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Heat Pump Water Heater Market Progress Evaluation Report #7

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Table of Contents

Executive Summary

On behalf of the Northwest Energy Efficiency Alliance (NEEA), NMR Group, Inc. ("the team") completed the 7th Market Progress Evaluation Report (MPER) of NEEA's Heat Pump Water Heater (HPWH) Initiative. This initiative works to push the supply chain to more rapidly adopt HPWHs, close the price gap between HPWHs and conventional electric tanks, finalize the updated Advanced Water Heater Specification, and drive the adoption of a federal standard for HPWHs.

MPER #7 overarching research objectives:

Track consumer awareness of HPWHs in the Northwest over time, including assessing the impact of NEEA's Pre- and Post- "Boring but Efficient" Campaign in 2022.

Report on the size of the market for HPWHs.

Measure key MPIs related to high priority market barriers and review the program's logic model.

Key research activities:

1. Review logic model
2. Estimate size of HPWH market
3. Survey HPWH installers
4. Interview HPWH retailers
5. Survey consumers
6. Scrape retailer websites for stocking data

Key findings and recommendations:

1 The HPWH initiative has helped build a strong foundation for HPWH adoption. Installers know what they are and have favorable opinions – a positive sign for future market growth. However, there are enough substantive barriers that installer recommendation rates remain low.

Despite the HPWH initiative's foundation to promote uptake, HPWHs represent a small portion of the water heater market in the Northwest. Installer and consumer awareness are key components to increasing the modest recommendation rates and continuing to encourage positive perceptions of the technology.

Related recommendation. Past MPERs have noted how boosting installer recommendation rates directly impacts market share, because customers trust their installers. NEEA should continue its work overcoming barriers that limit recommendation rates but may want to focus on scenarios resulting in successful installation – that is, where the conditions are right for the units to perform as expected with minimal modifications to the home. This should yield consumers satisfied with the installation process, installation and operating costs, and unit reliability, as well as installers comfortable recommending the technology without fear of expensive callbacks to address performance complaints.

2 Installers have become much more familiar with HPWHs, but still do not often recommend them.

In MPER #5, 30% of installers – sampled from Hot Water Solutions (HWS) trainee lists– considered themselves very familiar with HPWHs and worked with them regularly. MPER #7 found that half of installers (49%) – sampled from the general population, not just HWS trainee lists – said the same, showing signs of increasing awareness of HPWHs (MPI 1a). Even with positive impressions and most installers agreeing that HPWHs lower energy bills, installers were not as likely to agree that they are good replacements for traditional electric water heaters. Less than one-third of installers (28%) said they regularly recommend HPWHs to customers and most said they were unlikely to recommend a HPWH to a friend or colleague.

Related recommendation. Continue or even ramp up HWS training efforts, specifically about quality installation practices and identifying scenarios where the systems will perform as expected. Where possible, consider hands-on training for installers with limited HPWH experience. The general population of water heater installers (MPER #7) have positive impressions of HPWHs, but HWS-trained installers surveyed several years ago (MPER #5) were far ahead in terms of comfort with HPWHs. These HWS-trained installers may also be avoiding installation pitfalls, helping them maximize customer satisfaction and reduce callbacks.

3 Concerns about callbacks due to complaints about reliability and hot water availability limit installer recommendation rates.

Installers whose companies are familiar with or install HPWHs still receive complaints or requests for service soon after installation. Customer callbacks are costly and may cause installers to shift recommendations away from HPWHs, which installers say require more maintenance than standard water heaters. Despite consistently high customer satisfaction reports (in the 90% range in MPER #4, #6,

and #7; MPI 4a), one-quarter of installers received complaints regarding HPWHs not producing enough hot water. Some installers attempt to resolve the issue by changing the unit from hybrid to electric, eliminating the efficiency gains of installing a HPWH. This decision leads to high costs for customers, increased energy consumption, and depressed recommendation rates for HPWHs. Trained installers are more likely to agree that HPWHs are reliable (70% of trained installers in MPER #5 compared to 55% of general installers in MPER #7).

Related recommendation. NEEA must continue its work with market actors, particularly manufacturers and installers, to make the necessary improvements to the technology or to installation practices to reduce callbacks. Manufacturers must continue to engage with NEEA regarding the challenges installers face and work with NEEA to directly address the problems installers describe. In many cases, installers may be the face of the products, and they do not want to jeopardize their own client base by installing problematic equipment. Manufacturers must provide robust product support, via training, marketing, and installer outreach, to gain market share and build installer confidence. If product issues have largely been resolved by manufacturers – and whenever product updates help address installer concerns – manufacturers need to proactively communicate this to installers, and potentially consumers, to avoid bad early experiences dictating the trajectory of the market for years to come.

Related recommendation. Via HWS trainings and other market actor outreach, educate installers about options to increase hot water and avoid service callbacks, focusing on options that do not increase consumption, e.g., ensuring that systems are installed correctly, in appropriate installation locations, that tanks are sufficiently large for the customer's needs, and that customers understand how they might need to adjust their behavior to accommodate the characteristics of the new unit.

4 Cost continues to be a significant barrier to HPWH adoption.

In MPER #7, over one-half of installers (57%), HWS-trained and not trained, agreed that HPWHs were a good replacement for electric resistance water heaters (MPI 1a). Nearly three-quarters (71%) of installers who recalled a HWS training (n=14) agreed that HPWHs are good replacements for electric resistance models, similar to 79% of HWS-trained installers in MPER #5. Those who disagreed with this statement in MPER #7 (n=26) most frequently cited the high upfront cost as a primary reason (73% of the 26), followed by lack of consumer awareness (58%) and too long of a payback period (50%) – another cost-related factor. Of the homeowners who purchased water heaters in the last year (n=150), 57% considered installing a HPWH. Among respondents who did not consider purchasing a HPWH, cost was the most cited reason (25%), followed by a lack of familiarity with the technology (23%). HPWHs have a longer average installation time than electric resistance storage water heaters, resulting in consumers incurring an additional labor cost on top of a higher upfront cost for a HPWH.

Related recommendation. Continue working with manufacturers and installers to identify ways to make HPWHs more affordable to purchase and install. This could include a mix of strategies known to NEEA, such as helping installers follow best practices for installation, teaching installers about which homes are going to be the strongest candidates for installation and require limited modification, working with utilities to boost incentive amounts and availability, or even promoting new product development, such as 120-volt plug-in models that can be installed without the need for (or cost of) an electrician.

5 Most HPWH installations require accommodations that can increase installation time and cost, but a substantial portion of homes – at least 29% – can still readily accommodate HPWHs.

In MPER #7, installers familiar with HPWHs estimated that nearly one-third of homes (29%, on average) could accommodate a HPWH without making more changes to the installation area than is typical for a storage water heater. While this means that most homes have circumstances that make it harder and costlier to accommodate a HPWH, it also shows a significant portion of the market is ripe for HPWH adoption. Assuming no unexpected issues, one would expect that this 29% of households could be well-served by a HPWH.

In MPER #5, HWS-trained installers estimated that one-half of the homes they visit (51%), on average, could readily accommodate a HPWH. Compared to the 29% of homes estimated by general installers in MPER #7, this finding provides additional evidence that HWS training provides installers with the knowledge and resources to overcome situations that untrained installers may find challenging.

Installers estimated that one-third of HPWH installations (31%) require ductwork, adding an average of two hours of labor to a HPWH installation. Installers that offered general contracting and/or electrical services alongside water heater installations were more likely to agree with the statement "My company regularly recommends HPWHs to customers" (29%) than water heater installers whose companies did not offer these services (9%). Those installers that offer additional services may be better equipped to overcome challenging HPWH installations that require modifying the installation area, adding ducting, or adding new wiring or electrical work.

Related recommendation. In the short term, NEEA should encourage installers to focus on the portion of the market that installers already think can readily accommodate a HPWH (29%, on average). With additional training from HWS, the share of the market considered "low-hanging fruit" should grow in the medium and longer term, as HWS-trained installers reported in MPER #5 that that figure was closer to half of homes.

Related recommendation. Installation contractors with in-house electrical or general contracting services may be well positioned to accommodate challenging HPWH installations, so NEEA should ensure that these firms are well trained on best practices for HPWH installations, including how to accommodate challenging installation scenarios. If more installers can easily deal with the circumstances that might make it harder to fit a HPWH, the percentage of homes that represent challenging installations would inherently decrease.

