPs and HPWHs, there is still enough lack of familiarity and first-hand experience to limit participants’ comfort with both technologies. This is an important issue, given the fact that focus groups participants identified a “widely accepted” technology as important to the purchase decision.

“You always think the newer technology is better, but maybe it’s not.”

“I don’t know everything... I need more information”

“I don’t know enough about it yet”

“New is not necessarily always better.”

“I don’t want to be the guinea pig on something like this.”

“I’m not inclined to buy something that’s so new because you’re left holding the bag if that thing fails.”

Based on the surveys, men were more likely to state that they were both “aware of” and “have seen” DHPs—as were higher income respondents, those in climate zones 4 and 6, and those in Washington. Similarly, the HPWH surveys found that men, higher income respondents, those in climate zones 4 and 6, and those in Washington, were more likely to state that they were both “aware of” and “have seen” HPWHs.

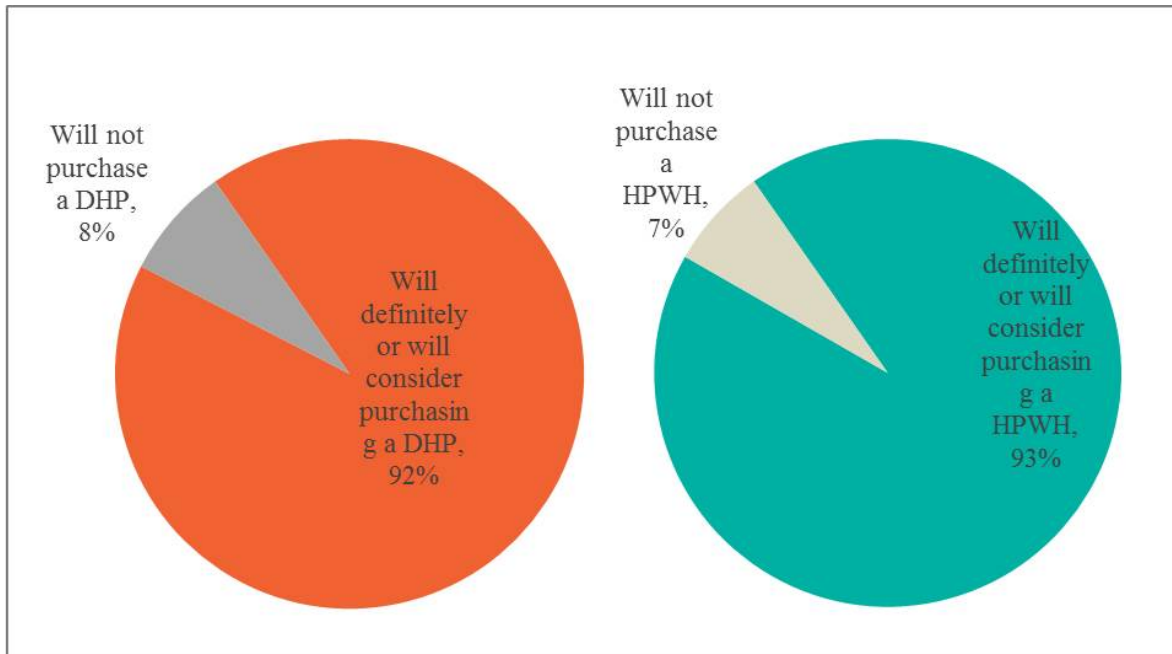
1.2 PERCEPTIONS

As shown in the previous section, just over 40% of respondents were aware of DHPs and almost 50% were aware of HPWHs, but they have limited understanding of, or familiarity with, the technologies. At present, this limited understanding appears to be working in favor of DHPs and HPWHs, as customer perceptions are generally neutral and unformed—the majority of respondents are open to learning more about these technologies and ultimately purchasing them.

Through the surveys, respondents indicated that they will be very receptive to DHPs when considering their next purchase, with 92% saying they will either “definitely purchase” or will “consider purchasing” a DHP when it is time to replace their existing heating system (see Figure 2). Similarly, respondents indicated that they will be very receptive to HPWHs when considering their next purchase, with 93% saying they will either “definitely purchase” (3%) or will “consider purchasing” (90%) an HPWH when it is time to replace their existing electric water heater (see Figure 2).

As demonstrated by these survey results, increasing respondents’ understanding of the technologies and creating opportunities for respondents to experience them may help to increase adoption of DHPs and HPWHs.

Figure 3. DHP and HPWH purchasing likelihood



M5. Based on the information presented today, please tell us which statement best represents your opinion:
 I will definitely purchase a ductless heat pump when I replace my current primary heating system.
 I will consider purchasing a ductless heat pump when I replace my current primary heating system.
 I will not purchase a ductless heat pump when I replace my current primary heating system.
 Base: All respondents, n=281

M5. Based on the information presented today, please tell us which statement best represents your opinion:
 I will definitely purchase a heat pump water heater when I replace my current water heater.
 I will consider purchasing a heat pump water heater when I replace my current water heater.
 I will not purchase a heat pump water heater when I replace my current water heater.
 Base: All respondents, n=290

Focus group participants for both technologies indicated a need to learn more before they would be comfortable installing a DHP or HPWH.

“I don’t know everything... I need more information”

“I don’t know enough about it yet”

“(A DHP is) an expensive unit that usually takes a contractor to install, it’s not something people just go out and do.”

“I’m not sure that it would be better (than what I have now).” “I don’t understand it yet... part of the thing is that you line them all up. I don’t understand what is the difference (between HPWH and conventional water heater).”

“I don’t know the difference between what I have and this (a HPWH).”

Many focus group participants also indicated they wanted detailed information on cost, energy, and install/maintenance costs/needs.

“What’s it cost to repair... and is there anyone out there who can do it?”

“I want to learn more about the functions, how it operates, limitations, all the different things before I’d commit to buying one.”

“I want to know what it costs.”

“What makes it different from a normal electric water heater?”

“Space limitations, whether it would fit in the space I have or if I’d have to make modifications.”

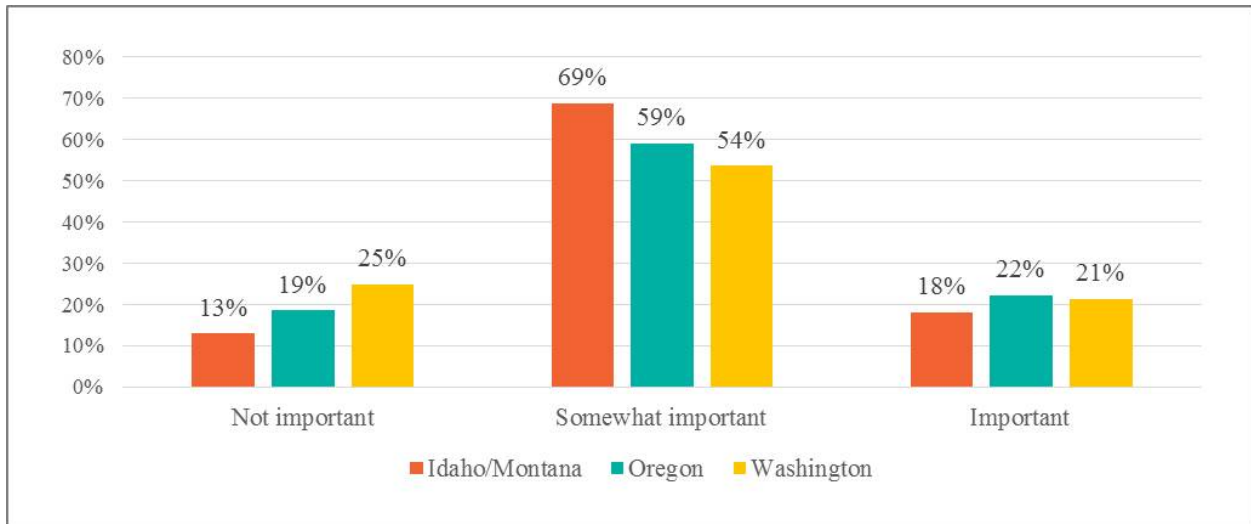
1.3 AESTHETICS

For DHPs, aesthetics of the heating equipment was a concern for participants. Focus group participants in Washington found it a more significant concern—especially women. Notably, the interior head of the DHP was not viewed favorably by about half of the focus group participants—indicating that this may be an important barrier to address in messaging, as participants make trade-offs between DHPs and less prominent heating systems.

Fewer than 21% of all survey respondents indicated that appearance was significantly important to them. While most did indicate that aesthetics were still somewhat important, other benefits may be motivating enough to outweigh those concerns.

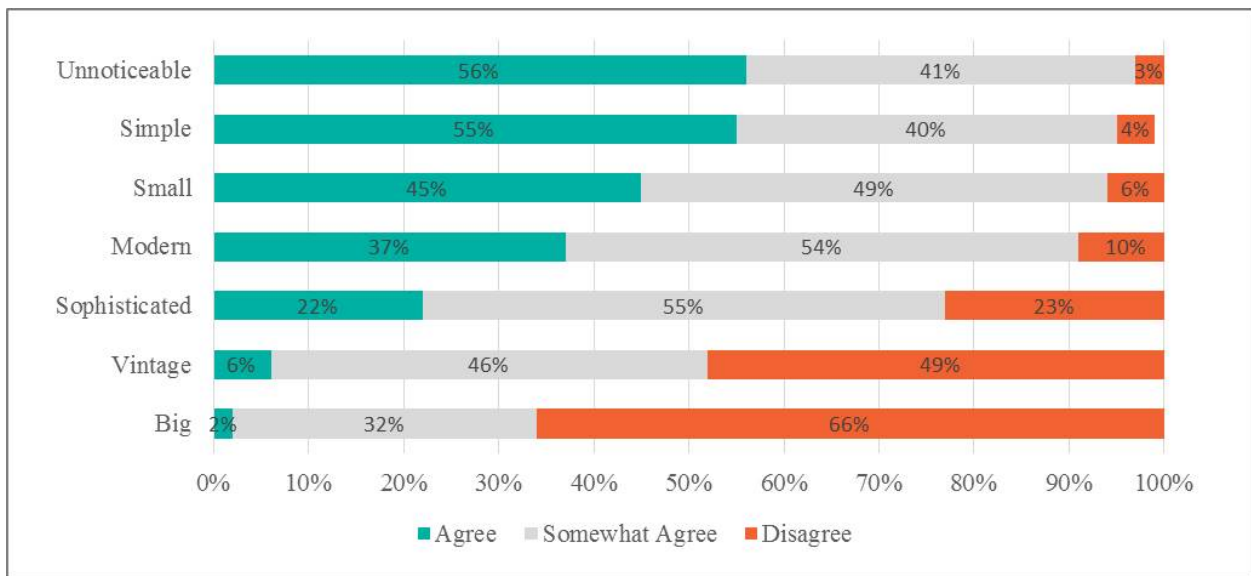
These findings are further reinforced by the surveys, which asked what respondents preferred their heating equipment to look like; survey respondents said that they wanted their equipment to be “simple” (56%), “unnoticeable” (55%), and “small” (45%). (See Figures 3 and 4 below.)

Figure 4. Importance of heating equipment appearance for DHPs



A1. “How important to you is the appearance of your heating equipment?”
 “Very important” and “Not important” based on top 3 and bottom 3 scale options. “Somewhat important” based on the middle 4 scale options.
 Base: All respondents, n=281

Figure 5. Ideal heating technology appearance



A1. “My ideal heating technology would look...”
 “Very important” and “Not important” based on top 3 and bottom 3 scale options. “Somewhat important” based on the middle 4 scale options.
 Base: All respondents, n=281

In the focus groups, participants identified “modern” as a preferred quality, and also noted that other technologies, such as baseboard heaters or radiators, were “ugly.” Among Portland, Oregon focus group participants, aesthetics of DHPs were viewed as relatively unimportant. Most participants noted that they could envision ways of either hiding or decorating the unit.

“This (DHP) doesn’t look too terribly bad.”

“My baseboards are ugly, but I’ve lived with those baseboards a long time.”

“If it’s efficient and cheap, it’s very beautiful.”

By comparison, focus group participants in Spokane, Washington highly prioritized the aesthetics of DHPs. Participants said they would not place DHPs in commonly used rooms in their homes, such as living rooms.

“I don’t like clutter... that thing hanging off the wall, it looks obtrusive.”

“What I have now is pretty unnoticeable, so to have something like this hanging on your wall. And you know what, I’m short, getting up here and dusting it off on top, it’s not anything I’d be interested in doing.”

“I don’t have a lot of wall space.”

In focus groups, men were less likely than women to have concerns of the look of the DHP.

“I have a lot of windows. I have one wall, there’s no electricity on that wall. If I have wall space, I have artwork.” - female participant

“I didn’t care that it wasn’t beautiful, I do care about how much space it takes up.” - female participant

“As a guy, if you don’t like it, put a poster over it.” - male participant

“If I didn’t like how it looked, I’d build something around it.” - male participant

The ability to install DHPs in different areas in their homes, and to have more control over the temperature in those areas, was appealing to focus group participants in both Spokane and Portland, and offers a key opportunity to overcome the aesthetics barrier.

“I like the idea of having the smart technology to individually control rooms.”

“It would be nice to be able to control every area, have control of rooms that are being used. Ours, you turn it on and the whole house is being heated to that temperature, you’ve got that one singular control. It would be nice to be able to control them individually.”

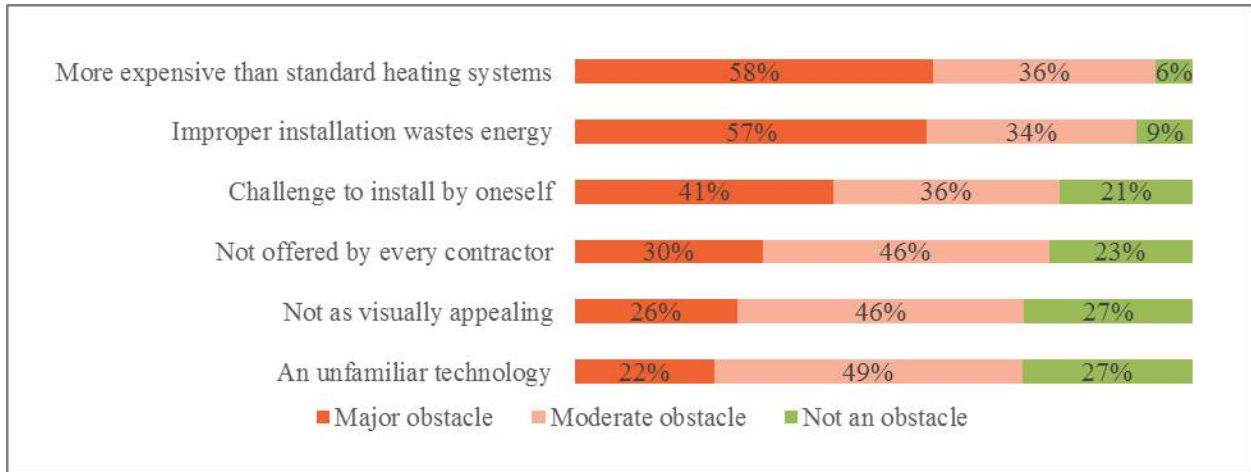
“I’ll heat the front room, but I won’t heat anything else. But if it’s below zero, and I want to heat the bedroom, bathroom, I can.”

The aesthetics of HPWH were not explored as they are not installed in main living spaces in the home.

1.4 BARRIERS

The primary barrier described by both DHP and HPWH survey respondents was the upfront costs of purchase. Following that, DHP respondents identified the uncertainty about installation and the long-term lifecycle maintenance costs. HPWH respondents were also concerned that a HPWH may be hard to install without a contractor, and, while a lesser concern, their lack of familiarity and a concern that HPWHs may not be offered by all contractors were issues for approximately one out of every four respondents (Figure 7).