6 Installers continue to use workarounds to avoid HPWHs.

The 2015 National Appliance Energy Conservation Act (NAECA) updates increased the federal minimum efficiency requirements for large (>55 gallons), residential electric water heaters to be unreachable without heat pump technology, meaning that large, residential electric resistance water heaters are generally no longer available in the market. However, only 17% of installers are using HPWHs as a replacement, and instead 33% are switching to single commercial electric resistance water heaters with a smaller capacity. The commercial electric water heaters cost as much as HPWHs but are stocked less often than HPWHs, suggesting other performance factors of electric resistance models are outweighing energy and cost savings in recommendations.

Related recommendation. Continue to encourage utility partners to offer incentives on HPWHs over 55 gallons to lower the likelihood that installers and customers who prefer a higher capacity water heater will implement workarounds to avoid installing a HPWH.

Related recommendation. On future research with installers, continue to investigate and measure installer motivations for workarounds to track change over time. Understanding what workarounds installers use – and why they chose to do so – can help identify opportunities to either change their behavior or change the product to respond to their concerns.

7 While installers in Montana and Idaho are less familiar with HPWHs and less likely to recommend them, overall familiarity is up, and NEEA's recent marketing campaign may be helping boost customer receptiveness in these states.

Installers and retailers contacted in this study identify customer awareness of HPWHs to be an important component of increasing HPWH uptake.[1] While over one-half of the installers in Washington and Oregon said they were *very familiar* with HPWHs and worked with them regularly (62% and 54%, respectively), fewer than one-fourth of the installers in Idaho (14%) and Montana (25%) gave the same assessment.

HPWH customer awareness in rural areas has historically lagged that of urban areas. NEEA's "Boring but efficient" targeted awareness campaign of 2022 appears to have successfully increased HPWH awareness among rural respondents. Consumers who recalled seeing the awareness campaign think HPWHs are efficient and a good value at higher rates than those who did not recall seeing an ad.

Related recommendation. Continue targeting rural consumers in HPWH awareness campaigns (and HWS trainings), building on the success from the most recent "Boring but Efficient" campaign.

8 Retailers need support from utility partners and manufacturers to promote HPWHs, as they have less stake in any particular type of water heater, but are still a key source of information, particularly for the DIY market.

Retail stores represent a key part of the HPWH market, provide valuable information directly to consumers, and serve as an important resource in the DIY market. In MPER #7, 36% of consumer survey respondents who purchased electric water heaters in the past three years installed it themselves and over one-half (59%) reported purchasing the water heater from a retail store. Over one-half of the HPWH purchasers in the MPER #6 survey reported self-installing the HPWH. Retailers interviewed for MPER #7 described customers who self-install large appliances as price-sensitive and looking to save money on labor costs. Self-installing HPWHs, especially retrofitting, takes a considerable amount of knowledge on ventilation requirements and adequate spacing.

Related recommendation. Increase the penetration and visibility of HPWH awareness campaigns in retail stores and their online channels, ideally even in locations not served by utility incentive programs. Over half of consumers reported *purchasing* a water heater from retailers, but only 10% of customers reported *hearing about* HPWHs from them. If retailers increase their promotion of HPWHs, more customers could be driven to that product. However, this will take intervention and support from NEEA

[1] The NEEA HPWH initiative's logic model has incorporated consumer awareness of HPWHs into the anticipated outcomes (Outcome 9).

and utility stakeholders, given that retailers have little reason to promote one product over another as long as the units sell and they meet their customers' needs. Traditional in-store marketing and educational materials may help push customers to these more efficient products, but online-only customers also need targeting, through landing pages, banner ads, and other online advertisements on retailer websites. Additional training of floor associates may help support retailers in promoting HPWHs, but efforts here should recognize that DIY-focused big box retailers do not use a commission-based pay structure, so associates would not generally be expected to provide in-depth customer support. As these retailers' business models prioritize overall sales and customer experience, HPWH manufacturers, distributors, and other stakeholders could be better positioned to provide support for customers.

Related recommendation. Conduct additional research about DIY installers to understand how to better support them in choosing and installing HPWHs. According to research conducted in MPERs #6 and #7, up to 53% of HPWHs are self-installed. One of the retailers interviewed for MPER #7 expressed surprise at this estimate, but additional research is needed to more accurately estimate the proportion of electric storage water heaters and self-installed HPWHs. To understand the motivations of DIY installers and better support them, future research should ask additional questions about motivation, purchase and installation experience, and satisfaction with the performance of their HPWH.

Related recommendation. Continue HWS' efforts to educate potential DIY HPWH purchasers about how to install these systems, and specifically focus on how to navigate challenging installation scenarios. These barriers can be difficult enough for professionals to overcome, and even more so for DIY installers who lack the same level of experience and training. DIY customers should be able to access information for choosing the right HPWH for their application and understand proper installation technique, given that deviation from manufacturer specifications impacts the unit's efficiency. Future research with DIY customers could clarify if and how they relied on the HWS DIY-focused installation guides, highlighting opportunities to refine those materials.[2]

9 Increasing consumer awareness remains a key component of market transformation, especially since most people do not think about their hot water heater until it breaks.

Water heaters are not generally top of mind, as NEEA's "Boring but Efficient" HPWH marketing campaign acknowledges and replacing them early to save energy is relatively uncommon. According to respondents in the MPER #7 consumer survey, water heater failure, breakage, or leaks are the top reasons for purchasing a new water heater. Water heater replacement is not often considered unless necessary, so customers' pre-existing awareness of the technology serves as a key component in their willingness to accept a HPWH recommendation from their contractor or retailer.

Related recommendation. Add at least one MPI for the logic model's Outcome 9: *Consumers are increasingly aware of, and purchase, HPWHs*, so that the initiative can specifically track consumer awareness of HPWHs with established metrics of market progress and continue to measure progress in future MPERs. Such a measurement should likely include state-level and/or rural and urban assessments, where data permit. MPERs #6 and #7 have measured consumer awareness in service of any such MPI update. See Appendix F for additional, minor suggested tweaks to the Initiative's logic model and MPIs.

[2] https://hotwatersolutionsnw.org/installation/do-it-yourself

10 Manufacturers did not provide HPWH shipment data for use in this MPER's market sizing effort.

Previous MPERs relied on valuable water heater shipment data from manufacturers to estimate market size. Without it, the MPER #7 market sizing report was based on assumptions and trends in the preceding MPERs. Accordingly, ***the market sizing values presented in this MPER are not as reliable as previous estimates and should be viewed with extreme caution***.

Related recommendation. NEEA and its funders should continue to strengthen relationships with manufacturers to encourage them to resume providing this information. Ideally, NEEA funders could help with this process. While NEEA could require manufacturers to provide data as a condition of including their models on NEEA's Advanced Water Heating Specification Qualified Products List, ideally, collaborative discussions across stakeholders would yield the desired effects. Partnerships with other regional energy efficiency organizations (REEO's) – SWEEP, MEEA, NEEP, SEEA, and SPEER – and utility funders who recognize the importance of measuring market progress might encourage manufacturers to participate in nationwide data-sharing arrangements.

Section 1 *Background*

NEEA's 7th evaluation of progress in the HPWH market in the Northwest

The NEEA Heat Pump Water Heater (HPWH) Initiative. NEEA's HPWH Initiative operates with the ultimate goal of transforming the water heater market in the Northwest, such that efficient HPWHs become the product of choice for end-users and installers. Specific goals are to achieve the following:

- A more stringent federal standard for electric water heaters, essentially requiring heat pump technology for 45+ gallon electric models by 2025.
- Increased supply, demand, and market adoption of HPWHs, particularly those that meet the Advanced Water Heater Specification (AWHS) for use in cold climates.
- Reduced barriers to HPWH adoption, such as the following:
    - High upfront cost
    - Low product availability
    - Lack of awareness/confidence from end-users and installers

HPWH Initiative Progress to Date. NEEA staff have engaged the water heater market since 2005, working with manufacturers with the goal of bringing new HPWH technology to the market. In 2007, NEEA staff worked with ENERGY STAR to release the first ENERGY STAR specifications for water heaters, a key element that encouraged a large manufacturer to commit to building a qualifying product. NEEA developed requirements for HPWH in northern climates into the Advanced Water Heater Specification (AWHS). This specification has advanced the performance tiers from the original Tier 1 to the current Tier 4 level, increasing energy savings by 67%.

NEEA launched the HPWH Market Test in 2012 to provide incentives for installing Tier 2 HPWHs. Between 2012 and 2022, the Initiative has helped to increase consumer awareness of HPWHs and overseen the installation of more than 120,000 HPWHs in the Northwest. Tier 3 HPWHs were introduced in 2015, and since 2019, 98% of HPWH sales are Tier 3 or better.

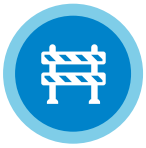
Over the years, NEEA has worked with manufacturers and advanced AWHS requirements to target improved customer experience. NEEA developed nine advanced HPWH trainings for installers and other industry stakeholders. NEEA also updated the AWHS to require all HPWHs to be CTA-2045 compatible and influenced the federal standard requiring all electric storage water heaters 55 gallons or larger to meet efficiency standards only achieved by HPWH technology.

Market Progress Evaluation Report (MPER) #7. Achieving targeted market changes and long-term market transformation requires two key components: (1) consistent collection and analysis of market data, and (2) integrating that information into program design and operation. To help measure progress in the market, the NEEA HPWH Initiative uses a logic model to guide its work. The logic model methodically describes how NEEA's activities can lead to specific short, medium, and long-term market outcomes. NEEA reviews the logic model annually to ensure it remains up to date. The logic model also includes market progress indicators (MPIs) that represent metrics by which progress toward those outcomes can be measured.

By conducting periodic assessments of the HPWH market, NEEA follows evaluation best practices for achieving and documenting change in a complex market. NEEA completes regular MPERs to measure and compare market changes against established baselines and to identify opportunities to improve its market interventions. As the single largest residential energy savings opportunity for the Northwest region, it is critical to NEEA's mission that the HPWH Initiative is effective and that progress in this market is tracked appropriately. Accordingly, MPER #7 follows and builds upon methodological approaches established in previous MPERs to allow for consistent comparisons of market progress across time. The research goals of each MPER vary depending on NEEA's immediate research needs and how much time has passed since a given market progress indicator has been measured. NEEA does not measure every market progress indicator within each MPER, and each MPER is tailored to the current state of the market.

Research Objectives

This MPER has three overarching research objectives:



Track consumer awareness of HPWHs in the Northwest over time, including assessing the impact of NEEA's Pre- and Post- "Boring but Efficient" social media advertisement campaign in 2022.

Report on the size of the market for HPWHs.

Measure key MPIs related to high priority market barriers and review the program's logic model.

Methodology

The team undertook a variety of research tasks to address the research objectives.

More detail about the methodology of each research task can be found in the respective appendices. All survey and interview guides can be found in Appendix H.

Core Study Tasks

Review logic model. The team reviewed the program's logic model to verify that the market transformation theory was logical and consistent. The team reviewed the Operations Plan, conducted staff interviews, and reviewed NEEA's past HPWH MPERs to confirm that the initiative was operating in line with its logic model and that MPER #7 included MPIs that had not been studied in the previous MPER.

Estimate the size of the HPWH market. The MPER reports on the size of the market for HPWHs in the Northwest. It includes installation estimates by attributes such as state, retail vs. distributor supply channel, and emergency vs. non-emergency replacement units. However, this MPER deviated from the methodology used in MPERs #4, #5, and #6 NEEA was unable to procure manufacturer sales data as in previous years. This report relies on estimates developed by NEEA, supplemented with primary data collection efforts such as the installer survey. Comparisons to previous MPERs should be interpreted with caution.

Survey HPWH installers (n=101). The team conducted a web and phone survey with HPWH installers. Installers were recruited from commercially available directories of plumbers and from NEEA's list of Hot Water Solutions trainees. The survey assessed installers' experience with and perspectives on HPWHs.

Interview HPWH retailers (n=2). The team attempted to discuss HPWH sales and stocking practices with key plumbing retailers in the Northwest; two participated, but conversations about sales were limited by company policy.

Web-scrape HPWH retailer sites (n=21). The team scraped the electric water heater listings on the web sites of 21 of the 151 branches of two major home improvement retailers in the four Northwest states. This effort gathered data on the extent to which HPWHs are in-stock and available for emergency replacements through retailers. It scraped the same branches reviewed in MPER #6, to develop comparisons over time.

Survey with consumers before and after a NEEA HPWH awareness campaign (pre: n=416, post: n=411). NEEA conducted a HPWH awareness campaign via digital media in the fall of 2022. The MPER included a pre- and post-campaign web survey of residents of the Northwest, assessing their awareness of and opinions about HPWHs, and for post-campaign respondents, if they recalled the campaign.

Synthesis session. On May 31, 2023, NMR and NEEA conducted a synthesis session to discuss preliminary findings from the research activities.

Section 2 *Key Findings*

This section summarizes important findings derived from the study's research. For each finding, the team offers any related recommendations, followed by results that support the finding.

1 *The HPWH initiative has helped build a strong foundation for HPWH adoption. Installers know what they are and have favorable opinions – a positive sign for future market growth. However, there are enough substantive barriers that installer recommendation rates remain low.*

HPWHs have not yet become the dominant type of water heater in the Northwest, and there are meaningful factors limiting their uptake, as the findings below describe. Nonetheless, the HPWH initiative has clearly helped develop a strong foundation for future market growth. While there are clear signs of growth in consumer and installer awareness, and installers have developed positive perceptions of HPWHs, there are enough barriers that market share and installer recommendation rates remain modest. The following findings provide additional detail around these points.

Related recommendation. Past MPERs have noted how boosting installer recommendation rates directly impacts market share, because customers trust their installers. NEEA should continue its work overcoming barriers that limit recommendation rates but may want to focus on scenarios resulting in successful installation – that is, where the conditions are right for the units to perform as expected with minimal modifications to the home. This should yield consumers satisfied with the installation process, installation and operating costs, and unit reliability, as well as installers comfortable recommending the technology without fear of expensive callbacks to address performance complaints.

2 ··· *Installers have become much more familiar with HPWHs, but still do not often recommend them.*

MPER #7 conducted a water heater installer survey including respondents with and without HPWH experience, while the MPER #5 survey focused on installers recruited from HWS' trainee lists. Nearly all the installers surveyed for MPER #7 (96%) were aware of HPWHs and 71% said their company installs them. Only half of the installers (49%) considered themselves very familiar with HPWHs and reported working with them regularly, but in MPER #5, only 30% of installers – a sample drawn entirely from HWS trainee lists – could say the same. While not perfectly comparable samples, MPER #7 shows signs of increased familiarity with HPWHs among the installer population (MPI 1a), where even the general population of installers shows more familiarity with HPWHs than the HWS-trained group surveyed in MPER #5.

Installers surveyed for MPER #7 reported positive impressions of HPWHs (MPI 1a), though generally not as positive as HWS-trained installers surveyed in MPER #5. In MPER #7, most installers aware of HPWHs agreed with the statement "my company's installation technicians can install HPWHs correctly" (84%, 89% in MPER #5) and that "replacing an electric resistance water heater with a HPWH will lower a customer's overall energy bill" (78%, 90% in MPER #5). However, installers were not as likely to agree that HPWHs are good replacements for traditional electric water heaters (57%, 79% in MPER #5) or are reliable (55%, 70% in MPER #5). Less than one-third of installers (28%) said their company regularly recommends HPWHs to customers. One-half of consumers who purchased a water heater in the past three years (51%) recalled their contractor or installer recommending a HPWH. Customers in MPER #7 reported a higher recommendation rate than installers, but lower than the consumer survey estimate in MPER #6 (64%).

Most installers said they were unlikely to recommend a HPWH to a friend or colleague. The overall net promoter score, a market research metric that relies on a 0 to 10 scale to assess the rate at which respondents recommend a product or brand, was negative, meaning more installers who were aware of HPWHs said they were not likely to recommend one to a friend or colleague than to recommend one. Asking this question helps distill their true thoughts about these systems, and the result shows substantial room for improvement.

Related recommendation. Continue or even ramp up HWS training efforts, specifically about quality installation practices and identifying scenarios where the systems will perform as expected. Where possible, consider hands-on training for installers with limited HPWH experience. The general population of water heater installers (MPER #7) have positive impressions of HPWHs, but HWS-trained installers surveyed several years ago (MPER #5) were far ahead in terms of comfort with HPWHs. These HWS-trained installers may also be avoiding installation pitfalls, helping them maximize customer satisfaction and reduce callbacks.