Figure 6. Obstacles to purchasing DHPs



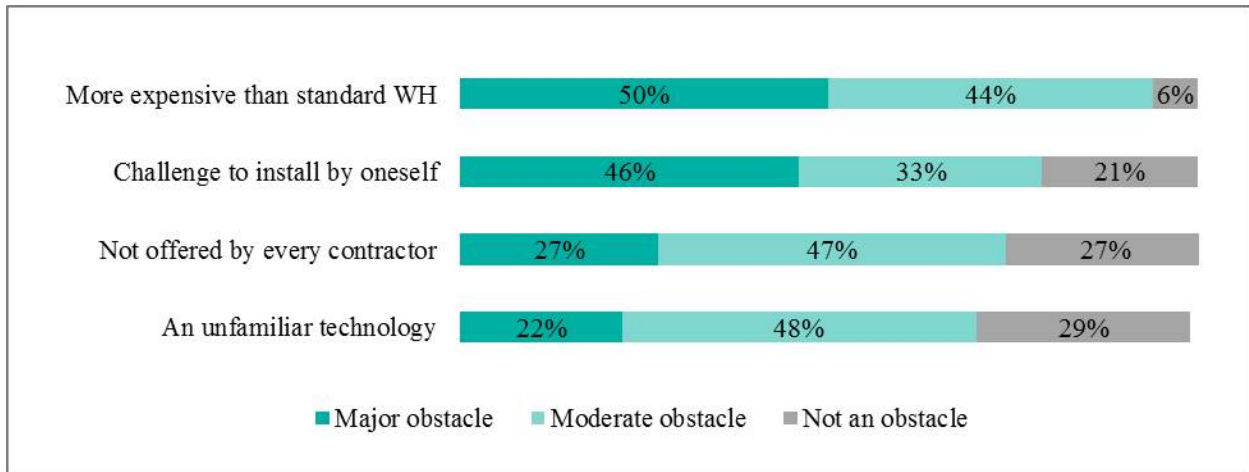
BENE2. While there are many benefits to installing a ductless heat pump, there are also a number of challenges to doing so. On a scale of 1 to 10, where 1 is not an obstacle and 10 is a major obstacle; please indicate how much of an obstacle is each of these factors when choosing between a ductless heat pump and a standard primary heating system.

“Very important” and “Not important” based on top 3 and bottom 3 scale options. “Somewhat important” based on the middle 4 scale options.

Some categories do not sum to 100% due to rounding.

Base: All respondents, n=277.

Figure 7. Obstacles to purchasing HPWHs



BENE2. While there are many benefits to installing a heat pump water heater, there are also a number of challenges to doing so. On a scale of 1 to 10, where 1 is not an obstacle and 10 is a major obstacle; please indicate how much of an obstacle is each of these factors when choosing between a heat pump water heater and a standard water heater. “Very important” and “Not important” based on top 3 and bottom 3 scale options. “Somewhat important” based on the middle 4 scale options.

Some categories do not sum to 100% due to rounding.

Base: All respondents, n=290.

DHP focus group participants also consistently brought up and lingered on the fact that DHPs are typically more expensive than standard electric heating systems. They also described concerns about having to work with contractors for installation and maintenance of DHPs, both because of the associated costs of hiring a contractor and because contractors were not always viewed as trustworthy. In fact, many focus group participants emphasized a need for detailed information on cost, energy, and install/maintenance costs/needs suggesting that until they had more information on this they would be unlikely to consider an installation.

“(A DHP is) an expensive unit that usually takes a contractor to install, it’s not something people just go out and do.”

“I don’t want to spend a lot of time tracking someone down – for repairs, installation, maintenance, etc.”

“What’s it cost to repair... and is there anyone out there who can do it?”

“It’s an expensive unit that usually takes a contractor (because) people don’t install their own.”

Conversely, participants noted that DHPs might be a more desirable solution when compared to putting in a new duct system—an undertaking that would incur significant costs compared to those associated with DHPs.

Participants in the HPWH focus groups also cited the obstacles identified in Figure 6, but more heavily emphasized concerns related to their lack of familiarity with HPWH technologies. In many instances, participants who were concerned with this issue associated a new (or unfamiliar)

technology with risk as a sign that the technology had either not been proven or that the technology was unpopular.

“High technology means high problems.”

“Related to the unfamiliarity of the technology, because if it needs special permitting (or has other unknown challenges)... unless this technology is vetted, I’m not as comfortable.

“If it’s way beyond me, in terms of technology, then I don’t like that.”

Similarly, many HPWH participants were concerned that an unfamiliar technology may be difficult to service and that finding a knowledgeable contractor to maintain the equipment may be challenging. For this reason, participants perceived new technologies as potentially adding to the upfront and lifetime cost of the equipment.

“(New technology) doesn’t have a history to show that it lasts a long time.”

“When I call a contractor to talk about the options, I want to talk about all of the options. So, to me that’s a challenge. If I have to go search for a contractor who only does these, that’s a problem, rather than just calling up (generic) plumber and say ‘come out and talk to me about hot water options.’”

“A challenge to install indicates to me that perhaps there will be a challenge to maintain.”

Based on these findings, continued messaging and outreach efforts to contractors offering HPWHs will be important for long-term market transformation.

There were few significant differences across DHP respondents related to these barriers, although respondents in climate zone 5 were most likely to consider the wasted energy from improperly installed equipment a major obstacle. Higher income respondents were less motivated by the ability to self-install. As such, they were less likely to rate “can be a challenge to install yourself” as a major obstacle. They were also less likely to consider an unfamiliar technology to be an obstacle.

Similarly, for HPWH there were few significant differences across respondents as it relates to barriers although Oregon respondents were slightly more likely to rate “unfamiliar technology” as an obstacle to HPWH installation while those with higher incomes were more likely to rate “not offered by every contractor” as an obstacle to purchase. Oregon respondents were slightly more likely to rate “unfamiliar technology” as an obstacle to HPWH, though the percentage for all states is less than 30%. Finally, women were more likely than men to rate “not offered by every contractor” and “unfamiliar technology” as major obstacles to purchase.

1.5 PURCHASE INTENTIONS

Both DHP and HPWH survey respondents overwhelmingly indicated that they did not intend to replace their existing equipment until it failed; however, there is a different sense of urgency for each technology.

Most of the DHP survey respondents (92%), said that they would not replace their existing equipment before it breaks. This creates a barrier, as many electric resistance systems can be limped along indefinitely and there is rarely a “failure” or “emergency” that requires full system replacements. This finding was supported by focus group participants who noted they not only won’t replace until breakdown—they don’t even plan to think about it until then (or until it is apparent they have a problem with their current system).

“With our current system, you can tell when it’s going down. So we have some time to think about what to do next.”

“I don’t think my system (baseboards) will ever break down.”

“It depends on when it happens, if it’s during the summer, can we wait another winter?”

“You shouldn’t wait till the last minute, unfortunately, I’m one of those people”

This “waiting for failure” tendency creates a significant barrier for DHPs, as existing resistance heating systems tend to have very long lives and are often less expensive to repair than replace. Further, participants with existing ducting are likely to stick with forced air systems since the infrastructure is already in place.

The vast majority of HPWH respondents intend to purchase a new water heater when their current water heater breaks down (73%), not beforehand. Clearly, installing a new water heater (for most respondents) is a replace on failure proposition—few intend to replace before a breakdown. In addition, and as noted earlier, many participants were receptive to HPWHs but the focus group findings indicate that few, if any, will actively seek out information on alternative technology options in the event of an emergency replacement.

“If it’s not broke, don’t fix it. That’s just the way I roll.”

“I might wait a day or two (doing research) but after that, you gotta shower.”

“I’d shop around, compare energy savings, price... but quickly.”

Participants suggested that they would purchase the water heater that is “on the shelf” or on “the truck,” underscoring the importance of market-actor promotion of HPWH for the majority of water heater purchasers.

“If it’s not in the stores, I’m not going to buy it.”

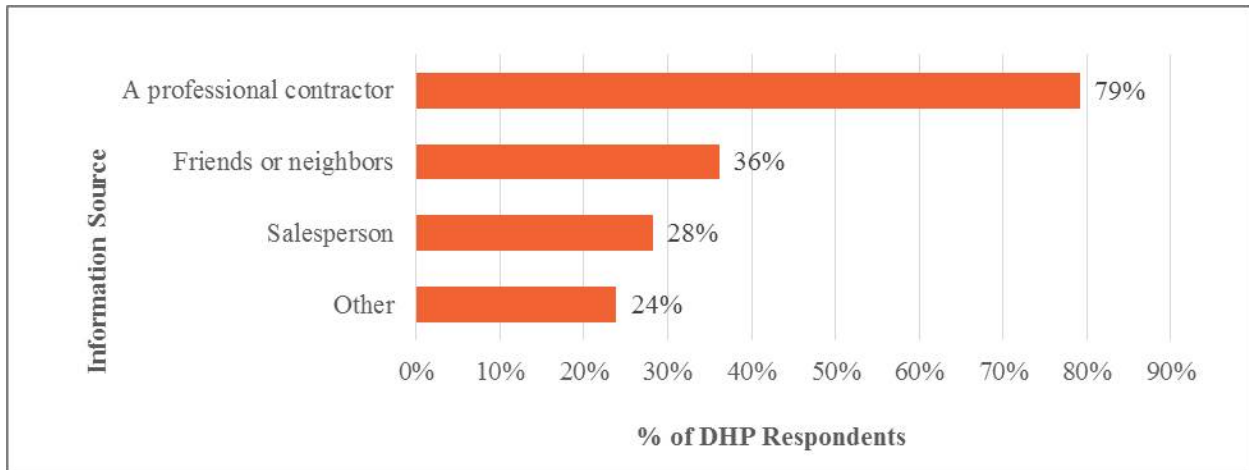
“The last water heater I got was from (name of local plumbing company), I’d probably go back there.”

While men and higher income respondents were significantly more likely to replace a water heater prior to failure/breakdown (as were the higher income respondents), these findings still underscore the need to employ methods to prompt consumers to make the HPWH decision at the point of emergency replacement.

1.6 ROLE OF THE CONTRACTOR

In most cases, contractors play a prominent role in driving respondents toward specific technologies. For DHPs, the majority of respondents (79%) indicated that they would seek out contractors for more information on the technology, followed by friends or neighbors (36%), and salespeople (28%). The results were similar for HPWHs, where 64% of respondents indicated that they would seek out contractors for more information on the technology, followed closely by salespersons (39%) and neighbors (31%). While there appears to be a healthy segment of electric water heating respondents that would self-install a replacement unit, the majority of respondents appear to be inclined to seek out a contractor.

Figure 8. Sources of additional information on DHPs

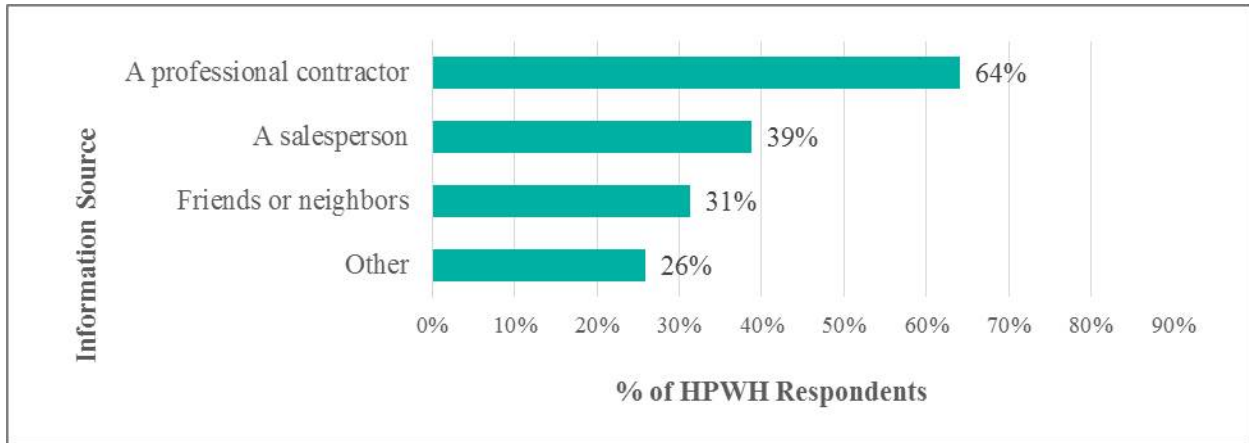


*Respondents could choose more than one answer.

EQUIP2. “When considering a primary heating system purchase, who would you talk to for more information about your product options? (Please check all that apply)?”

Base: All respondents, n=282

Figure 9. Sources of additional information on HPWHs



*Respondents could choose more than one answer.

EQUIP2. “When considering a water heater purchase, who would you talk to for more information about your product options? (Please check all that apply)?”

Base: All respondents, n=292

This preference echoes the findings cited in the previous section, where consumers were most inclined to seek out technologies at the time of installation under primarily emergency situations.

“The water heater I have, I got it installed, I don’t think about it until I have to install a new one...until it doesn’t work... exactly.”

“In a crisis situation, you do the best you can.”

“(A new water heater) doesn’t become part of the budget until it’s an emergency.”

Many customers cited neighbors as a preferred source of information; the focus group findings indicated that customers were most likely to seek out the advice of neighbors, friends, and family members with direct experience in home renovation or general contracting—indicating that technical expertise is a desired attribute of any person they seek out for information.

“(Talk to an informed neighbor), then you get the nitty gritty.”

“I’d talk to my homeowners association, knowing them, they probably have some stipulations... just to make sure that it’s ok to install that equipment and go from there. And maybe they’d have a recommendation.”

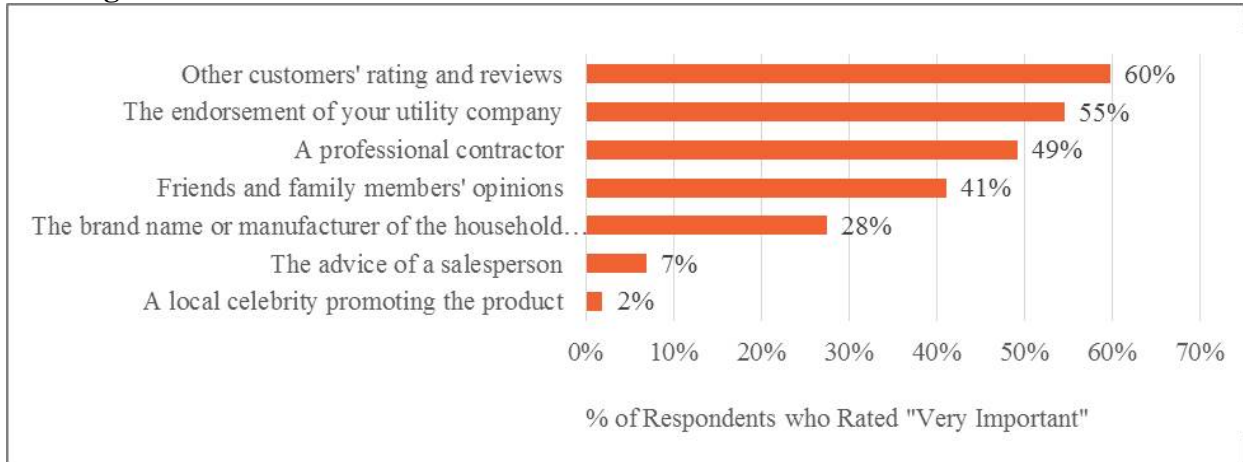
“I’ve got a few friends who do contracting work, so I might go to them, among the other options as well, they probably have experience too.”

“I probably would ask a relative that works for (local contractor), and that would have been part of the contracting piece, he’s an installer.”

1.7 DELIVERY VEHICLES

While the majority of respondents would seek information from contractors, sales people, and family and friends, they clearly indicate that for both technologies “customers” ratings and reviews” and their “utility company” have a considerable amount of influence on the actual decision-making process. While contractors—along with friends and family members, manufacturer brand, and salespeople—also have some influence, they take a backseat to customer ratings and reviews and the local utility (see Figures 10 and 11).