3 ··· *Concerns about callbacks due to complaints about reliability and hot water availability limit installer recommendation rates.*

3.1. Whether due to issues with the unit or installation, callbacks continue to be a significant concern for installers. Installers avoid systems that trigger callbacks, as this decreases profits

and risks client retention. The same issues that trigger callbacks for installers may also prompt customer returns at retail outlets.

Getting a customer callback is problematic for installers. Callbacks require installers to return to address issues, costing them time and money. Unfortunately, nearly half of installers whose company installed HPWHs or who were familiar with HPWHs (n=86) agreed with the statement "My company is likely to get customer complaints or service requests soon after installing a heat pump water heater." If customers are happy with the water heater they already have, one can understand why installers might be hesitant to recommend a system that seems likely to end up triggering costly callbacks. Similarly, NEEA's Challenging Installation study found that 85% of installers said HPWHs required more maintenance than a standard water heater, which might trigger callbacks.[3]

The two retailers interviewed for MPER #7 did not share how often HPWHs were returned to their stores, but one said the return rate was "higher than you would expect." While no details were shared, a high rate of returns might correspond to some of the same issues driving service requests for professionally installed HPWHs. Retailers represent a significant portion of HPWH sales – estimated at 19% in MPER #6 and 28% in MPER #7. If frequent returns affect retailers' stocking practices, the overall market for HPWHs would be significantly impacted.

Related recommendation. NEEA must continue its work with market actors, particularly manufacturers and installers, to make the necessary improvements to the technology or to installation practices to reduce callbacks. Manufacturers must continue to engage with NEEA regarding the challenges installers face and work with NEEA to directly address the problems installers describe. In many cases, installers may be the face of the products, and they do not want to jeopardize their own client base by installing problematic equipment. Manufacturers must provide robust product support, via training, marketing, and installer outreach, to gain market share and build installer confidence. If product issues have largely been resolved by manufacturers – and whenever product updates help address installer concerns – manufacturers need to proactively communicate this to installers, and potentially consumers, to avoid bad early experiences dictating the trajectory of the market for years to come.

3.2. Only a slight majority of installers reported that HPWHs are reliable. HWS-trained installers previously surveyed for MPER #5 were more likely to think this.

Fifty-five percent of surveyed installers who were aware of HPWHs (MPER #7) but 70% of HWS-trained installers surveyed in MPER #5 agreed that HPWHs are reliable. With this level of concern about system reliability, modest recommendation rates become unsurprising – installers have a vested interest in keeping customers happy.

Examples of complaints from installers about reliability include statements like:

- *"HPWHs fail in the first year of usage, and they break all the time."*
- *"If you can get around having to install a HPWH, then go with something else."*
- *"HPWHs are really expensive and their failure rate is epic."*

[3] https://neea.org/img/documents/Heat-Pump-Water-Heater-Market-Research-Challenging-Installation-Scenarios.pdf

3.3. Despite high customer satisfaction with HPWHs, a quarter of installers reported issues with HPWHs not providing enough hot water, potentially causing unsatisfied customers, energy-wasting outcomes, and depressed recommendation rates.

Recent MPERs have consistently shown that HPWH owners are satisfied with their systems – satisfaction has been in the 90% range among purchasers surveyed in MPERs #4, #6, and #7. However, one-quarter of installers (25%) reported receiving service complaints related to HPWHs not producing enough hot water – a significant concern given that this is *the* purpose of the unit. Six of these installers said they deal with this issue by changing the unit from hybrid to electric resistance, which negates the efficiency gains of installing a HPWH. If that setting is not reverted (automatically or manually), the owner could pay a significant premium for a HPWH that operates no more efficiently than a standard electric resistance model. Six of these installers also said they attempt to prevent these types of callbacks by explaining to the customer upfront about recovery time, valuable guidance that might help consumers slightly adjust their behavior (or expectations) to maximize their satisfaction with their new HPWH.

While installing a larger HPWH could reduce callbacks about hot water availability, it comes at a cost to the customer. A customer could pay an additional $400, on average, to install a 65-gallon HPWH instead of a 50-gallon unit, based on web-scraped prices from retailers.

Additionally, increasing storage temperatures and installing mixing valves at the water heater's hot water outlet may also help reduce callbacks by increasing the effective output of the unit. The Challenging Installation report found that "a surprisingly low portion of installers reported they would be likely to increase set point temperature and add a mixing valve as a potential solution for space constraints, [even though] this could enable installation of smaller units." This practice is not without downsides, however. It increases energy consumption, increases installation cost, and the HWS site notes that it can shorten the life of the HPWH or void the warranty.[4]

Related recommendation. Via HWS trainings and other market actor outreach, educate installers about options to increase hot water and avoid service callbacks, focusing on options that do not increase consumption, e.g., ensuring that systems are installed correctly, in appropriate installation locations, that tanks are sufficiently large for the customer's needs, and that customers understand how they might need to adjust their behavior to accommodate the characteristics of the new unit.

4 … *Cost continues to be a significant barrier to HPWH adoption.*

4.1. Installers, consumers, and retailers emphasized the upfront cost of a HPWH as a barrier preventing more widespread adoption of the technology.

As noted above, the MPER # 7 installer survey included HWS-trained installers and those who were not trained. Overall, just over one-half (57%) of the installers agreed that HPWHs are good replacements for electric resistance water heaters, but nearly three-quarters (71%) of installers who recalled a HWS training (n=14) agreed that they were good replacements for electric resistance models, similar to 79% of HWS-trained installers in MPER #5 (MPI 1a). Those who disagreed with this statement in MPER #7

[4] https://hotwatersolutionsnw.org/news/mixing-valves-work-with-heat-pump-water-heaters

(n=26) most frequently cited the high upfront cost as a primary reason (73% of the 26), followed by lack of consumer awareness (58%) and too long of a payback period (50%) – another cost-related factor. Installers provided a variety of other explanations, but interestingly, the top two reasons are not associated with the performance of the product. In fact, explanations that might indicate a product problem, such as "had a bad experience" with them, or "HPWHs don't work well," were far less commonly cited (31% and 12%, respectively), highlighting the continued importance of cost as a barrier.

More than one-half of homeowners (57%) who had purchased water heaters in the past three years (n=150) said they had considered installing a HPWH. Among respondents who did not consider purchasing a HPWH, cost was the most cited reason (25%), followed by a lack of familiarity with the technology (23%).

One of the retailer interviewees indicated that the socioeconomic characteristics of the area where a branch is located are among the variables factored into HPWH stocking decisions. Due to upfront cost, budget-conscious customers are not the target market for HPWHs, and stocking practices respond to demand, meaning one might expect more affluent areas to stock more HPWHs.

According to web-scraping findings, 40- and 50-gallon HPWHs cost approximately $1,300 more than a similarly sized electric resistance water heater at retailers in the Northwest.[5] The average price for a HPWH sold via major retailers ranged from about $1,900 to $2,600. A price sensitivity analysis conducted by NEEA in 2022 found the ideal price point for electric HPWHs was $1,350 to $1,500,[6] lower than the web-scraped retail prices, but potentially achievable with utility incentives.

The cost of HPWHs will continue to pose a challenge for HPWH market adoption. Supply chain challenges, increasing material and labor costs, inflation, and other market pressures could continue to put upward pressure on the cost of HPWH installation.

4.2. The increased labor time associated with installing HPWHs and addressing challenging installation scenarios raises the cost of the HPWHs but can also boost profits for the installer, assuming they can avoid callbacks.

HPWHs can take more than twice as long to install than electric resistance storage water heaters. Installers estimated that electric storage water heaters take an average of 2.5 hours to install while HPWHs take 3.75 to 5.75 hours to install, depending on whether ducting is required. These values align with those found in NEEA's recent Challenging Installation research.

While increased labor time increases the installation cost of the water heater for the consumer, it can also boost profits for the installer. That said, almost a third (31%) of installers reported that gas tankless models are the most profitable water heaters for their company to install, primarily due to tankless units having the most labor-intensive installation. HPWHs are also labor intensive to install, but only 5% of installers overall (n=101), and 7% of installers who said their company installs HPWH (n=72), identified them as the most profitable water heater to install. Installers may also be running into issues with HPWHs – including callbacks or unbudgeted complications during the installation – that cut into their

[5] Not all HPWH models were rebated, even at store locations promoting utility incentives. The average cost of a HPWH at a store location not inside a utility territory (n=5) was $1,734, compared to $1,658 at stores in utility territories offering HPWHs.
[6] https://neea.org/img/documents/Pricing-Research-for-Efficient-Water-Heaters.pdf

profits, while they have more experience successfully installing tankless units. Gas tankless models have also developed a reputation as having benefits beyond energy efficiency, such as a small form factor and unlimited hot water, boosting their desirability. If installers are unable to make a strong pitch for the value proposition of a HPWH, the increased upfront cost may not be as palatable as that of similarly costly tankless models, even if HPWHs are substantially more energy efficient.