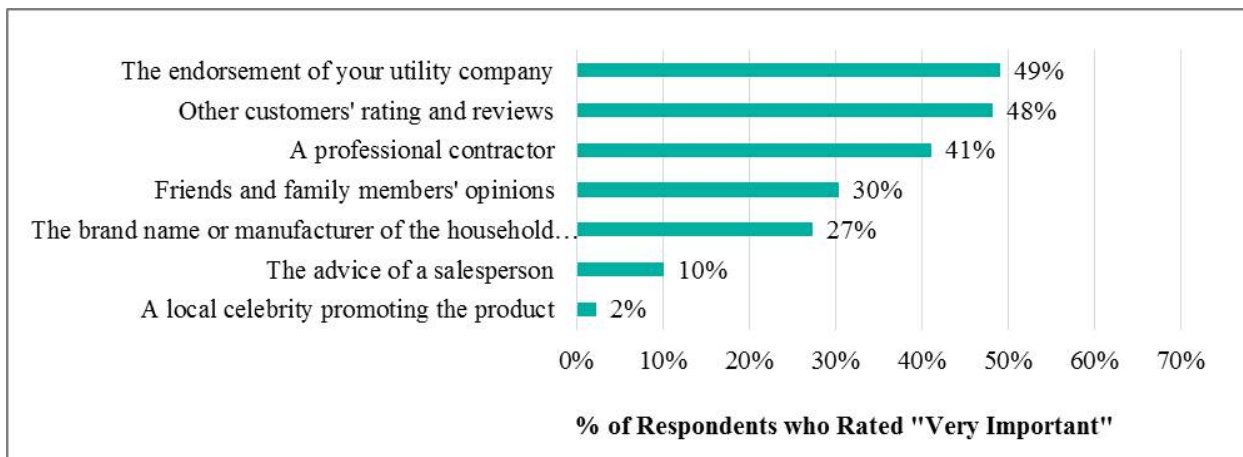
Figure 10. DHP Importance of sources of information on influencing decision-making



EQUIP4. “On a scale of 1 to 10, where 1 is not important at all and 10 is very important, how important are the following sources in influencing your decision when considering a new primary heating system?”

Base: All respondents, n=279 “Very important” based on top 3 scale options (8, 9, or 10)

Figure 11. HPWH Importance of sources of information on influencing decision-making

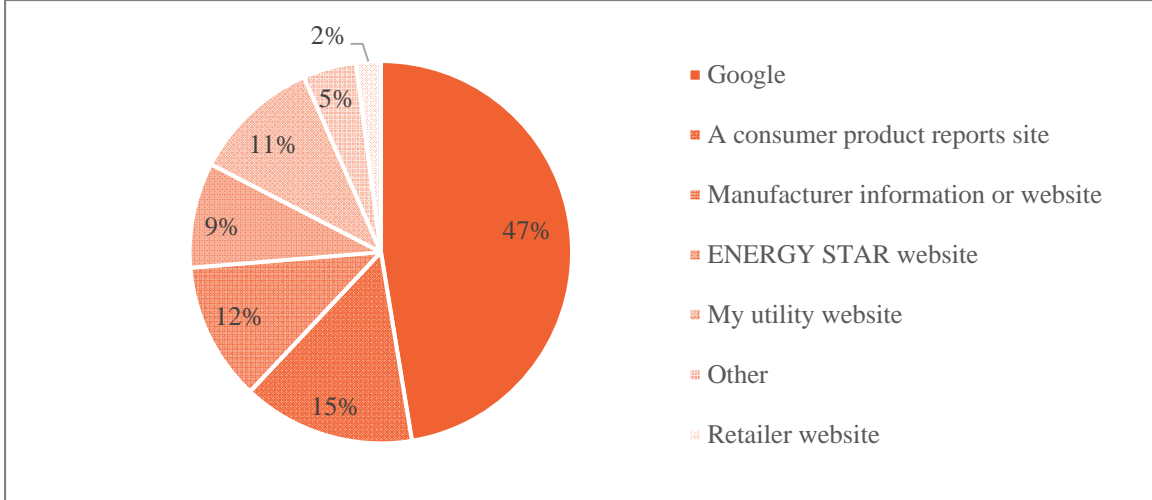


EQUIP4. “On a scale of 1 to 10, where 1 is not important at all and 10 is very important, how important are the following sources in influencing your decision when considering a new water heater?”

Base: All respondents, n=292 “Very important” based on top 3 scale options (8, 9, or 10).

In addition to these information sources and sources of influence, people frequently search the internet for more information about products prior to purchase. When they go to the internet, most people frequently start their research with a Google search or by visiting a consumer products report site. This is consistent across both technologies. However, the next most common source of information differed by technology: for DHPs, 12% of respondents indicated that they would visit the manufacturer website, where as HPWH respondents indicated that they would visit their utility website (13%) for more information.

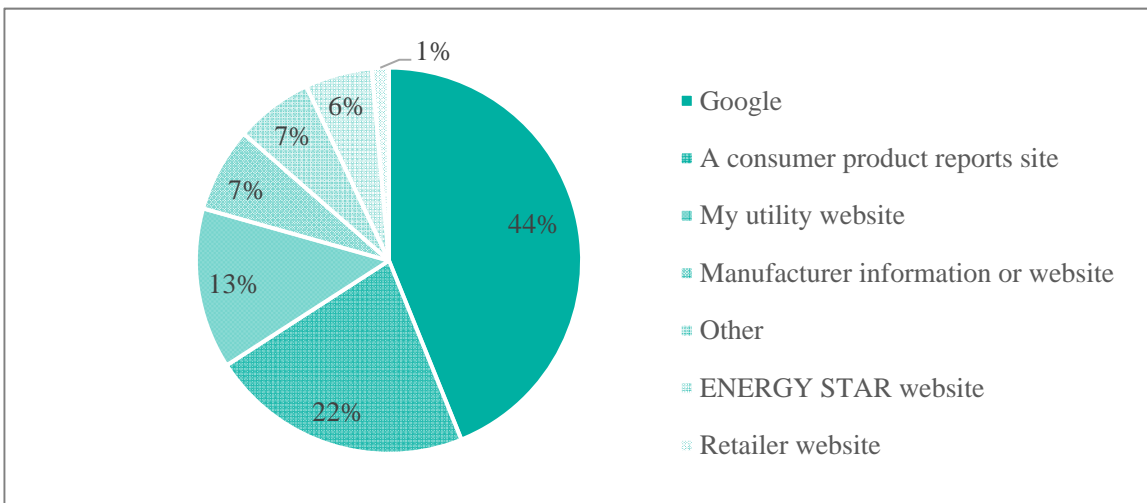
Figure 12. Internet research starting places for DHPs



EQUIP3. “If you were seeking information on the internet related to ductless heat pumps, where would you start your search? (select one)”

Base: All respondents, n=281

Figure 13. Internet research starting places for HPWHs



EQUIP3. “If you were seeking information on the internet related to heat pump water heaters, where would you start your search? (select one)”

Base: All respondents, n=292

Focus group findings indicate that participants favor these sources because they are viewed as honest representations of the technology and are not coming from entities that are trying to sell them a new product.

“I do a lot of things myself, so reading (online) reviews, often I find hints in there of how (what) was a problem and how they overcame it.”

“The (online) feedback gets you thinking, you can kinda break it down to what you think is real.”

“I’d do some research online, so that I could go in and ask specific questions, especially those that they don’t always want to give you the answer to. Like, this one has to be 28 inches off the ground.”

“Consumer Reports is my go-to for virtually everything”

“For a product, I go to Consumer Reports. But I go to DIY, because I like to do most of the things myself, and see what kind of things they had to say about different issues of installing X or Y.”

DHP focus group participants observed that the manufacturer and brand do carry weight with consumers when they are considering the purchase of new equipment. Their concerns ranged from past experiences with the brand, to how long it might take to get replacement parts if the product is manufactured overseas.

“If I’ve had experience with them, then I trust them.”

“Established companies... usually they’ll stand behind (their equipment).”

“I’d never heard of the name (brand) before, but I was assured it was a good one.”

“Brand still matters, but it’s not in my top two (motivations).”

“I want to know where it’s manufactured, where the parts are made.”

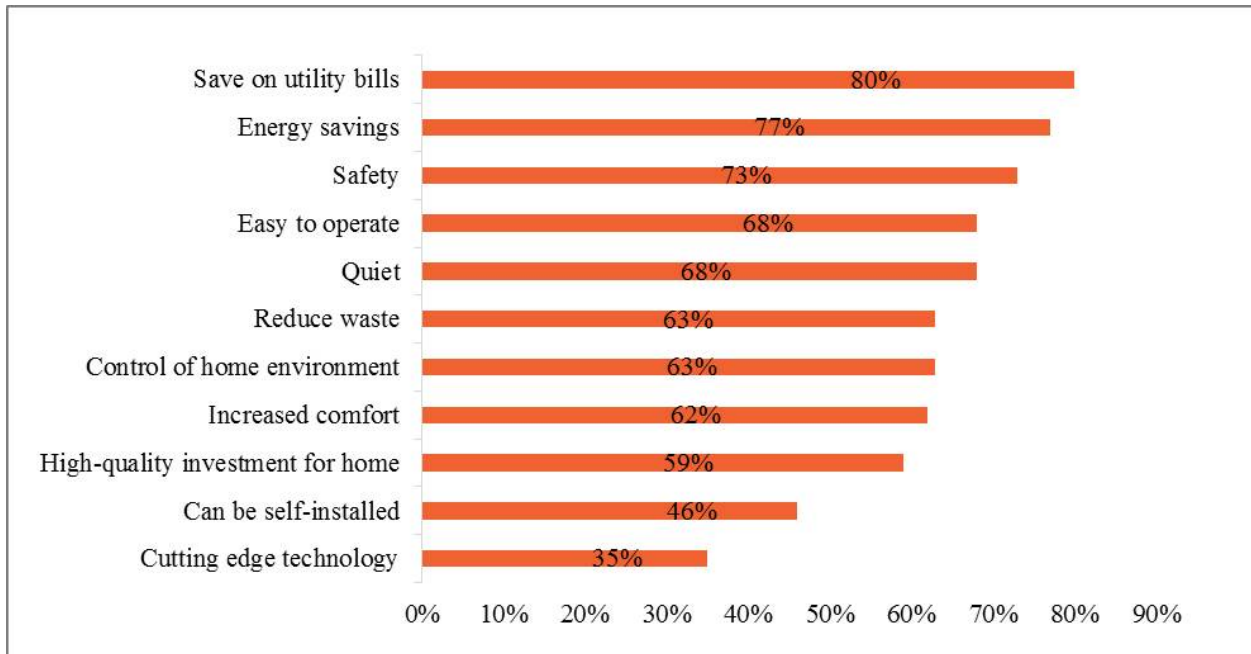
“Do I have to send this back to the factory, back to (foreign country) to get it repaired?”

1.8 MESSAGING PROMPTS

For both technologies, respondents rated “more energy efficient” and “saves on energy bills”—which, incidentally, most see as synonymous—followed by durability/long life as very important benefits for a DHP or HPWH. However, there were more distinctions when considering the most influential messages for each technology.

When considering the most motivating messages, after saving money and energy, DHP respondents identified “safety” (73%) and “easy to operate” (68%) and HPWH respondents identified “reliability” (72%) and “safety” (65%).

Figure 14. Purchasing motivators DHPs

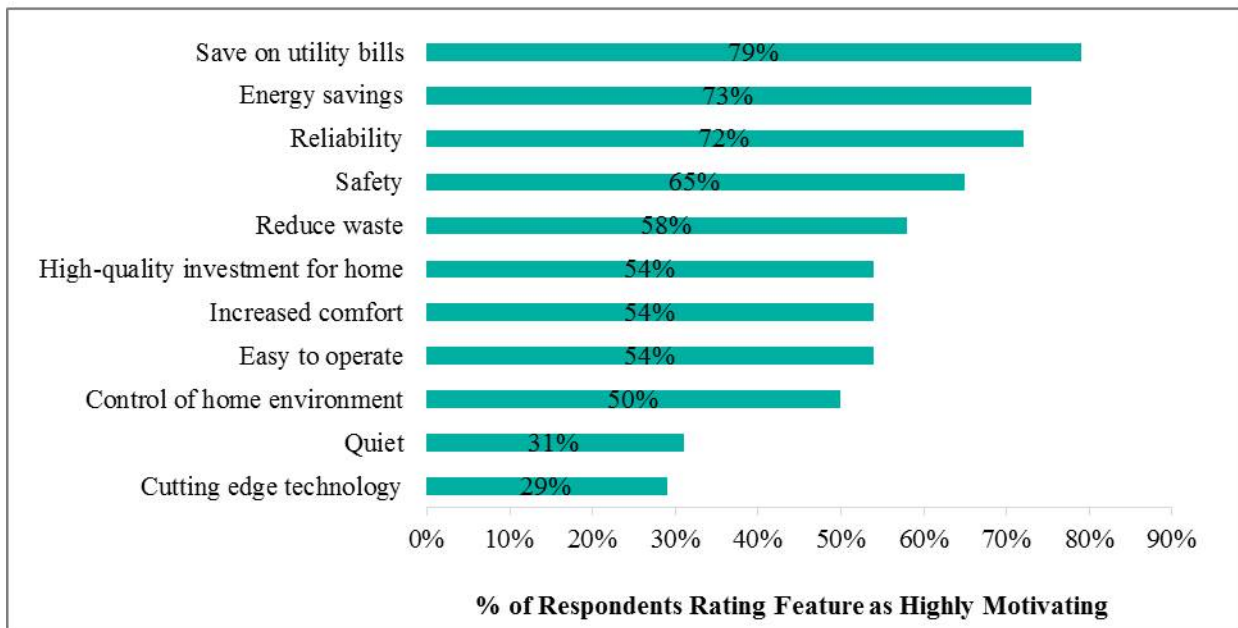


M1. “When making a decision to purchase a ductless heat pump, which of the following are the most motivating to you?”

Base: All respondents, n=280

“Highly motivating” based on top 3 scale options (8, 9, or 10).

Figure 15. Purchasing motivators HPWHs



M1. “When making a decision to purchase a heat pump water heater, which of the following are the most motivating to you?”

Base: All respondents, n=290

When DHP survey respondents were asked to indicate their motivating features in order of importance, over half of respondents (56%) ranked “save on utility bills” as the most motivating. This was followed by 16% who ranked “energy savings” and 13% who ranked “safety,” as most motivating. Notably, “cutting edge technology” was never ranked as most motivating.

When HPWH survey respondents were asked to rank all motivating features in order of importance, nearly half (42%) ranked “save on utility bills” as most motivating. This was followed by 16% who ranked “energy savings” and 12% and 10% who ranked “reliability” and “safety,” respectively, as most motivating. Notably, all the other features tested (the complete list is in Figure 6), were rarely, if ever, ranked as most motivating.

When asked to indicate the importance of underlying features tied to the most motivating benefits, almost all respondents typically ranked messages associated with lower energy bills or lower energy costs as the most motivating. Ninety-eight percent of those who said saving money was the most motivating then indicated that “lower energy bills” was the most important sub-motivation for saving money. This was followed by “lower maintenance costs” and “longer product life”—virtually tied at 90% and 89% respectively.

Table 2. Ranking for related features among DHP and HPWH respondents who said saving money was motivating

| | DHPs | | HPWHs | |
|--------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| | Percent Very Motivating | Percent Less Motivating | Percent Very Motivating | Percent Less Motivating |
| Lower energy bills | 97.8% | 0.0% | 95.1% | 0.5% |
| Lower maintenance costs | 89.6% | 1.8% | 90.1% | 0.8% |
| Longer product life | 89.0% | 0.4% | 85.3% | 1.9% |

*Based on top 3 and bottom 3 scale options.

M2d. “You said *save money* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to saving money:”

Base: Respondents who ranked *save money* an 8, 9, or 10. n=228

M2d. “You said *save money* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to saving money:”

Base: Respondents who ranked *save money* an 8, 9, or 10. n=227

Table 3. Ranking for related features among DHP and HPWH respondents who said energy savings was motivating

| | DHPs | | HPWHs | |
|-----------------------------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| | Percent Very Motivating | Percent Less Motivating | Percent Very Motivating | Percent Less Motivating |
| Reduced electricity bills | 97.7% | 0.0% | 93.6% | 0.0% |
| Using only what I need | 80.0% | 1.7% | 82.0% | 0.5% |
| Avoiding waste | 74.4% | 2.9% | 68.2% | 2.2% |
| Ensuring there are enough resources for the future | 56.8% | 11.6% | 62.6% | 6.3% |
| Reduced carbon or pollution emissions | 53.2% | 15.4% | 61.4% | 7.9% |

*Based on top 3 and bottom 3 scale options.

M2c. “You said *energy savings* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to energy savings:”

Base: Respondents who ranked *energy savings* an 8, 9, or 10. n=216

M2c. “You said *energy savings* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to energy savings:”

Base: Respondents who ranked *energy savings* an 8, 9, or 10. n=212

While saving money and energy were the top motivating messages for both DHP and HPWH, the third most motivating message differed for each technology. DHP respondents cited safety, while HPWH respondents cited reliability as the most motivating message.

Table 4. Ranking for related features among DHP respondents who said safety was motivating

| | DHP | |
|---------------------------------------------------------------------------------|--------------------------------|--------------------------------|
| | Percent Very Motivating | Percent Less Motivating |
| Longer life | 92.5% | 0.0% |
| Durable Construction | 91.0% | 0.0% |
| Ease of use, user friendly | 87.2% | 0.0% |
| Reduced carbon or pollution emissions from the generation of electricity | 57.1% | 13.6% |

*Based on top 3 and bottom 3 scale options.

M2e. “You said *safety* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to safety:”

Base: Respondents who ranked safety an 8, 9, or 10. n=205

Table 5. Ranking for related features among HPWH respondents who said reliability was motivating

| | HPWH | |
|----------------------------------------|--------------------------------|--------------------------------|
| | Percent Very Motivating | Percent Less Motivating |
| Longer life | 95.3% | 0.8% |
| Durable construction | 88.5% | 0.4% |
| Predictability of water heating | 79.4% | 1.8% |
| Ease of use, user friendly | 77.8% | 1.7% |

*Based on top 3 and bottom 3 scale options.

M2e. “You said *reliability* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to reliability:”

Base: Respondents who ranked reliability an 8, 9, or 10. n=211

When asked to pair motivations to generate the most impactful message, most DHP focus group respondents either paired “save money” and “save energy” as they were viewed as one-in-the-same and inextricably linked, or selected “save money” or “save energy” with “durability” or

“safety.” Focus group respondents commented on the cost of having to replace/repair heating equipment making the durability of DHPs an important benefit of the technology. It should be noted that when queried about durability and the longer life of DHPs, compared to other technologies, participants specifically described the importance of durability over the longer life.

“(Saving money and saving energy) go hand in hand, can’t have one without the other”

“If it’s durable, it’s going to last longer. Less expense, less waste.”

“It’s a balance of saving on your bills, reduced waste, and that includes installation cost. I’ve seen baseboard heating that lasts for 50 years, my god, that technology hasn’t changed at all.”

Most HPWH focus group respondents either paired “save money” and “save energy” with “high quality investment” a phrase most participants associated with “durability” or “safety.”

“High quality investment: quality I think about long term, something that isn’t going to fall apart... made in the USA, durability, something that is going to last, something that has standards...something you don’t have to replace all the time.”

“Energy savings means I’m going to save on my bills, and if it’s reliable I’m not going to have to replace it frequently or it’s not going to break down.”

“High quality investment means it has good reviews, it will last a long time.”

For DHP participants, energy savings directly translated to reductions on their monthly energy bills. This was consistent across all groups. Second to that, respondents expressed concerns over safety.

“Safety is always a factor.”

“I don’t want the kids to touch it.”

“I’ve got grandkids, kids, pets, people in the neighborhood...”

Some DHP focus group participants described the appeal of a do-it-yourself approach as well, they want to be able to install the technology and repair it, if needed, without a contractor. This was particularly important among Portland, Oregon focus group participants.

“I can install most things, I can do this too.”

“It seems easy, and if it’s not, then hopefully the cost of hiring someone to do it would not be high.”

“It could be a challenge, but if there’s a great YouTube video...”

“A heat system is not something I would install in my house, so it’s irrelevant.”

Both the survey and focus group findings found that some respondents do consider environmental and sustainability benefits of energy efficient equipment. This is indicated by the motivating factors displayed in Figures 13 and 14 above. Focus group participants for both technologies indicated that reducing waste in order to conserve and share resources was important (in general).

“Energy is a limited commodity... We, as a country, as a people, as a world, need to start conserving energy and finding new sources.”

“A lot of people think that as an economic thing, but it allows you to spend the energy on other things.”

“I wonder if it’s not just saving on the electricity, but if there’s a water (savings) thing too.”

For DHPs, while men and women (79% and 75%, respectively) do not differ significantly with respect to rating “saving energy” and “saving money” as motivating, women were more likely than men to rate the benefits such as safety, control, smart technology, and ease of use as important. Respondents with incomes greater than \$40,000 per year were less likely to rate “save energy” as a motivator. Additional detail on significance across topic categories is outlined Appendix C.

With HPWHs, while men and women (70% of both groups) do not differ with respect to rating “saving energy” and “saving money” as motivating, women were more likely than men to rate the benefits like safety, control, smart technology, and ease of use as important. Higher income respondents were less likely to rate “save energy” as a motivator. Oregon residents were more likely than residents of Washington to rate “more control over water temperature” as an important benefit while Washington residents place value in “reduce pollution”. Finally, rural residents were more likely to rate “comfort” and “quiet” as motivating factors. Additional detail on significance across topic categories is outlined Appendix C.

These findings indicate that while saving energy and saving money were far and away the most important benefit and motivating feature NEEA should consider secondary messages as important to communicating the benefits of DHPs and HPWHs, emphasizing the added value of these motivators, specifically safety and reliability, in addition to saving money or saving energy.

4. CONCLUSIONS

As indicated in the survey and the focus groups, most respondents are making equipment purchase decisions at the time of equipment failure. As a result, it is important to ensure that consumers are familiar with the DHP and HPWH technologies—including key features and benefits—in advance.

Given customer propensity to both make equipment replacement decisions at the point of failure and rely on contractors, it is important for messaging to target both the end consumer and installation contractors.

While consumers typically replace heating equipment at the point of failure (or near failure), this dynamic presents a challenge when it comes to marketing DHPs for several reasons. First, DHPs impact both the internal and external aesthetics of a home. Given this, it is important to educate consumers early (prior to failure) and give them time to ponder a replacement decision (and its impact on both internal and external aesthetics). Second, DHPs undoubtedly take some time to plan and install—it is not a quick replacement of “like” equipment. The aesthetic challenge and installation timeline suggest that messaging should focus on encouraging consumers to both think about, and install, DHPs sooner than they would in absence of the technology. Data indicates that the probability of a customer replacing an existing heating system (be it electric forced air or resistance heat) with a DHP is significantly reduced if the decision (and installation) is not made prior to the failure of the existing system.

While messaging should focus on energy and bill savings, contractors must be able to talk about the benefits of the DHP or HPWH and have them “on the truck.” While contractors are a key source of information, education, product delivery, and installation, it is also important to consider what appears to be a significant Do-It-Yourself market. To serve this market, retailers must have knowledgeable sales staff and, as importantly, product on the shelf.

While it is not surprising that many consumers turn to their utility for information and guidance on energy-efficient equipment, general internet searches and related online resources (such as customer reviews) appear to be important to many consumers. In this respect, it appears that consumers view other online commenters as peers—elevating them to a level of credibility that, in times past, may have been reserved for family, friends, and neighbors.

It is clear that messaging around energy savings and bill savings, which most participants consider one and the same, are the most significant motivators of purchasing behavior. DHP respondents also responded to messages around safety, comfort, and control over their environment. For HPWH respondents, making a high-quality investment was appealing and captured a number of additional benefits to new equipment, including safety and reliability.

While aesthetics were a concern for DHP survey and focus groups respondents, once the benefits of the technology were explained—particularly the ability to solve comfort issues in problematic areas of the home—many were more interested in the benefits than the aesthetics. Nevertheless, the issue of aesthetics cannot be overlooked.

Conversely, both the focus groups and surveys support the notion that water heaters are an out-of-sight, out-of-mind technology. That is, they are frequently hidden in a space that is rarely visited (such as a basement, closet, or garage) and consumers simply don’t think about their water heater (or care to look at it) until they either lack sufficiently hot water or have no hot water at all. Therefore, it should be of little surprise that attributes such as “cutting edge” or “smart” technology have little appeal to consumers. Few appear to plan on “showing off” their new water heater to friends, family members, or neighbors.

Overall, it is clear that consumers will consider a new, proven technology that will save them money (energy) as long as they are convinced that the energy savings claims are credible and, perhaps as importantly, that the technology will be both reliable and safe.

Based on these data and focus group results NEEA should consider the following recommendations:

- Because resistance heating systems rarely “fail,” consider messaging that will **prompt DHP installation for other reasons** instead of relying on sales at the time of breakdown.
- Consider ways to **prompt the desired behavior** at the time of breakdown for HPWHs since they are rarely preemptive replacements.
- **Make sure contractors understand the benefits** of each technology and can work as an effective channel.
- **Messaging at/on consumer review sites is highly influential** and should be leveraged.
- Provide information that **shows the full purchase and maintenance costs** against the potential savings for both technologies.
- **Spend time explaining the safety benefits of the DHP technology**; consumers are motivated by the idea that the DHP is a safer technology.
- **DHP aesthetics are a concern, more so with women than men; however** the other benefits (safety, comfort) and the flexibility to install where you want/need (to solve comfort issues within various areas of the home) helps overcome that concern.
- **Pay attention to the Do-It-Yourself market** in messaging, making sure information is available at the point of retail purchase.
- **Control and a more comfortable environment ranked as quite motivating for DHP consumers** and should be considered in all messaging over other topics like the look or the idea that it is a cutting-edge technology.

APPENDIX A – QUOTAS AND ANALYSIS POINTS

Quotas and Analysis Points

| | HPWH | DHP | Quota | Quota and Type |
|-----------------------------------------------------------------------------------------------------------------------|-------------|------------|------------------------------------|-----------------------|
| 1. Technology quotas | x | x | 250 each | Hard |
| 2. Heating Zone 3 | x | x | 75 total across technologies | Hard |
| 3. Location, urban or rural | x | x | NA | Analysis Point |
| 4. Customer age (goal is to understand barriers to demographic 25 to 45 who have lower technology adoption) | x | x | NA | Analysis Point |
| 5. Retirees | x | x | NA | Analysis Point |
| 6. Higher household income | x | x | NA | Analysis Point |
| 7. Recent replacement of a hot water heater with a standard tank style electric water heater instead of a HPWH | x | | NA | Analysis Point |
| 8. Others as identified in interviews and discussion with the team | x | x | NA | Analysis Point |

APPENDIX B – FINAL DEMOGRAPHICS

Final Survey Demographics

| | DPH (n=282) | HPWH (n=292) |
|--------------------------------|--------------------|---------------------|
| <i>State</i> | | |
| Idaho/Montana | 29 | 48 |
| Oregon | 109 | 108 |
| Washington | 144 | 136 |
| <i>Location</i> | | |
| Urban | 208 | 214 |
| Rural | 74 | 78 |
| <i>Climate Zone</i> | | |
| Zone 4 | 201 | 195 |
| Zone 5 | 59 | 62 |
| Zone 6 | 22 | 35 |
| <i>Age</i> | | |
| 18-29 | 6 | 1 |
| 30-44 | 31 | 6 |
| 45-64 | 122 | 102 |
| 65+ | 123 | 180 |
| <i>Household Income</i> | | |
| < \$40k | 80 | 60 |
| \$40-80k | 111 | 103 |
| \$80-120k | 36 | 43 |
| \$120k+ | 21 | 23 |

Final Focus Group Demographics

| | DHP Focus Group Participants (n=20) | HPWH Focus Group Participants (n=16) |
|--------------------------|------------------------------------------------|-------------------------------------------------|
| Gender | | |
| Male | 7 | 8 |
| Female | 13 | 8 |
| Age | | |
| <40 | 2 | 1 |
| ≥40 | 18 | 15 |
| Home Ownership | | |
| 2-9 years | 7 | 5 |
| ≤10 years | 13 | 11 |
| Household Income | | |
| ≤\$50K | 9 | 7 |
| \$50K-\$100K | 6 | 4 |
| ≥\$100K | 5 | 5 |
| Water Heater Age* | | |
| <10 years | N/A | 3 |
| ≥10 years | N/A | 5 |

APPENDIX C- SIGNIFICANCE

The following sections discuss significant findings for states, climate zones, gender, income, and other demographic characteristics for each technology.

DHP SIGNIFICANCE

This section outlines significant differences (at the 90% confidence level) across important segments and demographic characteristics of interest. Key segment and demographic comparisons include: gender, income, climate zone, state, and urban/rural. It is important to keep in mind, when reviewing the findings, that a total of 282 DHP surveys completed. As a result, comparisons within a key segment or demographic characteristic involve comparing groups where the number of survey completions for each group is, by definition, less than 282. This is particularly important to keep in mind for those comparisons where there are more than two groups being compared for example, four income brackets, three climate zones, four states. Given the limited number of respondents for most groups, it is important to keep in mind the differences that may “test” out as statistically significant, may not be—for lack of a better term—significant in a practical sense. In other words, the percentage difference separating the groups may not be all that compelling.

Gender

Men are more likely to state that they are both “aware of” and “have seen” DHPs. They are also more likely than women to state that they are the replacement decision-maker.

Women are more likely than men to rate all purchasing motivators as motivating, with significant differences for the increased safety and control over their environment.

Similarly, across all possible DHP benefits and barriers, women are more likely than men to rate the benefits as important and the barriers as obstacles. The differences are statistically significant for one benefit, reducing indoor air pollution and one barrier, lack of availability at every contractor.

Men and women agree on the importance of the appearance of heating equipment with roughly 20% of each group stating it is very important but significantly more women want their heating technology to look modern, unnoticeable, simple and small.

Income

Higher income respondents are more likely to have seen a DHP and are less motivated by the ability to self-install. As such, they are less likely to rate “can be a challenge to install yourself” as a major obstacle. They are also less likely to consider an unfamiliar technology to be an obstacle.

Lower income respondents are more likely to rate “reduce waste” as a motivator. They are also more likely to consider the increased expense a barrier to purchasing a DHP.

Climate Zone

Climate zone 4 respondents are more “aware” of DHPs and are also more likely to have “seen” one and to replace their current heating system before failure. When researching their options, zone 4 respondents are more likely to use their utility website (though still low at 13.6%) and to talk to a professional contractor. They also have a stronger preference for heating technology that looks unnoticeable, sophisticated and simple.

Respondents in climate zone 5 are consider the wasted energy from improperly installed equipment a major obstacle. They are also most likely to start their internet search for product information with Google. Compared to respondents in zone 4, they are more likely to rate durability as very important and less likely to consider unfamiliar technology a barrier.

Though there were only 21 respondents in climate zone 6, they were significantly less likely to rate “provide more comfort”, “are quiet”, and “help you control your environment” as motivators.

State

As compared to other states, more respondents in Oregon know where to purchase a DHP and they are more likely to replace prior to failure of their current heating system. They also are more likely to find cutting-edge technology highly motivating. Compared to respondents in Washington, they place more importance on the reviews of other customers and saving on energy bills. They also find reducing waste more motivating than respondents in Washington.

Fewer respondents in Idaho and Montana have heard of or seen a DHP. When seeking information on a primary heating system, they are least likely to talk to a professional contractor for more information. They are also least likely to prefer unnoticeable or simple heating equipment.

Rural/Urban

While similar percentages of urban and rural respondents have heard of a DHP, more rural respondents have seen one. They are also more likely to have learned about the technology through a friend or family member whereas the urban respondents were more likely to have learned about the technology through their utility or a contractor.

Rural respondents are more likely to refer to a consumer product report website when doing internet research and they are more deterred by the lack of availability at every contractor.

Urban respondents are more likely to replace prior to failure, to talk to a professional contractor for more information and are more motivated by cutting-edge technology. They also have a stronger preference for heating equipment that looks sophisticated and simple.