Related recommendation. Continue working with manufacturers and installers to identify ways to make HPWHs more affordable to purchase and install. This could include a mix of strategies known to NEEA, such as helping installers follow best practices for installation, teaching installers about which homes are going to be the strongest candidates for installation and require limited modification, working with utilities to boost incentive amounts and availability, or even promoting new product development, such as 120-volt plug-in models that can be installed without the need for (or cost of) an electrician.

5 ··· *Most HPWH installations require accommodations that can increase installation time and cost, but a substantial portion of homes – at least 29% – can still readily accommodate HPWHs.*

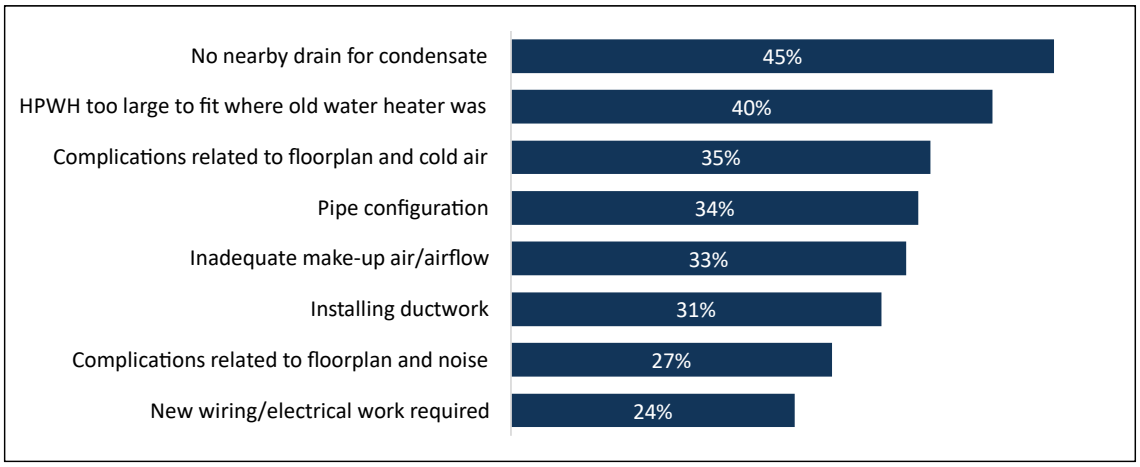
5.1. No nearby drain for condensate, tight spaces, and inadequate make-up air are the most common challenges encountered by installers. Notably, HWS-trained installers report encountering barriers to HPWHs at lower rates than general installers, indicating trained installers may be better at resolving these issues.

In MPER #7, installers familiar with HPWHs estimated that nearly one-third of homes (29%, on average) could accommodate a HPWH without making more changes to the installation area than is typical for a storage water heater. While this means that most homes have circumstances that make it harder and costlier to accommodate a HPWH, it also shows a significant portion of the market is ripe for HPWH adoption. Assuming no unexpected issues, one would expect that this 29% of households could be well-served by a HPWH.

In MPER #5, HWS-trained installers estimated that one-half of the homes they visit (51%), on average, could readily accommodate a HPWH. Compared to the 29% of homes estimated by general installers in MPER #7, this finding provides additional evidence that HWS training provides installers with the knowledge and resources to overcome situations that untrained installers may find challenging.

Nearly half of installers said installation technicians “always” or “very frequently” encounter no nearby drain for condensate when installing a HPWH (45%) or that the HPWH is too large to fit where the old water heater was located (40%). Figure 1 shows other common installation challenges, not all of which are equally problematic for an installer to accommodate.

Figure 1: Frequently encountered installation challenges (n=97)



Notes: Question was asked of respondents who were aware of HPWHs (Q10).
Q19. How frequently do installation technicians face challenges with the following aspects of a heat pump water heater installation?

HWS-trained installers in MPER #5 also identified no nearby drain for condensate as the installation challenge they most frequently encountered, followed by inadequate make-up air or airflow.[7] MPER #7 provides additional quantitative corroboration to the findings from the Challenging Installations study: the Challenging Installations installers reported encountering issues with condensate drainers in 46% of homes and spaces that would not fit a HPWH in 38% of homes, on average.

Related recommendation. In the short term, NEEA should encourage installers to focus on the portion of the market that installers *already* think can readily accommodate a HPWH (29%, on average). With additional training from HWS, the share of the market considered "low-hanging fruit" should grow in the medium and longer term, as HWS-trained installers reported in MPER #5 that that figure was closer to half of homes.

[7] The scale in MPER #5 was slightly different; 31% of installers encountered no nearby drain for condensate and 25% encountered inadequate make-up/airflow "always" or "most of the time".

5.2. Accommodations for HPWH installations, particularly ductwork, can significantly increase the labor required for installation. Installation companies that offer additional services such as electrical work, light carpentry, or duct installation may be more likely to recommend HPWHs because they are equipped to handle these installation issues.

Surveyed installers estimated that about one-third (31%) of HPWH installations required ductwork. A HPWH installation that does not require ducting takes 3.75 hours to install, on average, compared to 5.75 hours for a HPWH that requires ducting.

One-quarter of installers indicated that their companies offered general contracting and/or electrical services alongside water heater installations.[8] Such installers were more likely to strongly agree with the statement "My company regularly recommends HPWH to customers" (29%) than water heater installers whose companies did not offer these services (9%). Installers whose companies also offer general contracting and/or electrical services may be better equipped to overcome challenging HPWH installations that require modifying the installation area, adding ducting, or adding new wiring or electrical work.

Related recommendation. Installation contractors with in-house electrical or general contracting services may be well positioned to accommodate challenging HPWH installations, so NEEA should ensure that these firms are well trained on best practices for HPWH installations, including how to accommodate challenging installation scenarios. If more installers can easily deal with the circumstances that might make it harder to fit a HPWH, the percentage of homes that represent challenging installations would inherently decrease.

6 ··· *Installers continue to use workarounds to avoid HPWHs.*

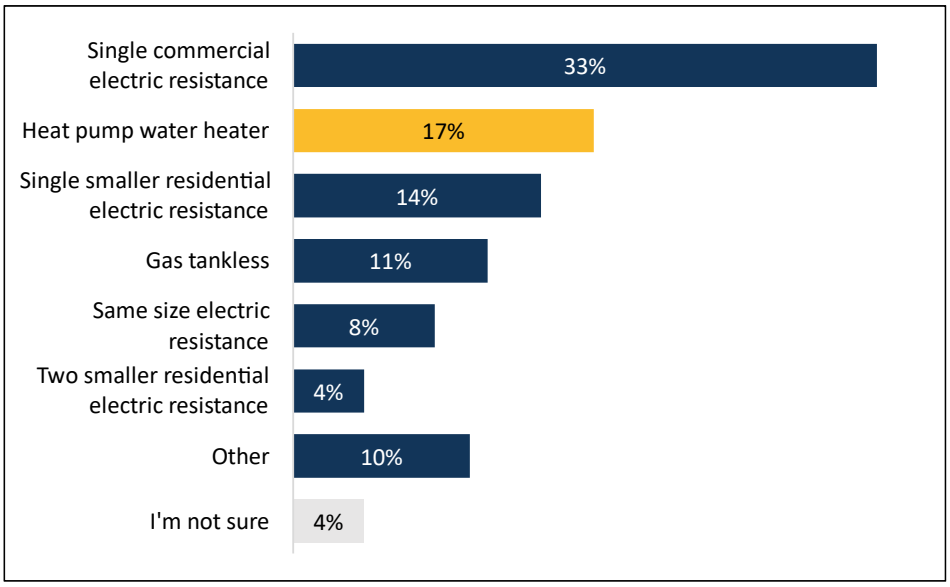
6.1. The 2015 NAECA updates have not yet led to widespread adoption of HPWHs to replace large, residential electric storage water heaters. The fact that installers are trying to choose other products, like commercial electric resistance or small non-heat pump models – or even switch fuels to gas tankless units – indicates hesitancy to adopt heat pump water heaters.