HPWH SIGNIFICANCE

This section outlines significant differences (at the 90% confidence level) across important segments and demographic characteristics of interest. Key segment and demographic comparisons include: gender, income, climate zone, state, and urban/rural. It is important to keep in mind, when reviewing the findings, that a total of 292 HPWH surveys were completed. As a result, comparisons within a key segment or demographic characteristic involve comparing groups where the number of survey completions for each group is, by definition, less than 292. This is particularly important to keep in mind for those comparisons where there are more than two groups being compared for example, four income brackets, three climate zones, four states. Given the limited number of respondents for most groups, it is important to keep in mind the differences that may “test” out as statistically significant, may not be—for lack of a better term—significant in a practical sense. In other words, the percentage difference separating the groups may not be all that compelling.

Gender

Men are more likely to state that they are both “aware of” and “have seen” HPWHs. They are also more likely than women to 1) replace a water heater prior to failure/breakdown, and 2) state that they are the replacement decision-maker.

While men and women (70 percent of both groups) do not differ with respect to rating “saving energy” and “saving money” as motivating, women are more likely than men to rate all other purchasing motivators as motivating. Similarly, across all possible HPWH benefits, women are more likely than men to rate the benefits as important. The differences are statistically significant for four benefits: safety, control, smart technology, and ease of use.

Similarly, while men and women (70 percent of both groups) do not differ with respect to rating utility bill savings, energy efficiency, and durability as important, women are more likely than men to rate “not offered by every contractor” and “unfamiliar technology” as major obstacles to purchase.

Income

Higher income respondents are more aware of HPWHs, more willing to purchase prior to failure/breakdown, and less likely to say the expense (increased cost) is an obstacle to purchase. They are also more likely to rate “not offered by every contractor” as an obstacle to purchase. Higher income respondents are also less likely to rate “save energy” as a motivator.

Climate Zone

Climate zone 4 and 6 respondents are more “aware” of HPWHs, while climate zone 6 respondents are also more likely to have “seen” one. Climate zone 5 respondents are more likely to cite “challenge to install” as a major obstacle.

State

Washington respondents are less likely to have “seen” a HPWH and less likely to rate “reduce pollution” as an important benefit. Washington and Oregon respondents (as compared to Idaho and Montana) are also more likely to purchase a water heater prior to failure/breakdown.

Respondents from Oregon are more likely than residents of Washington to rate “more control over water temperature” as an important benefit. Oregon respondents are slightly more likely to rate “unfamiliar technology” as an obstacle to HPWH installation, though the percentage for all states is less than 30 percent.

Rural/Urban

Rural residents are more likely to purchase a water heater prior to failure/breakdown and to rate “comfort” and “quiet” as motivating factors.

APPENDIX D – SURVEYS

DHP SURVEY

Goal: This survey evaluates NEEA customers’ understanding of Ductless Heat Pumps (DHP) technology, as well as their perceptions of this equipment and motivations toward purchasing it. Its primary goal is to support DHP messaging and marketing campaigns.

Targets: The survey targets single-family homeowners who have lived in their homes for at least two years and have electric resistance heating as their primary source of heat.

E-MAIL TEXT:

Dear Homeowner,

ILLUME Advising, LLC is conducting a market research study to understand your experience with, and understanding of, heating technologies. We invite you to take a brief survey to share your experience. Your participation will give us invaluable feedback on how to promote more efficient energy technologies.

If you have any questions, please contact ILLUME at research@illumeadvising.com.

Please click here to access the survey. It will take about 15 minutes.

Thank you,

ILLUME Advising, LLC

[Screen break]

BASIC SCREENING

- S1 Which best describes your home?
1. Own a single family home
 2. Rent a single family home [THANK AND TERMINATE]
 3. Live in a multi-family dwelling [THANK AND TERMINATE]
 4. Other [THANK AND TERMINATE]

- S2 How many years have you lived in your current home?

1. ___ year/s. [IF 1 OR LESS, THANK AND TERMINATE]

[Screen break]

- S3 How old is your heating equipment?

1. Less than 10 years old [THANK AND TERMINATE]
2. At least ten years old
3. I don't know [THANK AND TERMINATE]

[Screen break]

[ASK IF S3=2, ELSE AWAR1]

S4 When do you anticipate needing to replace your primary heating system?

1. Within the next two years
2. More than two years, but less than ten
3. Ten or more years
4. I don't know

[Screen break]

S5 What is the fuel for your current *primary* heating system?

1. Electricity
2. Natural gas [THANK AND TERMINATE]
3. Wood [THANK AND TERMINATE]
4. Other [THANK AND TERMINATE]

[Screen break]

S6 What type of primary heating system is currently installed in your home?

1. Forced air furnace
2. Baseboard/radiant heating
3. Wood heating
4. Other, please describe. [OPEN END]

[Screen break]

S7 Do you use a *secondary* heating system in addition to the primary heating system?

1. No
2. Yes, please describe. [OPEN END]

GENERAL AWARENESS & PERCEPTIONS OF DHP TECHNOLOGY

AWAR1. Have you heard of a ductless heat pump or mini split?

1. Yes

2. No

[Screen break]

[ASK IF AWAR1=1; ELSE GO TO AWAR4]

AWAR2. How familiar are you with this technology?

| Not familiar at all | | | | | | | | | | Very familiar | |
|---------------------|---|---|---|---|---|---|---|---|----|---------------|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | |

[Screen break]

AWAR3. How did you learn about ductless heat pumps? (Please check all that apply)

1. Through my utility.
2. A friend or family member.
3. At my job.
4. Through a contractor.
5. Through a retailer.
6. On the TV.
7. On the Internet.
8. Other: [Please describe]
9. Don't remember/don't know

[Screen break]

AWAR4. A ductless heating and cooling system is a highly efficient zonal heating and cooling system that does not require the use of air ducts. Ductless systems consist of an outdoor compressor unit and one or more indoor air-handling units, called “heads,” linked by a dedicated refrigerant line. Indoor heads are typically mounted high on a wall or ceiling covering a three-inch hole where the refrigerant line passes through from the outside unit, which is mounted at the base of the house. Each indoor head corresponds with a heating and cooling zone that can be controlled independently.

This is a ductless heat pump. Have you seen this equipment in person before?

1. Yes
2. No



[Screen break]

AWAR5. On a scale from 1 (completely disagree) to 10 (completely agree), please indicate your assessment of the following statement: “I know exactly where to go to find a ductless heat pump in my area.”

Completely
disagree

1

2

3

4

5

6

7

8

Completely
agree

9

10

[Screen break]



UNDERSTANDING OF ENERGY BENEFITS & BARRIERS TO INSTALLATION

BENE1. There are a number of benefits to owning a ductless heat pump. For each benefit listed below, on a scale of 1 to 10, where 1 is not important at all and 10 is very important, please indicate how important this benefit is to you when considering a new primary heating system. [ROTATE]

| Ductless heat pumps ... | Not important at all | | | | | | | | Very important | |
|---------------------------------------------------------------------------------------|----------------------|---|---|---|---|---|---|---|----------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. ...are smaller than other primary heating systems | | | | | | | | | | |
| b. ... are up to two times more energy efficient than other primary heating systems | | | | | | | | | | |
| c. ...provide more direct user control over temperature | | | | | | | | | | |
| d. ...can save you 25%-50% on your energy bills | | | | | | | | | | |
| e. ... can help reduce indoor air pollution | | | | | | | | | | |
| f. ...are more durable and have a long life compared to other primary heating systems | | | | | | | | | | |
| g. ... are safer than some other types of heating | | | | | | | | | | |
| h. ... are easier to install than standard primary heating systems | | | | | | | | | | |
| i. ... are a “smart,” advanced technology | | | | | | | | | | |
| j. ... increase the comfort of your home. | | | | | | | | | | |

[Screen Break]

BENE2. While there are many benefits to installing a ductless heat pump, there are also a number of challenges to doing so. On a scale of 1 to 10, where 1 is not an obstacle and 10 is a major obstacle, please indicate how much of an obstacle is each of these factors when choosing between a ductless heat pump and a standard primary heating system. [ROTATE]

| Ductless heat pumps... | Not an obstacle | | | | | | | | A major obstacle | |
|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---|---|---|---|---|---|---|------------------|-------------------------------------------------------------------------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. ... are typically more expensive than standard primary heating systems |  | | | | | | | | | |
| b. ...can be a challenge to install yourself | | | | | | | | | | |
| c. ...are not offered by every contractor | | | | | | | | | |  |
| d. ...are an unfamiliar technology | | | | | | | | | | |
| e. ... may not be as visually appealing as a built in central system | | | | | | | | | | |
| f.... improperly installed equipment may waste energy | | | | | | | | | | |

[Screen break]

AESTHETICS

A1. How important to you is the *appearance* of your heating equipment?

Not important at all Very important

1 2 3 4 5 6 7 8 9 10

[Screen break]

A2. My ideal heating technology would look... [ROTATE]

| My ideal household heating technology would look... | Strongly Disagree | | | | | | | | Strongly Agree | |
|-----------------------------------------------------|-------------------|---|---|---|---|---|---|---|----------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. modern | | | | | | | | | | |
| b. vintage | | | | | | | | | | |
| c. unnoticeable | | | | | | | | | | |
| d. sophisticated | | | | | | | | | | |
| e. simple | | | | | | | | | | |
| f. big | | | | | | | | | | |
| g. small | | | | | | | | | | |

[Screen break]

A3. What concerns would you have if you placed a ductless heat pump in your living room?

[OPEN END]

[Screen break]

PURCHASE OF NEW EQUIPMENT

EQUIP1 Who is the primary decision maker in your home when it comes to something like the purchase of a new primary heating system?

1. Me
2. Someone else in my household
3. It is a joint decision

[Screen break]

EQUIP2. When considering a primary heating system purchase, who would you talk to for more information about your product options? [Please check all that apply]

1. Friends or neighbors
2. A professional contractor
3. A salesperson
4. Other: [Please describe]

[Screen break]

EQUIP3. If you were seeking information on the internet related to ductless heat pumps, where would you start your search?

1. Google
2. ENERGY STAR website
3. My utility website
4. Manufacturer information or website
5. A consumer product reports site
6. Retailer website
7. Other [Please describe]

[Screen break]

EQUIP4. On a scale of 1 to 10, where 1 is not important at all and 10 is very important, how important are the following sources in influencing your decision when considering a new primary heating system? [ROTATE]

| | Not at all important | | | | | | | | Very important | |
|--------------------------------------------------------------|----------------------|---|---|---|---|---|---|---|----------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. Other customers' rating and reviews | | | | | | | | | | |
| b. The endorsement of your utility company | | | | | | | | | | |
| c. The brand name or manufacturer of the household equipment | | | | | | | | | | |
| d. Friends and family members' opinions | | | | | | | | | | |
| e. A local celebrity promoting the product | | | | | | | | | | |
| f. A professional contractor | | | | | | | | | | |
| g. The advice of a salesperson | | | | | | | | | | |

[Screen break]

MESSAGING

M1. When making a decision to purchase a ductless heat pump, which of the following are the most motivating to you? Please score how motivating they are, where 1 would not motivate you to purchase a ductless heat pump at all, and 10 would be highly motivating to you in making your purchase decision. [ROTATE]

| | Not at all motivating | | | | | | | | Highly motivating | |
|--------------------------------------------------------------------|-----------------------|---|---|---|---|---|---|---|-------------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. Ductless heat pumps are a cutting-edge technology | | | | | | | | | | |
| b. Ductless heat pumps help you control your environment | | | | | | | | | | |
| c. Ductless heat pumps save energy | | | | | | | | | | |
| d. Ductless heat pumps save money on utility bills | | | | | | | | | | |
| e. Ductless heat pumps reduce waste | | | | | | | | | | |
| f. Ductless heat pumps can be self installed | | | | | | | | | | |
| g. Ductless heat pumps provide more comfort | | | | | | | | | | |
| h. Ductless heat pumps are quiet | | | | | | | | | | |
| i. Ductless heat pumps are safe | | | | | | | | | | |
| j. Ductless heat pumps are a high-quality investment for your home | | | | | | | | | | |
| k. Ductless heat pumps are easy to operate | | | | | | | | | | |

[Screen break]

M2.

[ASK IF M1a = 8, 9, or 10]

M2a. You said *cutting edge technology* was motivating. On a scale of 1 to 10 with 1 being the least motivating and 10 being the most motivating, please rank the following features related to cutting edge technology. [ROTATE]

- Ease of use, user friendly [1 2 3 4 5 6 7 8 9 10]
- Owning a premium product [1 2 3 4 5 6 7 8 9 10]
- Knowing the technology will not get outdated as fast as others [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1b = 8, 9, or 10]

M2b. You said having the *ability to better control your environment* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to ability to better control your environment. [ROTATE]

- Ease of use, user friendly [1 2 3 4 5 6 7 8 9 10]
- More settings options [1 2 3 4 5 6 7 8 9 10]
- Ability to control remotely via smart phone [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1c = 8, 9, or 10]

M2c. You said *energy savings* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to energy savings: [ROTATE]

- Reduced electricity bills [1 2 3 4 5 6 7 8 9 10]
- Reduced carbon or pollution emissions from the generation of electricity [1 2 3 4 5 6 7 8 9 10]
- Avoiding waste [1 2 3 4 5 6 7 8 9 10]
- Using only what I need [1 2 3 4 5 6 7 8 9 10]

- Ensuring there are enough resources for the future [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1d = 8, 9, or 10]

M2d. You said *money savings* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to saving money: [ROTATE]

- Lower energy bills [1 2 3 4 5 6 7 8 9 10]
- Lower maintenance costs [1 2 3 4 5 6 7 8 9 10]
- Longer product life [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[Screen break]

[ASK IF M1e = 8, 9, or 10]

M2e. You said *reducing waste* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to waste reduction. [ROTATE]

- Lower energy bills [1 2 3 4 5 6 7 8 9 10]
- Saving energy [1 2 3 4 5 6 7 8 9 10]
- Using only my fair share [1 2 3 4 5 6 7 8 9 10]
- Ensuring there is enough energy for future generations [1 2 3 4 5 6 7 8 9 10]
- Reduced carbon or pollution emissions [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1f = 8, 9, or 10]

M2f. You said *self installation* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to self installation motivation. [ROTATE]

- No installation costs [1 2 3 4 5 6 7 8 9 10]
- Lower maintenance costs over time [1 2 3 4 5 6 7 8 9 10]
- I do not need to rely on a contractor [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF Mg = 8, 9, or 10]

M2g. You said *increased comfort* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to increased comfort. [ROTATE]

- Ability to control remotely via smart phone [1 2 3 4 5 6 7 8 9 10]
- More settings options [1 2 3 4 5 6 7 8 9 10]
- Allows you to control the temperature by zones in your home [1 2 3 4 5 6 7 8 9 10]
- Provides cooling as well as heating [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1h = 8, 9, or 10]

M2h. You said *quiet operation* was motivating. On a scale of 1 to 10 with 1 being the least motivating and 10 being the most motivating, please rank the following features related to quiet operation. [ROTATE]

- Less white noise [1 2 3 4 5 6 7 8 9 10]
- Pleasant home environment [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1i = 8, 9, or 10]

M2i. You said *safety* was motivating. On a scale of 1 to 10 with 1 being the least motivating and 10 being the most motivating, please rank the following features related to safety. [ROTATE]

- Longer life [1 2 3 4 5 6 7 8 9 10]
- Durable construction [1 2 3 4 5 6 7 8 9 10]
- Reduced carbon or pollution emissions from the generation of electricity [1 2 3 4 5 6 7 8 9 10]
- Ease of Use, user friendly [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1j = 8, 9, or 10]

M2j. You said making a *high quality investment* was motivating. On a scale of 1 to 10 with 1 being the least motivating and 10 being the most motivating, please rank the following features related to making a high quality investment. [ROTATE]

- Longer life [1 2 3 4 5 6 7 8 9 10]
- Durable construction [1 2 3 4 5 6 7 8 9 10]
- Save energy [1 2 3 4 5 6 7 8 9 10]
- Cost savings [1 2 3 4 5 6 7 8 9 10]
- Enhancing the value of my home [1 2 3 4 5 6 7 8 9 10]
- Ensuring that we have the best product on the market [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1k = 8, 9, or 10]

M2k. You said *ease of use* was motivating. On a scale of 1 to 10 with 1 being the least motivating and 10 being the most motivating, please rank the following features related to ease of use. [ROTATE]

- More settings options [1 2 3 4 5 6 7 8 9 10]
- Longer life [1 2 3 4 5 6 7 8 9 10]
- Ability to control remotely via smart phone [1 2 3 4 5 6 7 8 9 10]

[Screen break]

M3. You indicated that the following features were important to you. Looking at them now, please rank them in order of importance, where 1 = the most important feature. [ROTATE]

[READ IN ONLY RESPONSES WHERE M1a-k=8, 9, or 10, ROTATE]

- Cutting edge technology
- Control of your home environment
- Energy savings
- Save money on energy bills
- Reliability
- Reduce waste
- Increased comfort
- Quiet
- Safety
- High quality investment
- Easy to operate

-
[Screen break]

M4. Based on the information presented today, please tell us which statement best represents your opinion:

1. I will purchase a new ductless heat pump before my current primary heating system breaks.
2. I will wait until my current system breaks and then purchase a new primary heating system.

[Screen break]

M5. Based on the information presented today, please tell us which statement best represents your opinion:

1. I will definitely purchase a ductless heat pump when I replace my current primary heating system.
2. I will consider purchasing a ductless heat pump when I replace my current primary heating system.
3. I will not purchase a ductless heat pump when I replace my current primary heating system.

[Screen break]

M6. Please tell us why you will or will not purchase or consider a ductless heat pump.

1. [OPEN END]

[Screen break]

THANK AND TERMINATE SCRIPT

The survey has been completed. Thank you for your feedback. Have a great day!

HPWH SURVEY

Goal: This survey evaluates NEEA customers' understanding of Heat Pump Water Heaters (HPWH) technologies, as well as their perceptions of this equipment and motivations toward

purchasing it. Its primary goal is to support HPWH messaging and marketing campaigns.

Targets: The survey targets single-family homeowners who have lived in their homes for two years and have electric resistance heating as their primary source of heat. The HPWH portion also screens for those customers who own electric water heater that are at least ten years old, however, this is not

HEAT PUMP WATER HEATER (HPWH) SURVEY

1.1 E-MAIL TEXT:

Dear Homeowner,

ILLUME Advising, LLC is conducting a market research study to understand your experience with, and understanding of, water heating technologies. We invite you to take a brief survey to share your experience. Your participation will give us invaluable feedback on how to promote more efficient energy technologies.

If you have any questions, please contact ILLUME at research@illumeadvising.com.

Please click here to access the survey. It will take about X minutes.

Thank you,

ILLUME Advising, LLC

[Screen break]

1.2 BASIC SCREENING

S1 Which best describes your home?

5. Own a single family home
6. Rent a single family home [THANK AND TERMINATE]
7. Live in a multi-family dwelling [THANK AND TERMINATE]
8. Other [THANK AND TERMINATE]

[Screen Break]

S2 How many years have you lived in your current home?

1. ___ year/s. [IF 1 OR LESS, THANK AND TERMINATE]

[Screen break]

S3 What kind of water heater do you currently have installed in your home?

1. I have a conventional **electric** water heater.
2. I have a tankless **electric** water heater.
3. I have a conventional **gas** water heater. [THANK AND TERMINATE]
4. I have a tankless **gas** water heater. [THANK AND TERMINATE]
5. I have a heat pump water heater.
6. I don't know [THANK AND TERMINATE]

[Screen break]

S4 How old is your water heater?

4. Less than 10 years old [THANK AND TERMINATE]
5. At least ten years old
6. I don't know [THANK AND TERMINATE]

[Screen break]

[ASK IF S4=2, ELSE AWAR1]

S5 When do you anticipate needing to replace your water heater?

1. Within the next two years
2. More than two years, but less than ten
3. Ten or more years
4. I don't know

[Screen break]

1.3 GENERAL AWARENESS & PERCEPTIONS OF HPWH TECHNOLOGY

AWAR1. Have you heard of a heat pump water heater?

3. Yes
4. No

[Screen break]

[ASK IF AWAR1=1; ELSE AWAR4.]

AWAR2. How familiar are you with this technology?

| | | | | | | | | | | |
|------------------------|---|---|---|---|---|---|---|---|----|---------------|
| Not familiar at all | | | | | | | | | | Very familiar |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |

[Screen break]

AWAR3. How did you learn about heat pump water heaters? (Please check all that apply)

10. Through my utility.
11. A friend or family member.
12. At my job.
13. Through a contractor.
14. Through a retailer.
15. On the TV.
16. On the Internet.
17. Other: [Please describe]
18. Don't remember/don't know

[Screen break]

AWAR4. Heat pump water heaters work like a refrigerator, but in reverse – while a refrigerator pushes heat from inside the unit out to the air around it, a heat pump water heater uses fans and an evaporator to pull warmth from the surrounding air and transfers it to water in the storage tank. The average homeowner can save up to 10% on their home's electricity bill and can cut water-heating energy consumption by up to 50% compared to a standard electric water heater. If all north westerners adopted this technology it would save enough energy to power 381,500 homes each year.

This is a heat pump water heater. Have you ever seen a heat pump water heater in person?

1. Yes
2. No



[Screen break]

AWAR5. On a scale from 1 (completely disagree) to 10 (completely agree), please indicate your assessment on the following statement: “I know exactly where to go to find a heat pump water heater in my area.”

Completely disagree Completely agree
 1 2 3 4 5 6 7 8 9 10

[Screen break]

1.4 UNDERSTANDING OF ENERGY BENEFITS & BARRIERS TO INSTALLATION

BENE1. There are a number of benefits to owning a heat pump water heater. For each benefit listed below, on a scale of 1 to 10 where, 1 is not important at all and 10 is very important, please indicate how important this benefit is to you when considering a new water heater. [ROTATE]

| Heat pump water heaters... | Not important at all | | | | | | | | | Very important | |
|------------------------------------------|----------------------|---|---|---|---|---|---|---|---|----------------|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| a. ...are safer than other water heaters | | | | | | | | | | | |

| | | | | | | | | | | |
|-----------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|
| b. ... are up to two times more energy efficient than other water heaters | | | | | | | | | | |
| c. ...provide more direct control over water temperature | | | | | | | | | | |
| d. ...can save you up to 10% on your energy bills | | | | | | | | | | |
| e. ... can help reduce pollution | | | | | | | | | | |
| f. ...are more durable and have a long life compared to other water heaters | | | | | | | | | | |
| g. ... are a “smart,” advanced technology. | | | | | | | | | | |
| h. ... are easier to use than other water heaters. | | | | | | | | | | |

[Screen Break]

BENE2. While there are many benefits to installing a heat pump water heater, there are also a number of challenges to doing so. On a scale of 1 to 10, where 1 is not an obstacle and 10 is a major obstacle; please indicate how much of an obstacle is each of these factors when choosing between a heat pump water heater and a standard water heater. [ROTATE]

| Heat pump water heaters... | Not an obstacle | | | | | | | | A major obstacle | |
|-----------------------------------------------------------------|-----------------|---|---|---|---|---|---|---|------------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. ... are typically more expensive than standard water heaters | | | | | | | | | | |
| b. ...can be a challenge to install yourself | | | | | | | | | | |
| c. ...are not offered by every contractor | | | | | | | | | | |
| d. ...are an unfamiliar technology | | | | | | | | | | |

[Screen break]

1.5 PURCHASE OF NEW EQUIPMENT

EQUIP1 Who is the primary decision maker in your home when it comes to something like the purchase of a new water heater?

4. Me
5. Someone else in my household
6. It is a joint decision

[Screen break]

EQUIP2. When considering a water heater purchase, who would you talk to for more information about your product options? [Please check all that apply]

5. Friends or neighbors
6. A professional contractor
7. A salesperson
8. Other: [Please describe]

[Screen break]

EQUIP3. If you were seeking information on the internet related to heat pump water heaters, where would you start your search?

8. Google
9. ENERGY STAR website
10. My utility website
11. Manufacturer information or website
12. A consumer product reports site
13. Retailer website
14. Other [Please describe]

[Screen break]

EQUIP4. On a scale of 1 to 10, where 1 is not important at all and 10 is very important, how important are the following sources are in influencing your decision when considering a new

water heater. [ROTATE]

| | Not at all important | | | | | | | | Very important | |
|--------------------------------------------------------------|----------------------|---|---|---|---|---|---|---|----------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. Other customers' rating and reviews | | | | | | | | | | |
| b. The endorsement of your utility company | | | | | | | | | | |
| c. The brand name or manufacturer of the household equipment | | | | | | | | | | |
| d. Friends and family members' opinions | | | | | | | | | | |
| e. A local celebrity promoting the product | | | | | | | | | | |
| f. A professional contractor | | | | | | | | | | |
| g. The advice of a sales person | | | | | | | | | | |

[Screen break]

1.6 MESSAGING

M1. When making a decision to purchase a heat pump water heater, which of the following are the most motivating to you? Please score how motivating they are, where 1 would not motivate you to purchase a heat pump water heater at all, and 10 would be highly motivating to you in making your purchase decision. [ROTATE]

| | Not at all motivating | | | | | | | | Highly motivating | |
|----------------------------------------------------------|-----------------------|---|---|---|---|---|---|---|-------------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. Heat pump water heaters are a cutting-edge technology | | | | | | | | | | |
| b. Heat pump water heaters help you control | | | | | | | | | | |

| | | | | | | | | | | |
|------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|
| your home environment | | | | | | | | | | |
| c. Heat pump water heaters save energy | | | | | | | | | | |
| d. Heat pump water heaters save money on utility bills | | | | | | | | | | |
| e. Heat pump water heaters are reliable | | | | | | | | | | |
| f. Heat pump water heaters reduce waste | | | | | | | | | | |
| g. Heat pump water heaters provide more comfort | | | | | | | | | | |
| h. Heat pump water heaters are more quiet | | | | | | | | | | |
| i. Heat pump water heaters are safe | | | | | | | | | | |
| j. Heat pump water heaters are a high-quality investment for your home | | | | | | | | | | |
| k. Heat pump water heaters are easy to operate | | | | | | | | | | |

[Screen break]

M2.

[ASK IF M1a = 8, 9, or 10]

M2a. You said *cutting edge technology* was motivating. On a scale of 1 to 10 with 1 being the least motivating and 10 being the most motivating, please rank the following features related to cutting edge technology [ROTATE]

- Ease of use, user friendly [1 2 3 4 5 6 7 8 9 10]
- Owning a premium product [1 2 3 4 5 6 7 8 9 10]
- Knowing the technology will not get outdated as fast as others [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1b = 8, 9, or 10]

M2b. You said having the *ability to better control your home environment* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to ability to better control your home environment. [ROTATE]

- Ease of use, user friendly [1 2 3 4 5 6 7 8 9 10]
- More settings options [1 2 3 4 5 6 7 8 9 10]
- Ability to control remotely via smart phone [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1c = 8, 9, or 10]

M2c. You said *energy savings* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to energy savings: [ROTATE]

- Reduced electricity bills [1 2 3 4 5 6 7 8 9 10]
- Reduced carbon or pollution emissions from the generation of electricity [1 2 3 4 5 6 7 8 9 10]
- Avoiding waste [1 2 3 4 5 6 7 8 9 10]
- Using only what I need [1 2 3 4 5 6 7 8 9 10]
- Ensuring there are enough resources for the future [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1d = 8, 9, or 10]

M2d. You said *save money* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to saving money: [ROTATE]

- Lower energy bills [1 2 3 4 5 6 7 8 9 10]
- Lower maintenance costs [1 2 3 4 5 6 7 8 9 10]
- Longer product life [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1e = 8, 9, or 10]

M2e. You said *reliability* was motivating. On a scale of 1 to 10 with 1 being the least motivating and 10 being the most motivating please, rank the following features related to reliability. [ROTATE]

- Ease of use, user friendly [1 2 3 4 5 6 7 8 9 10]
- Predictability of water heating [1 2 3 4 5 6 7 8 9 10]
- Longer life [1 2 3 4 5 6 7 8 9 10]
- Durable construction [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1f = 8, 9, or 10]

M2f. You said *reducing waste* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to waste reduction. [ROTATE]

- Lower energy bills [1 2 3 4 5 6 7 8 9 10]
- Saving energy [1 2 3 4 5 6 7 8 9 10]
- Using only my fair share [1 2 3 4 5 6 7 8 9 10]
- Ensuring there is enough energy for future generations [1 2 3 4 5 6 7 8 9 10]
- Reduced carbon or pollution emissions [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1g = 8, 9, or 10]

M2g. You said *increased comfort* was motivating. On a scale of 1 to 10, with 1 being the least motivating and 10 being the most motivating, please rank the following features related to increased comfort. [ROTATE]

- Ability to control remotely via smart phone [1 2 3 4 5 6 7 8 9 10]
- More settings options [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1h = 8, 9, or 10]

M2h. You said *quiet operation* was motivating. On a scale of 1 to 10 with 1 being the least motivating and 10 being the most motivating, please rank the following features related to quiet operation. [ROTATE]

- Less white noise [1 2 3 4 5 6 7 8 9 10]

- Pleasant home environment [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1i = 8, 9, or 10]

M2i. You said *safety* was motivating. On a scale of 1 to 10 with 1 being the least motivating and 10 being the most motivating, please rank the following features related to safety. [ROTATE]

- Longer life [1 2 3 4 5 6 7 8 9 10]
- Durable construction [1 2 3 4 5 6 7 8 9 10]
- Reduced carbon or pollution emissions from the generation of electricity [1 2 3 4 5 6 7 8 9 10]
- Ease of Use, user friendly [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1j = 8, 9, or 10]

M2j. You said making a *high quality investment* was motivating. On a scale of 1 to 10 with 1 being the least motivating and 10 being the most motivating, please rank the following features related to making a high quality investment. [ROTATE]

- Longer life [1 2 3 4 5 6 7 8 9 10]
- Durable construction [1 2 3 4 5 6 7 8 9 10]
- Save energy [1 2 3 4 5 6 7 8 9 10]
- Cost savings [1 2 3 4 5 6 7 8 9 10]
- Enhancing the value of my home [1 2 3 4 5 6 7 8 9 10]
- Ensuring that we have the best product on the market [1 2 3 4 5 6 7 8 9 10]

[Screen break]

[ASK IF M1ik = 8, 9, or 10]

M2k. You said *ease of use* was motivating. On a scale of 1 to 10 with 1 being the least motivating and 10 being the most motivating, please rank the following features related to ease of use. [ROTATE]

- More settings options [1 2 3 4 5 6 7 8 9 10]
- Longer life [1 2 3 4 5 6 7 8 9 10]
- Ability to control remotely via smart phone [1 2 3 4 5 6 7 8 9 10]

[Screen break]

M3. You indicated that the following features in a water heater were important to you. Looking at them now, please rank them in order of importance, where 1 = the most important feature.

[READ IN ONLY RESPONSES WHERE M1a-k=8, 9, or 10, ROTATE]

- a. Cutting edge technology
- b. Control of your home environment
- c. Energy savings
- d. Save money on energy bills
- e. Reliability
- f. Reduce waste
- g. Increased comfort
- h. Quiet
- i. Safety
- j. High quality investment
- k. Easy to operate

[Screen break]

M4. Based on the information presented today, please tell us which statement best represents your opinion:

3. I will purchase a new water heater before my current water heater breaks.
4. I will wait until my current water heater breaks and then purchase a new water heater.

[Screen break]

M5. Based on the information presented today, please tell us which statement best represents your opinion:

4. I will definitely purchase a heat pump water heater when I replace my current water heater.
5. I will consider purchasing a heat pump water heater when I replace my current water heater.
6. I will not purchase a heat pump water heater when I replace my current water heater.

[Screen Break]

M6. Please tell us why you will or will not purchase or consider a heat pump water heater.

1. [OPEN END]

[Screen Break]

1.7 THANK AND TERMINATE SCRIPT

The survey has been completed. Thank you for your feedback. Have a great day!

APPENDIX E – FOCUS GROUP GUIDE

A.1 DHP FOCUS GROUP GUIDE

SCREENER

NOTE: Instructions to screener in brackets [INSTRUCTIONS].