The 2015 NAECA updates increased the federal minimum efficiency requirements for large (>55 gallons), residential electric water heaters to be unreachable without heat pump technology. This means that large, residential electric resistance water heaters are generally no longer available in the market.

However, less than one-fifth of installers (17%) said their typical replacement strategy for a large electric storage water heater was a HPWH, the seemingly obvious choice. One-third said their typical replacement strategy in that scenario was to install a commercial electric resistance storage model (Figure 2). Among HWS-trained installers who recalled the training (n=14) from the MPER #7 survey, 43% said they typically replaced a large electric storage water heater with a HPWH. This is comparable to MPER #5, in which 40% of HWS-trained installers) said their typical replacement strategy was a HPWH.

[8] Sixteen percent of installers surveyed said their companies provided construction or general contracting services and 9% said their companies provided electrical services.

Figure 2: Typical Replacement Strategy for >55 Gallon Electric Storage Water Heater (n=89)



Q30. When you replace a large capacity (⩾55 gallons) electric resistance storage water heater for a residential customer, what is your typical replacement strategy?

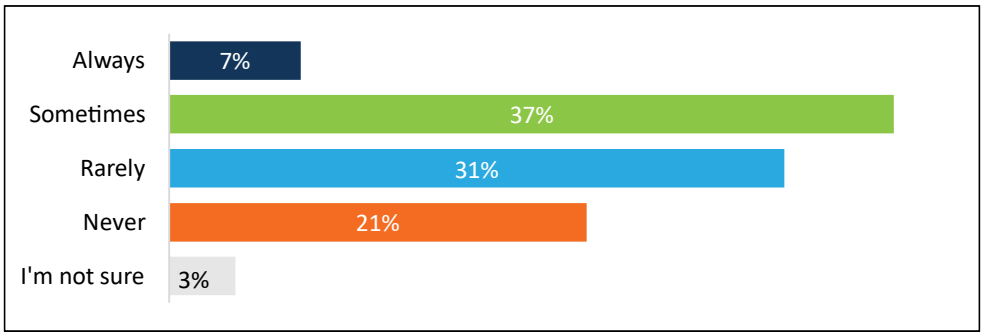
7.2. Large commercial electric resistance storage water heaters are available for purchase at major home improvement retailers, but they cost as much as HPWHs and are not typically kept in stock.

As previously noted, one-third (33%) of installers in MPER #7 and 10% of HWS-trained installers in MPER #5 said their typical replacement strategy for a large electric storage water heater is a commercial model. According to price data captured by retailer web-scraping, large commercial storage water heaters (60 to 80 gallons) cost roughly $2,500 to $2,700 on average (n=12 models) and are not typically kept in stock, while HPWHs of the same size cost approximately $2,400 to $2,600, on average (n=11), and are kept in stock more often. Installers and consumers identified cost as a primary barrier to HPWH installation, but installers still recommend these commercial models, indicating that issues of initial cost can be overcome if the unit offers other perceived advantages. Given that the upfront cost of these units is similar and the utility bills associated with HPWHs would be lower, other factors about the unit's performance must be driving these recommendations to electric resistance models.

6.3. Installers put mixing valves on small electric resistance tanks to get the water volume of a larger tank, and as a workaround for installing large HPWHs.

Nearly one-half of installers estimated that they always (7%) or sometimes (37%) install a mixing valve on smaller electric resistance storage tank water heaters to increase the amount of water they produce (Figure 3). Of these respondents, 23% (or 9% of all installers surveyed) said they installed mixing valves to avoid installing a HPWH in place of a large electric resistance model.

Figure 3: Mixing Valve Installation Frequency (n=89)



Notes: This question was asked only to respondents who reported installing electric resistance storage water heaters (Q12).
Q30. When installing smaller electric resistance storage tank water heaters (<55 gallons), how often do you install mixing valves in order to increase the amount of hot water produced by the smaller tank?

Related recommendation. Continue to encourage utility partners to offer incentives on HPWHs over 55 gallons to lower the likelihood that installers and customers who prefer a higher capacity water heater will implement workarounds to avoid installing a HPWH.

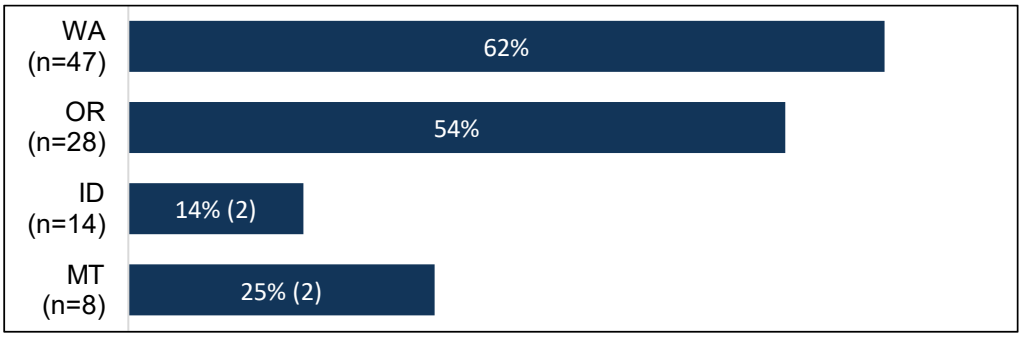
Related recommendation. On future research with installers, continue to investigate and measure installer motivations for workarounds to track change over time. Understanding what workarounds installers use – and why they chose to do so – can help identify opportunities to either change their behavior or change the product to respond to their concerns.

7 *While installers in Montana and Idaho are less familiar with HPWHs and less likely to recommend them, overall familiarity is up, and NEEA's recent marketing campaign may be helping boost customer receptiveness in these states.*

7.1. Almost one-half (49%) of installers aware of HPWHs were very familiar with them and worked with them regularly (up from 30% of HWS-trained installers in MPER #5).

Over half of the installers in Washington and Oregon said they were *very familiar* with HPWHs and worked with them regularly (62% and 54%, respectively). However, fewer than one-fourth of the installers in Idaho and Montana gave the same assessment (Figure 4).

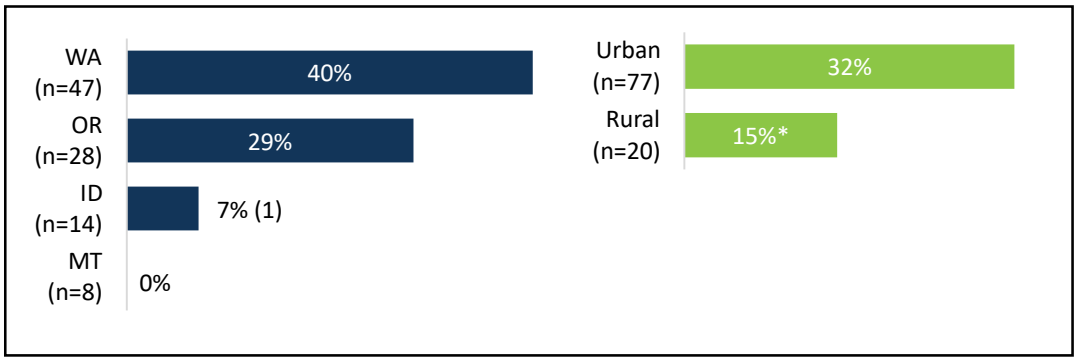
Figure 4: "Very Familiar" with HPWH, by state



Q11. Before this survey, which of the following best describes your level of familiarity with heat pump water heaters?

Installers in Washington and Oregon as well as those based in urban counties were more likely to agree with the statement, "My company regularly recommends heat pump water heaters to customers" than were installers in Idaho, Montana, or rural counties. Overall, 28% of respondents agreed with this statement.

Figure 5: Regularly recommends HPWH to customers



Notes: Respondents who were aware of HPWH (A2) responded to this question.
** denotes that findings are statistically different from urban respondents.*
A9. Please assess how much you agree or disagree with the following statement: My company regularly recommends HPWH to customers.

The differences in HPWH recommendation rates by installers in different states were less pronounced when comparing across specific installation scenarios, such as a customer in need of an emergency replacement or making a planned replacement.