1. Which best describes your home? [READ LIST]
 1. Own a single family home
 2. Rent a single family home TERM
 3. Live in a multi-family dwelling TERM
 4. Other TERM

2. How long have you owned your home? [DO NOT READ LIST]
 1. Less than 2 years TERM
 2. 2-9 years
 3. 10 years or longer
 4. I don't know TERM

2. Who is the primary decision maker in your household when considering purchasing major appliances? [READ LIST]
 1. I am the primary decision maker
 2. It is a joint decision between myself and someone else in the household.
 3. I am not the primary decision maker. TERM
 4. Other TERM

3. What is the fuel for your current *primary* heating system? We define *primary* as the heating system that you use to heat your entire house, the first system you go to when you need heat. [DO NOT READ LIST, PROMPT IF NECESSARY]
 5. Electricity
 6. Natural gas TERM
 7. Propane TERM
 8. Wood TERM
 9. Other TERM

4. What type of *primary* heating system is currently installed in your home? [DO NOT READ, PROMPT IF NECESSARY]

- 5. Electric forced air furnace
- 6. Baseboard/radiant heating
- 7. Heat pump or ductless heat pump
- 8. Wood heating TERM
- 9. Other TERM

5. Do you use a *secondary* heating system in addition to the primary heating system? We define *secondary* as a heating system that you use to supplement the existing, *primary* system. This system is often used to heat specific rooms or areas independently of, or in addition to, the *primary* system.

- 3. No (Accept for DHP)
- 4. Yes

6. What type of *secondary* heating system do you use? [DO NOT READ, PROMPT IF NECESSARY]

- 1. Portable electric space heater
- 2. Wood stove
- 3. Fireplace
- 4. Heat pump or ductless heat pump
- 5. Gas furnace TERM
- 6. Propane furnace TERM
- 7. Other TERM

7. What percentage of the time do you use your *secondary* heating system? [DO NOT READ]

- 1. <10%
- 2. 11-25%
- 3. 26-50% TERM
- 4. 51-75% TERM
- 5. 76-100% TERM

8. Do you have any other heating systems currently in use in your home? [DO NOT PROMPT] [SELECT ALL THAT APPLY]

- 1. Portable electric space heater (Accept for DHP)
- 2. Wood stove (Accept for DHP)
- 3. Fireplace (Accept for DHP)
- 4. Heat pump or ductless heat pump(Accept for DHP)
- 5. Gas furnace TERM

6. Propane furnace
7. Other, _____ (OPEN END)

TERM
(Accept for DHP)

Demographics for screened in individuals:

9. Which best describes your education level?

1. Completed some high school
2. High school graduate
3. Completed some college
4. College graduate
5. Completed some post-graduate
6. Advanced degree

10. What was your total household income, before taxes, during the last 12 months?

1. Less than \$25,000
2. \$25,001-\$50,000
3. \$50,001-\$75,000
4. \$75,001-\$100,000
5. \$100,001-\$150,000
6. More than \$150,000

11. Please tell us the town or city where your home is located.

1. [OPEN END]

12. Please tell us your current age.

1. [OPEN END]

13. SCREENER: Note the gender of the individual:

1. Male
2. Female

INTRODUCTION (5)

Moderator Script: Hi Everyone. Thank you for taking the time to meet with us today. My name is [insert name], with ILLUME Advising, a market research company. Today we are going to talk about Ductless Heat Pumps.

Before we begin, there are a few things I want to call out:

- This focus group will be recorded. This is just for my note-taking purposes and for our analysis. Your specific thoughts and answers will not be directly associated with you.
- Also, the people who are funding this project are watching as well. But you probably already knew that.

I also want to discuss a few focus group ground rules:

- First, please turn your cell phones off.
- I am interested in hearing all of your opinions. Please feel free to talk freely, but try to remain mindful of others in the group. Try not to cut each other off and allow people to speak their minds. I value all of your opinions.
- Also, we have a lot of material to cover in 90 minutes. I want to be respectful of your time, so I may cut you off or redirect the conversation to keep us on time. Please don't take this as rudeness on my part. I am just trying to keep us moving.

Intros: Now, I would like to go around the room and learn a little about each of you. Please tell us your name, where you are from, and your favorite thing to do in your spare time.

WARM-UP (5 MINUTES)

Set-up: There are many things that contribute to your household energy use. Please take a moment to think about them.

Question: On the paper in front of you, please write down the top three things that contribute to your energy use.

Question: [Going around the room] What did you write down? Why?

GENERAL AWARENESS AND PERCEPTIONS OF DHP TECHNOLOGY (7.5 MINUTES)

Set-up: I would like to ask you all about heating technologies.

Question: [To all] How many of you are aware of how you heat your home? [Ask for a show of hands] – [We're looking for the language that points to primary heat source... electric or wood]

Question: [To those that are aware] What type of fuel do you use to heat your home? What kind of heating system do you have?

Probe: Do you use an electric heating system (baseboard/radiant heating, forced air furnace, something else)? Do you have a wood stove/furnace?

Question: [To those that are unaware] Can you tell us why you don't know how you heat your home?

Set-up: I would like to ask you all about a specific heating technologies.

Question: Have you heard of a “ductless heat pump?” [Ask for a show of hands]

Probe: Sometimes ductless heat pumps are called “mini splits,” have you ever heard of one of those?

Question: [To those who did hear about it] How did you learn about ductless heat pumps?

Question: [To those who did hear about it] How would you describe them?

Set-up: [To all] Here is an image of a ductless heat pump. [Hand this image to each participant]:



Question: This is a ductless heat pump. Have you ever seen a ductless heat pump in person?

[After they look at the picture, describe it] Read out loud “A ductless heating and cooling system is a highly efficient zonal heating and cooling system that does not require the use of air ducts. Ductless systems consist of an outdoor compressor unit and one or more indoor air-handling units, called “heads,” linked by a dedicated refrigerant line. Indoor heads are typically mounted high on a wall or ceiling covering a three-inch hole where the refrigerant line passes through from the outside unit, which is mounted at the base of the house. Each indoor head corresponds with a heating and cooling zone that can be controlled independently.”

Question: [To all] On the piece of paper in front of you, please write down the words in the description that stood out the most to you. We will discuss these later.

Question: Where in your neighborhood or city do you think you can actually find one of these?

UNDERSTANDING OF ENERGY BENEFITS AND OBSTACLES TO INSTALLATION (10 MINUTES)

Set-up: Now I'd like to ask you some questions about the benefits of this technology. I will give

you a number of statements. For each of them, please rate, from 1 to 10, how important it is for you. [Moderator records responses on the paper]

| Ductless heat pumps ... | Not important at all | | | | | | | | Very important | |
|-------------------------------------------------------------------------------|----------------------|---|---|---|---|---|---|---|----------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. ...are smaller than other heating systems | | | | | | | | | | |
| b. ... are up to two times more energy efficient than other heating systems | | | | | | | | | | |
| c. ...provide more direct user control over temperature | | | | | | | | | | |
| d. ...can save you 25%-50% on your energy bills | | | | | | | | | | |
| e. ... can help reduce waste | | | | | | | | | | |
| f. ...are more durable and have a long life compared to other heating systems | | | | | | | | | | |
| g. ... are safer than some other types of heating | | | | | | | | | | |
| h. ... are easier to install than standard heating systems | | | | | | | | | | |
| i. ... are a “smart,” advanced technology | | | | | | | | | | |
| j. ... increase the comfort of your home. | | | | | | | | | | |

Question: Please tell me what score you gave to [go through all of them, one at a time] a. Size / b. Energy efficiency / c. Temperature control / d. Saving on bills / e. Reduced pollution / f. durability / g. Safety / h. Easy to install / i. Smart / j. Comfort [Write on the flipboard the distribution of scores]

Probe: [For each question] It seems that [insert questions a. to j.] received rather high / low scores, why is that? Some people rated [insert a specific question] very high, and other very low,

why is that? [Let them discuss]

Question: [To all] Now lets look at the words you wrote down when I described ductless heat pumps to you. What words did you write down? [Moderator makes note of those that align with benefits and others that came to mind that were not listed]

Set-up: While there are many benefits to installing a ductless heat pump, there are also a few obstacles.

Question: On a scale of 1 to 10, where 1 is not an obstacle and 10 is a major obstacle; please indicate how much of an obstacle is each of these factors when choosing between a ductless heat pump and a standard heating system.

| Ductless heat pumps... | Not an obstacle | | | | | | | | A major obstacle | |
|----------------------------------------------------------------------|-----------------|---|---|---|---|---|---|---|------------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. ... are typically more expensive than standard heating systems | | | | | | | | | | |
| b. ...can be a challenge to install yourself | | | | | | | | | | |
| c. ...are not offered by every contractor | | | | | | | | | | |
| d. ...are an unfamiliar technology | | | | | | | | | | |
| e. ... may not be as visually appealing as a built in central system | | | | | | | | | | |
| f.... improperly installed equipment may waste energy | | | | | | | | | | |

AESTHETICS (10 MIN)

Set-up: Now let’s talk about the aesthetic aspect of heating systems.

Question: Where is your primary heating system currently located? [Prompt: We’re looking for the heating source used most frequently to heat your home]

Question: Is it located in a place where you see it on a daily basis?

Question: How important to you is the *appearance* of your heating equipment?

Not important at all Very important
 1 2 3 4 5 6 7 8 9 10

[Write the scores on the flipboard]

Question: [to all] Why is your score so high /low?

Probe: [To those who rated it high] How would you describe a good-looking heating system?

Set-up: Similar to our last discussion, I am going to read you several statements.

Question: Please write from 1 to 10 your agreement or disagreement with the following statements:

| My ideal household heating technology would look... | Strongly Disagree | | | | | | | | Strongly Agree | |
|-----------------------------------------------------|-------------------|---|---|---|---|---|---|---|----------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. modern | | | | | | | | | | |
| b. vintage | | | | | | | | | | |
| c. unnoticeable | | | | | | | | | | |
| d. sophisticated | | | | | | | | | | |
| e. simple | | | | | | | | | | |
| f. big | | | | | | | | | | |
| g. small | | | | | | | | | | |

Question: What concerns would you have if you placed a ductless heat pump in your home?

Probe: Where do you think you’d put a ductless heat pump in your home? Are there specific places where you would more likely place it, or less likely place it? Where on the wall would you put it? (lower down, higher up on the ceiling) [Talk through each area of the home, ask about rooms that may not have come up in the conversation]

PURCHASE OF NEW EQUIPMENT (10 MIN)

Set-up: Now I’d like to talk about the purchase of heating equipment.

Question: Who is the primary decision maker in your home when it comes to something like the purchase of a new heating system? [Let them discuss freely]

Set-up: Now imagine that you made the decision to get a new heating system.

Question: When considering a heating system purchase, who would you talk to for more information about your product options?

Probe: Would you talk to you family members? Friends? Neighbors? A contractor? A handy man? A home improvement store?

Question: Would you look for information on internet?

Probe: Would you look it up on Google? At the ENERGY STAR website? Your utility website? A manufacturer website? A consumer product reports site? A retailer website?

Set-up: Now I would like to discuss other ways that you might assess the value of a new heating system.

Question: On a scale of 1 to 10, where 1 is not important at all and 10 is very important, how important are the following sources are in influencing your decision when considering a new heating system.

| | Not at all important | | | | | | | | Very important | |
|--------------------------------------------------------------|----------------------|---|---|---|---|---|---|---|----------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. Other customers' rating and reviews | | | | | | | | | | |
| b. The endorsement of your utility company | | | | | | | | | | |
| c. The brand name or manufacturer of the household equipment | | | | | | | | | | |
| d. Friends and family members' opinions | | | | | | | | | | |

| | | | | | | | | | | |
|--------------------------------------------|--|--|--|--|--|--|--|--|--|--|
| e. A local celebrity promoting the product | | | | | | | | | | |
| f. A professional contractor | | | | | | | | | | |
| g. The advice of a sales person | | | | | | | | | | |

Question: Please tell me what score you gave to [go through all of them, one at a time] a. Customers ratings / b. Utility / c. Brand / d. Friends and family / e. Celebrity / f. Contractor / g. Sales person [Write on the flipboard the distribution of scores]

Probe: [For each question, depending on the results] It seems that [insert questions a. to g.] received rather high / low scores, why is that? Some people rated [insert a specific question] very high, and other very low, why is that? [Let hem discuss]

MESSAGING (40)

Set-up: Let’s discuss now what’s at stake when making a decision to purchase a ductless heat pump. I will give you a list of things than may be more or less motivating to you.

Question: Please score how motivating they are, where 1 would not motivate you to purchase a ductless heat pump at all, and 10 would be highly motivating to you in making your purchase decision. [Hand out the list]

| | Not at all motivating | | | | | | | | Highly motivating | |
|----------------------------------------------------------|-----------------------|---|---|---|---|---|---|---|-------------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. Ductless heat pumps are a cutting-edge technology | | | | | | | | | | |
| b. Ductless heat pumps help you control your environment | | | | | | | | | | |
| c. Ductless heat pumps save energy | | | | | | | | | | |
| d. Ductless heat pumps save money on utility bills | | | | | | | | | | |
| e. Ductless heat pumps | | | | | | | | | | |

| | | | | | | | | | | |
|--------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|
| reduce waste | | | | | | | | | | |
| f. Ductless heat pumps can be self installed | | | | | | | | | | |
| g. Ductless heat pumps provide more comfort | | | | | | | | | | |
| h. Ductless heat pumps are quiet | | | | | | | | | | |
| i. Ductless heat pumps are safe | | | | | | | | | | |
| j. Ductless heat pumps are a high-quality investment for your home | | | | | | | | | | |
| k. Ductless heat pumps are easy to operate | | | | | | | | | | |

Note: the following-probes will be used depending on the previous responses.

Set-up: [Stand by the flipboard] Which of these things received your top scores? [Write them on the flipboard] We have [insert top-rated item]...

Question: [If *cutting edge technology*] Why is cutting edge technology motivating? [Let them discuss]

Probe: [If none of these issues was raised] How would you rate being user friendly? Owning a premium product? Knowing the technology will not get outdated as fast as others?

Question: [If *ability to better control your environment*] Why is the ability to better control your environment so motivating? [Let them discuss]

Probe: [If none of these issues was raised] How would you rate being user friendly? Having more setting options? The ability to control remotely via smart phone?

Question: [If *energy savings* was motivating] Why energy savings is motivating? [Let them discuss]

Probe: [If none of these issues was raised] How would you rate reducing electricity bills? Reducing carbon or pollution emissions from the generation of electricity? Avoiding waste? Using only what you need? Ensuring there are enough resources for the future?

Question: [If *save money* was motivating] Why is saving that amount of money is so motivating?

Probe: [If none of these issues was raised] How would you rate lowering your energy bills? Lowering your maintenance costs? A longer product life?

Question: [If *reducing waste* was motivating] Why is waste reduction so motivating?

Probe: [If none of these issues was raised] How would you rate lowering energy bills? Saving energy? Using only my fair share? Ensuring there is enough energy for future generations? Reducing carbon or pollution emissions?

Question: [If *can be self installed* was motivating] Why is safe installation so motivating?

Question: [If *increased comfort* was motivating] Why is increased comfort motivating?

Probe: [If none of these issues was raised] How would you rate the ability to control remotely via smart phone? More settings options?

Question: [If *quiet* was motivating] Why is quiet motivating?

Probe: [If none of these issues was raised] How would you rate less white noise? Pleasant home environment?

Question: [If *safety* was motivating] Why is safety motivating?

Probe: [If none of these issues was raised] How would you rate longer life? Durable construction? Reducing carbon or pollution emissions from the generation of electricity? Ease of Use, user friendly?

Question: [If *high quality investment* was motivating] Why is high quality investment motivating?

Probe: [If none of these issues was raised] How would you rate longer life? Durable construction? Saving energy? Cost savings? Enhancing the value of my home? Ensuring that we have the best product on the market?

Question: [If *ease of use* was motivating] Why is ease of use motivating?

Probe: [If none of these issues was raised] How would you rate more settings options? Longer life? Ability to control remotely via smart phone?

Question: I’m going to hand out a set of cards with the statements we just discussed written on them. [Hand them the cards] Looking at these now, please pull out the top 5 statements you find most motivating for you, and rank those statements in order of most important (5) to least important (1).