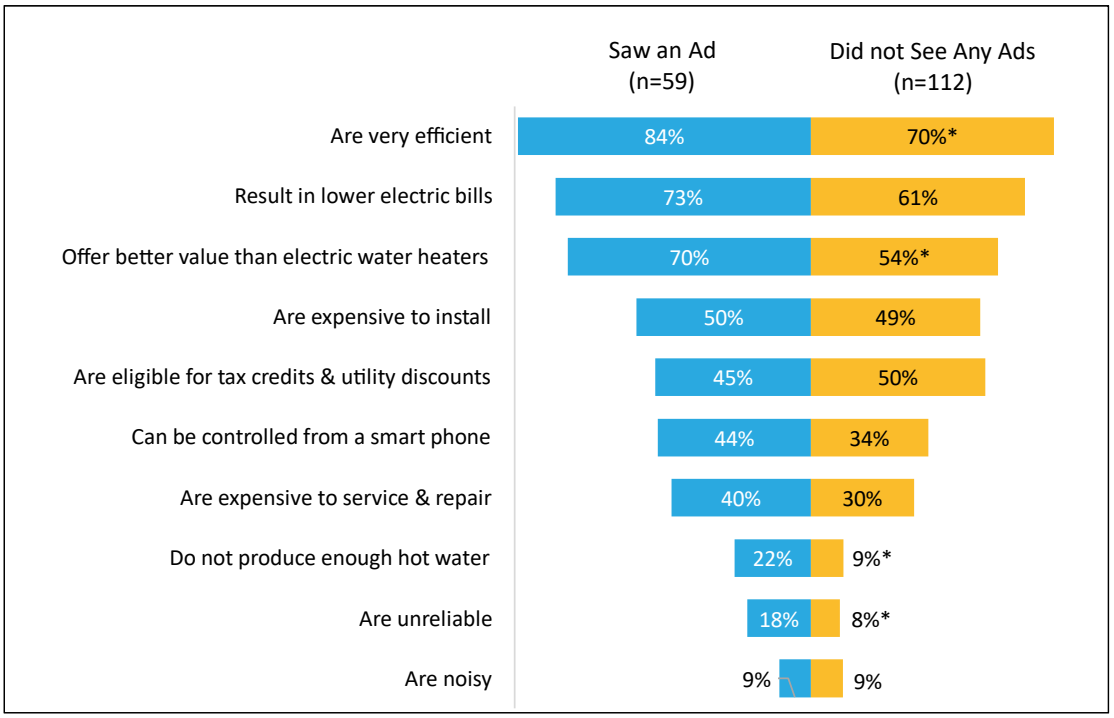
HPWH customer awareness in rural areas has historically lagged that of urban areas. This poses a problem for rural adoption, especially given that both installers and retailers contacted for this study identify increased customer awareness of HPWHs as important to increasing HPWH uptake.[9] The "Boring but Efficient" targeted awareness campaign of 2022 appears to have successfully increased HPWH awareness among rural respondents. That said, additional efforts are needed to deepen understanding of the technology and encourage adoption among both consumers and installers.

7.2. Consumers that saw NEEA's awareness campaign ads think HPWHs are efficient and a good value at higher rates than those that did not see ads.

Figure 6 displays the percentage of respondents who agreed with various statements about HPWHs after the campaign, broken out by those who saw campaign ads and those who did not. Respondents who saw an ad were significantly more likely to agree that HPWHs are very efficient (84%) and offer better value than electric resistance water heaters (70%) than those who did not see an ad (70% and 54%, respectively).

[9] The NEEA HPWH initiative's logic model has incorporated consumer awareness of HPWHs into the anticipated outcomes (Outcome 9).

Figure 6: Perceptions of HPWHs by Whether or not they Saw a HPWH Awareness Ad



Notes: Includes responses from the post-campaign survey only. Respondents who were aware of HPWH (A2) and recalled seeing a campaign ad (Q35) responded to this question.
** denotes that findings are statistically different from respondents who did not recall seeing an ad at the 90% confidence level.*
A9. Please assess how much you agree or disagree with the following statements.

Related recommendation. Continue targeting rural consumers in HPWH awareness campaigns (and HWS trainings), building on the success from the most recent "Boring but Efficient" campaign.

8 ... *Retailers need support from utility partners and manufacturers to promote HPWHs, as they have less stake in any particular type of water heater, but are still a key source of information, particularly for the DIY market.*

8.1. Retailers have a sizable share of the water heater market, including HPWHs. Consumers rely on information from retail stores and salespeople to inform purchasing decisions.

Retail stores are important sources of water heaters and information about them. Over half of MPER #7 consumer survey respondents who purchased an electric resistance water heater in the previous three years reported purchasing it from a retail store (59%). More than one-quarter of respondents (26%) indicated that retail salespeople are typical sources of information when deciding on mechanical equipment, such as a water heater, for their homes. Retailer representatives also indicated that they rely on utility partners and manufacturers to train salespeople on HPWHs, local program offerings, and new products.

When asked where they had heard of HPWHs, approximately one in ten consumers said they had heard about them from a retail salesperson (9%, 7% among homeowners in MPER #6) or retail store display (11%, %13% in MPER #6). Given the size of the retail market for HPWHs, these stores represent a significant conduit for helping customers better understand HPWHs.

8.2. The DIY market for water heater installations is sizable. Retailers represent an important opportunity to guide potential purchasers toward HPWHs and provide them with the resources needed to successfully install their HPWH, reducing returns from unsatisfied customers.

In MPER #7, one-third of respondents (36%) who purchased an electric resistance water heater in the past three years reported installing it themselves. Over half of HPWH purchasers in the MPER #6 survey (53%) reported self-installing the HPWH. One of the retailers interviewed for MPER #7 expressed surprise at this estimate of consumers who self-installed their electric water heater. That retailer did not provide a different estimate but did describe their customers who install large appliances themselves as price-sensitive and looking to save money on labor costs. There was no evidence from the consumer survey that DIY installers (n=41) had lower incomes than recent purchasers who had a contractor install their water heater – the price sensitivity described by the retailer may be attitudinal, not always directly tied to income.[10]

HPWHs that are not installed according to manufacturer specifications will not realize the advertised efficiency and energy savings. In particular, retrofitting HPWHs into tight spaces requires interventions to increase the air flow into the space, such as installing ducting or additional ventilation. The "HPWH in Small Spaces Lab Testing: The Amazing Shrinking Room" report identifies ventilation interventions and their associated costs and efficiency gains.[11] The research team estimated that ducting can increase the expected COP (coefficient of performance, a measure of energy efficiency) of a HPWH installed in an 84 square foot room by 38% to 116%, while two cheaper interventions that can be installed by a homeowner with basic tools can generate comparable gains: installing two wall grilles (107% increase in COP) or eight 3-inch holes with vent caps (42% increase).

Related recommendation. Increase the penetration and visibility of HPWH awareness campaigns in retail stores and their online channels, ideally even in locations not served by utility incentive programs. Over half of consumers reported purchasing a water heater from retailers, but only 10% of customers reported hearing about HPWHs from them. If retailers increase their promotion of HPWHs, more customers could be driven to that product. However, this will take intervention and support from NEEA and utility stakeholders, given that retailers have little reason to promote one product over another as long as the units sell and they meet their customers' needs. Traditional in-store marketing and educational materials may help push customers to these more efficient products, but online-only customers also need targeting, through landing pages, banner ads, and other online advertisements on retailer websites. Additional training of floor associates may help support retailers in promoting HPWHs,

[10] While the survey did not find a statistically significant difference in incomes between customers who did and who did not install their HPWHs themselves, HPWH owners had higher incomes than non-HPWH owners, a statistically significant difference.
[11] Larson Energy Research and Cascade Engineering Services. "Heat Pump Water Heaters in Small Spaces Lab Testing: The Amazing Shrinking Room." November 21, 2022. https://neea.org/resources/heat-pump-water-heaters-in-small-spaces-lab-testing-the-amazing-shrinking-room.

but efforts here should recognize that DIY-focused big box retailers do not use a commission-based pay structure, so associates would not generally be expected to provide in-depth customer support. As these retailers' business models prioritize overall sales and customer experience, HPWH manufacturers, distributors, and other stakeholders could be better positioned to provide support for customers.

Related recommendation. Conduct additional research about DIY installers to understand how to better support them in choosing and installing HPWHs. According to research conducted in MPERs #6 and #7, up to 53% of HPWHs are self-installed. One of the retailers interviewed for MPER #7 expressed surprise at this estimate, but additional research is needed to more accurately estimate the proportion of electric storage water heaters and self-installed HPWHs. To understand the motivations of DIY installers and better support them, future research should ask additional questions about motivation, purchase and installation experience, and satisfaction with the performance of their HPWH.