[READ THROUGH THE FOLLOWING LIST AND CAPTURE THE RANKING FOR EACH]

| | 1 | 2 | 3 | 4 | 5 |
|--------------------------------|---|---|---|---|---|
| a. Cutting edge technology | | | | | |
| b. Control of your environment | | | | | |
| c. Energy savings | | | | | |
| d. Save money on energy bills | | | | | |
| e. Reduce waste | | | | | |
| f. Self installation | | | | | |
| g. More comfort | | | | | |
| h. Quiet | | | | | |
| i. Safety | | | | | |
| j. High quality investment | | | | | |
| k. Easy to operate | | | | | |

Question: Now let’s compare some of these aspects in pairs. Using the cards, put together the two statements that you would find most motivating if they were combined.

[GO AROUND THE ROOM AND HAVE EVERYONE SHARE THEIR COMBINATIONS, CAPTURE ON THE WHITEBOARD]

Probe: Why did you combine these two statements? Are the statements more compelling when paired with another statement?

Question: Looking the pairs of statements you’ve put together as a group, which statements are most compelling to you?

Probe: Why is this compelling? Did anyone pick a statement they did not write? Why?

Question: Based on the information presented today, please tell us which statement best represents your opinion:

5. I will purchase a new ductless heat pump before my current heating system breaks.
6. I will wait until my current heating system breaks and then purchase a new heating

system.

Question: Based on the information presented today, please tell us which statement best represents your opinion:

7. I will definitely purchase a ductless heat pump when I replace my current heating system.
8. I will consider purchasing a ductless heat pump when I replace my current heating system.
9. I will not purchase a ductless heat pump when I replace my current heating system.

Question: Please tell us why you will or will not purchase or consider a ductless heat pump. [Let them discuss]

CLOSING (1 MIN.)

Thank you for your time today. You have been extremely helpful and I have truly enjoyed hearing your opinions and getting to know all of you. Your honorarium will be waiting for you outside.

HPWH FOCUS GROUP GUIDE

SCREENER

NOTE: Instructions to screener in brackets [INSTRUCTIONS].

1. Which best describes your home? [READ LIST]
 5. Own a single family home
 6. Rent a single family home TERM
 7. Live in a multi-family dwelling TERM
 8. Other TERM

2. How long have you owned your home? [DO NOT READ LIST]
 5. Less than 2 years TERM
 6. 2-9 years
 7. 10 years or longer
 8. I don't know TERM

3. Who is the primary decision maker in your household when considering purchasing major appliances? [READ LIST]

1. I am the primary decision maker
2. It is a joint decision between myself and someone else in the household.
3. I am not the primary decision maker. TERM
4. Other TERM

4. How is your home water heated?

1. Electricity
2. Gas / Propane TERM
3. Other TERM

5. How old is your water heater?

1. Less than two years TERM
2. 2-9 years old (Qualified for HPWH)
3. 10 years or older (Qualified for HPWH)
4. I don't know TERM

Demographics for screened in individuals:

9. Which best describes your education level?

1. Completed some high school
2. High school graduate
3. Completed some college
4. College graduate
5. Completed some post-graduate
6. Advanced degree

10. What was your total household income, before taxes, during the last 12 months?

1. Less than \$25,000
2. \$25,001-\$50,000
3. \$50,001-\$75,000
4. \$75,001-\$100,000
5. \$100,001-\$150,000

6. More than \$150,000

11. Please tell us the town or city where your home is located.

2. [OPEN END]

12. Please tell us your current age.

2. [OPEN END]

13. SCREENER: Note the gender of the individual:

3. Male

4. Female

INTRODUCTION (5)

Moderator Script: Hi Everyone. Thank you for taking the time to meet with us today. My name is [insert name], with ILLUME Advising, a market research company. Today we are going to talk about Heat Pump Water Heaters.

Before we begin, there are a few things I want to call out:

- This focus group will be recorded. This is just for my note-taking purposes and for our analysis. Your specific thoughts and answers will not be directly associated with you.
- Also, the people who are funding this project are watching as well. But you probably already knew that.

I also want to discuss a few focus group ground rules:

- First, please turn your cell phones off.
- I am interested in hearing all of your opinions. Please feel free to talk freely, but try to remain mindful of others in the group. Try not to cut each other off and allow people to speak their minds. I value all of your opinions.
- Also, we have a lot of material to cover in 90 minutes. I want to be respectful of your time, so I may cut you off or redirect the conversation to keep us on time. Please don't take this as rudeness on my part. I am just trying to keep us moving.

Intros: Now, I would like to go around the room and learn a little about each of you. Please tell us your name, where you are from, and your favorite thing to do in your spare time.

WARM-UP (5 MINUTES)

Set-up: There are many things that contribute to your household energy use. Please take a moment to think about them.

Question: On the paper in front of you, please write down the top three things that contribute to your energy use.

Question: [Going around the room] What did you write down? Why?

GENERAL AWARENESS AND PERCEPTIONS OF HPWH TECHNOLOGY (7.5 MINUTES)

Set-up: I would like to ask you all about heat pump water heaters.

Question: [To all] How many of you are aware of how you heat your household water? [Ask for a show of hands]

Question: [To those that are aware] What type of fuel do you use to heat your home? What kind of water heating system do you have?

Probe: Do you have a conventional tank water heater, a tankless water heater, something else?

Question: [To those that are unaware] Can you tell us why you don't know how you heat water in your home?

Set-up: I would like to ask you all about a specific water heating technologies.

Question: Have you heard of a heat pump water heater? [Ask for a show of hands]

Question: [To those who did hear about it] How did you learn about heat pump water heaters?

Question: [To those who did hear about it] How would you describe them?

Set-up: [To all] Here is an image of a heat pump water heater. [Hand this image to each participant:



Question: This is a heat pump water heater. Have you ever seen a heat pump water heater in person?

[After they look at the picture, describe it] Read out loud “Heat pump water heaters use electricity to move heat from one place to another instead of generating heat directly. Therefore, they can be two to three times more energy efficient than conventional electric resistance water heaters and can cut water-heating energy consumption by 50% compared to a standard electric water heater. If all north westerners adopted this technology it would save enough energy to power 381,500 homes each year.”

Question: [To all] On the piece of paper in front of you, please write down the words in the description that stood out the most to you. We will discuss these later.

Question: Where in your neighborhood or city would you look to find one?

UNDERSTANDING OF ENERGY BENEFITS AND BARRIERS TO INSTALLATION (10 MINUTES)

Set-up: Now I’d like to ask you some questions about the benefits of this technology. I will give you a number of statements. For each of them, please rate, from 1 to 10, how important it is for you. [Moderator records responses on the paper]

| Heat pump water heaters... | Not important at all | | | | | | | | Very important | |
|-----------------------------------------------------------------------------|----------------------|---|---|---|---|---|---|---|----------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. ...are safer than other water heaters | | | | | | | | | | |
| b. ... are up to two times more energy efficient than other water heaters | | | | | | | | | | |
| c. ...provide more direct control over water temperature | | | | | | | | | | |
| d. ...can save you up to 10% on your energy bills | | | | | | | | | | |
| e. ... can help reduce pollution | | | | | | | | | | |
| f. ...are more durable and have a long life compared to other water heaters | | | | | | | | | | |
| g. ... are a “smart,” advanced technology. | | | | | | | | | | |
| h. ... are easier to use than other water heaters. | | | | | | | | | | |

Question: Please tell me what score you gave to [go through all of them, one at a time] a. Safety / b. Energy efficiency / c. Temperature control / d. Bill saving / e. Pollution / f. Durability / g. Smart / h. Ease of use. [Write on the flipboard the distribution of scores]

Probe: [For each question] It seems that [insert questions a. to h.] received rather high / low scores, why is that? Some people rated [insert a specific question] very high, and other very low, why is that? [Let hem discuss]

Question: [To all] Now lets look at the words you wrote down when I described heat pump water heaters to you. What words did you write down? [Moderator makes note of those that align with benefits and others that came to mind that were not listed]

Set-up: While there are many benefits to installing a heat pump water heater, there are also a number of challenges to doing so.

Question: On a scale of 1 to 10, where 1 is not an obstacle and 10 is a major obstacle; please indicate how much of an obstacle is each of these factors when choosing between a heat pump water heater and a standard water heater.

| Heat pump water heaters... | Not an obstacle | | | | | | | A major obstacle | | |
|-----------------------------------------------------------------|-----------------|---|---|---|---|---|---|------------------|---|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. ... are typically more expensive than standard water heaters | | | | | | | | | | |
| b. ...can be a challenge to install yourself | | | | | | | | | | |
| c. ...are not offered by every contractor | | | | | | | | | | |
| d. ...are an unfamiliar technology | | | | | | | | | | |

PURCHASE OF NEW EQUIPMENT (10 MIN)

Set-up: Now I'd like to talk about the purchase of water heating equipment.

Question: Who is the primary decision maker in your home when it comes to something like the purchase of a new water heater? [Let them discuss freely]

Set-up: Now imagine that you made the decision.

Question: When considering a water heater purchase, who would you talk to for more information about your product options?

Probe: Would you talk to you family members? Friends? Neighbors? A contractor? A handy man? A home improvement store?

Question: Would you look for information on internet?

Probe: Would you look it up on Google? At the ENERGY STAR website? Your utility website? A manufacturer website? A consumer product reports site? A retailer website?

Set-up: Now I would like to discuss other ways that you might assess the value of a new water heater.

Question: On a scale of 1 to 10, where 1 is not important at all and 10 is very important, how

important are the following sources are in influencing your decision when considering a new water heater.

| | Not at all important | | | | | | | | Very important | |
|--------------------------------------------------------------|----------------------|---|---|---|---|---|---|---|----------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. Other customers' rating and reviews | | | | | | | | | | |
| b. The endorsement of your utility company | | | | | | | | | | |
| c. The brand name or manufacturer of the household equipment | | | | | | | | | | |
| d. Friends and family members' opinions | | | | | | | | | | |
| e. A local celebrity promoting the product | | | | | | | | | | |
| f. A professional contractor | | | | | | | | | | |
| g. The advice of a sales person | | | | | | | | | | |

Question: Please tell me what score you gave to [go through all of them, one at a time] a. Customers ratings / b. Utility / c. Brand / d. Friends and family / e. Celebrity / f. Contractor / g. Sales person [Write on the flipboard the distribution of scores]

Probe: [For each question, depending on the results] It seems that [insert questions a. to g.] received rather high / low scores, why is that? Some people rated [insert a specific question] very high, and other very low, why is that? [Let hem discuss]

MESSAGING (40)

Set-up: Let's discuss now what's at stake when making a decision to purchase a heat pump water heater. I will give you a list of things than may be more or less motivating to you.

Question: Please score how motivating they are, where 1 would not motivate you to purchase a heat pump water heater at all, and 10 would be highly motivating to you in making your purchase decision. [Hand out the list]

| | Not at all motivating | | | | | | | | Highly motivating | |
|-------------------------------------------|-----------------------|---|---|---|---|---|---|---|-------------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a. Heat pump water heaters are a cutting- | | | | | | | | | | |

| | | | | | | | | | | |
|------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|
| edge technology | | | | | | | | | | |
| b. Heat pump water heaters help you control your home environment | | | | | | | | | | |
| c. Heat pump water heaters save energy | | | | | | | | | | |
| d. Heat pump water heaters save money on utility bills | | | | | | | | | | |
| e. Heat pump water heaters are reliable | | | | | | | | | | |
| f. Heat pump water heaters reduce waste | | | | | | | | | | |
| g. Heat pump water heaters provide more comfort | | | | | | | | | | |
| h. Heat pump water heaters are more quiet | | | | | | | | | | |
| i. Heat pump water heaters are safe | | | | | | | | | | |
| j. Heat pump water heaters are a high-quality investment for your home | | | | | | | | | | |
| k. Heat pump water heaters are easy to operate | | | | | | | | | | |

Note: the following-probes will be used depending on the previous responses.

Set-up: [Stand by the flipboard] Which of these things received your top scores? [Write them on the flipboard]

Question: We have [insert top-rated item]

Question: [If *cutting edge technology*] Why is cutting edge technology motivating? [Let them discuss]

Probe: [If none of these issues was raised] How would you rate being user friendly? Owning a premium product? Knowing the technology will not get outdated as fast as others?

Question: [If *ability to better control your home environment*] Why is the ability to better control your home environment so motivating? [Let them discuss]

Probe: [If none of these issues was raised] How would you rate being user friendly? Having more setting options? The ability to control remotely via smart phone?

Question: [If *energy savings* was motivating] Why energy savings is motivating? [Let them discuss]

Probe: [If none of these issues was raised] How would you rate reducing electricity bills? Reducing carbon or pollution emissions from the generation of electricity? Avoiding waste? Using only what you need? Ensuring there are enough resources for the future?

Question: [If *save money* was motivating] Why is saving that amount of money is so motivating?

Probe: [If none of these issues was raised] How would you rate lowering your energy bills? Lowering your maintenance costs? A longer product life?

Question: [If *reliability* was motivating] Why is reliability so motivating?

Probe: [If none of these issues was raised] How would you rate being user friendly? The predictability of water heating? A longer life? A durable construction?

Question: [If *reducing waste* was motivating] Why is waste reduction so motivating?

Probe: [If none of these issues was raised] How would you rate lowering energy bills? Saving energy? Using only my fair share? Ensuring there is enough energy for future generations? Reducing carbon or pollution emissions?

Question: [If *increased comfort* was motivating] Why is increased comfort motivating?

Probe: [If none of these issues was raised] How would you rate the ability to control remotely via smart phone? More settings options?

Question: [If *quiet operation* was motivating] Why is quiet operation motivating?

Probe: [If none of these issues was raised] How would you rate less white noise? Pleasant home environment?

Question: [If *safety* was motivating] Why is safety motivating?

Probe: [If none of these issues was raised] How would you rate longer life? Durable construction? Reducing carbon or pollution emissions from the generation of electricity? Ease of Use, user friendly?

Question: [If *high quality investment* was motivating] Why is high quality investment motivating?

Probe: [If none of these issues was raised] How would you rate longer life? Durable construction? Saving energy? Cost savings? Enhancing the value of my home? Ensuring that we have the best product on the market?

Question: [If *ease of use* was motivating] Why is h ease of use motivating?

Probe: [If none of these issues was raised] How would you rate more settings options? Longer life? Ability to control remotely via smart phone?

Question: I'm going to hand out a set of cards with the statements we just discussed written on them. [Hand them the cards] Looking at these now, please pull out the top 5 statements you find most motivating for you, and rank those statements in order of most important (5) to least important (1).

[READ THROUGH THE FOLLOWING LIST AND CAPTURE THE RANKING FOR EACH]

- l. Cutting edge technology
- m. Control of your home environment
- n. Energy savings
- o. Save money on energy bills
- p. Reliability
- q. Reduce waste
- r. Increased comfort
- s. Quiet
- t. Safety
- u. High quality investment
- v. Easy to operate

Question: Now let's compare some of these aspects in pairs. Using the cards, put together the two statements that you would find most motivating if they were combined.

[GO AROUND THE ROOM AND HAVE EVERYONE SHARE THEIR COMBINATIONS, CAPTURE ON THE WHITEBOARD]

Probe: Why did you combine these two statements? Are the statements more compelling when paired with another statement?

Question: Looking the pairs of statements you've put together as a group, which statements are most compelling to you?

Probe: Why is this compelling? Did anyone pick a statement they did not write? Why?

Question: Based on the information presented today, please tell us which statement best represents your opinion:

7. I will purchase a new water heater before my current water heater breaks.
8. I will wait until my current water heater breaks and then purchase a new water heater.

Question: Based on the information presented today, please tell us which statement best represents your opinion:

10. I will definitely purchase a heat pump water heater when I replace my current water heater.
11. I will consider purchasing a heat pump water heater when I replace my current water heater.
12. I will not purchase a heat pump water heater when I replace my current water heater.

Question: Please tell us why you will or will not purchase or consider a heat pump water heater.
[Let them discuss]

CLOSING (1 MIN.)

Thank you for your time today. You have been extremely helpful and I have truly enjoyed hearing your opinions and getting to know all of you. Your honorarium will be waiting for you.