Related recommendation. Continue HWS' efforts to educate potential DIY HPWH purchasers about how to install these systems, and specifically focus on how to navigate challenging installation scenarios. These barriers can be difficult enough for professionals to overcome, and even more so for DIY installers who lack the same level of experience and training. DIY customers should be able to access information for choosing the right HPWH for their application and understand proper installation technique, given that deviation from manufacturer specifications impacts the unit's efficiency. Future research with DIY customers could clarify if and how they relied on the HWS DIY-focused installation guides, highlighting opportunities to refine those materials.[12]

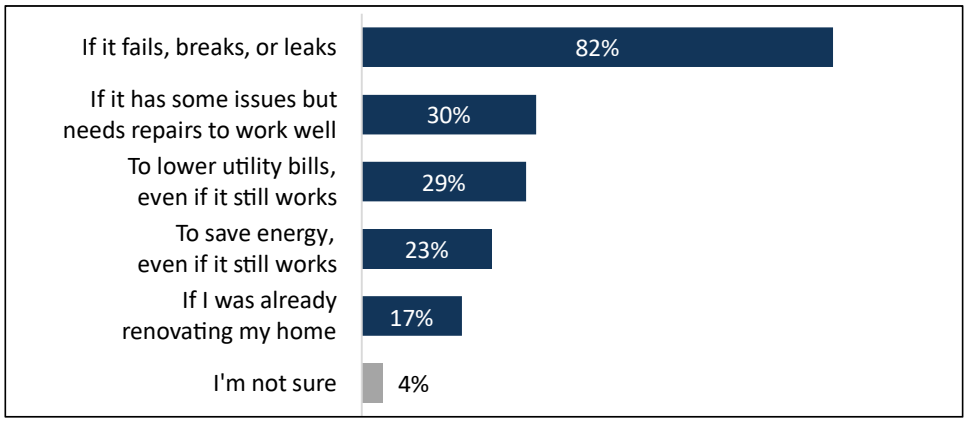
9 ··· *Increasing consumer awareness remains a key component of market transformation, especially since most people do not think about their hot water heater until it breaks.*

Water heaters are not generally top of mind, as NEEA's "Boring but Efficient" HPWH marketing campaign acknowledges, and replacing them early to save energy is relatively uncommon. Less than one-third of respondents in the MPER #7 consumer survey said they would consider replacing their water heater to lower utility bills and/or save energy, even if it still works (29% and 23%, respectively). A similar proportion of consumers in MPER #6 said they would consider replacing their water heater to save energy (28%) and/or lower utility bills (24%), even if their water heater still worked.[13] Retail representatives confirmed this, noting that retailers rarely offer sales on water heaters because most customers are not looking to purchase one unless they need it.

[12] https://hotwatersolutionsnw.org/installation/do-it-yourself

[13] The MPER #6 consumer survey was conducted with single-family homeowners with electric storage water heaters, while MPER #7 included renters, multi-family households, and consumers with non-electric water heaters, so the results are not directly comparable.

Figure 7: Reason for Purchasing a New Water Heater (n=827)



Notes: Includes responses from both the pre- and post-campaign surveys.
A15. What would cause you to purchase a new water heater (of any type)?

Even though water heaters may not be top of mind, NEEA's market transformation efforts still require progress in terms of consumer awareness of HPWHs – a challenge given most consumers rarely think about their water heaters. In line with the results of MPER #5, MPER #7 again found that installers reported that when they recommended a HPWH, customers typically accepted the recommendation about one-third of the time. Installer interviews in MPER #5 also noted that the likelihood of accepting a recommendation was highly correlated with a customer's previous pre-existing awareness of HPWHs – boosting recommendation rates drives adoption, but customer familiarity helps customers feel more comfortable with accepting a different technology from their current water heater.

Related recommendation. Add at least one MPI for the logic model's Outcome 9: *Consumers are increasingly aware of, and purchase, HPWHs*, so that the initiative can specifically track consumer awareness of HPWHs with established metrics of market progress and continue to measure progress in future MPERs. Such a measurement should likely include state-level and/or rural and urban assessments, where data permit. MPERs #6 and #7 have measured consumer awareness in service of any such MPI update. See Appendix F for additional, minor suggested tweaks to the Initiative's logic model and MPIs.

10 ... *Manufacturers did not provide HPWH shipment data for use in this MPER's market sizing effort.*

For past MPERs, manufacturers have provided incredibly valuable water heater shipment data to NEEA. This information is critical to NEEA's mission and has been invaluable in terms of measuring market progress. Without this information, NEEA has much less insight into overall market trends Because MPER #7 did not have access to the same primary data sources used in the previous MPERs, the market share and HPWH installation counts presented in this report were primarily based on various assumptions, including trends seen in previous MPERs. Accordingly, ***the market sizing values presented in this MPER are not as reliable as previous estimates and should be viewed with extreme caution***.

Related recommendation. NEEA and its funders should continue to strengthen relationships with manufacturers to encourage them to resume providing this information. Ideally, NEEA funders could help with this process. While NEEA could require manufacturers to provide data as a condition of including their models on NEEA's Advanced Water Heating Specification Qualified Products List, ideally, collaborative discussions across stakeholders would yield the desired effects. Partnerships with other regional energy efficiency organizations (REEO's) – SWEEP, MEEA, NEEP, SEEA, and SPEER – and utility funders who recognize the importance of measuring market progress might encourage manufacturers to participate in nationwide data-sharing arrangements.

Section 3 *Other Findings*

Web-scraping of retailer websites showed that retail stocking of HPWHs is similar to levels observed in MPER #6. Stores in utility territories that offer HPWH incentives stock more HPWHs. Increasing utility incentives and availability across the Northwest could increase HPWH visibility in an important market channel.

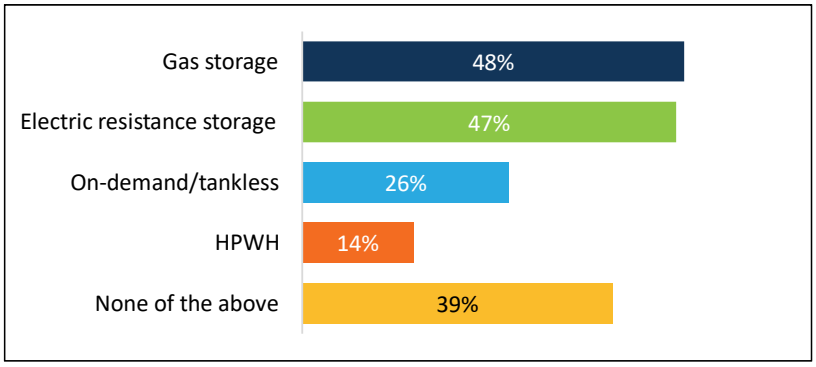
HPWHs represent 5% of available electric water heaters offered by retailers (MPI 2) and about 7% of their in-stock units (MPI 1e). In MPER #6, HPWHs represented 4% of available electric water heaters and 8% of retailers in-stock units. Retailers indicated that HPWHs were available at all distribution centers and are available for same-day installation – something that could make them much easier to install in emergency replacement scenarios. In-store stocking practices were driven by HPWH sales in the local market and the presence of utility incentives. Stores in utility territories with a HPWH incentive (n=16) stocked 4.7 HPWH per store, on average, compared to 1.7 HPWHs in stock in stores without utility incentives available (n=5).

Retail outlets are significant market channel for HPWHs, particularly in the emergency replacement market. Over three-quarters of respondents who purchased HPWHs for emergency replacements bought them at retail stores (MPER #6 purchaser survey). Over half of consumers (59%) who purchased a water heater in the past three years said they purchased it at a retail store (MPER #7 post-campaign survey).

Having HPWHs on-hand for emergency replacement is uncommon, but more common than in years past.

Only 14% of respondents kept HPWHs on hand for emergency replacements (Figure 8: Water Heaters On Hand for Emergency Replacement (n=101)Figure 8), but among HWS-trained installers surveyed for MPER #5, this figure was only 6%, a positive sign among the general installer population. Installers with HPWHs on hand recommend HPWHs to replace a failed water heater twice as often as other installers: 42% of the time, on average, compared to 19% of the time. One might expect that installers who have more favorable opinions of HPWHs would be the ones more likely to keep them on hand. However, installers who keep HPWHs on-hand were actually *not* more likely to agree with the statement that HPWHs are good replacements for electric resistance storage water heaters.

Figure 8: Water Heaters On Hand for Emergency Replacement (n=101)



Q33. What types of water heating equipment does your company typically keep on hand for emergency replacements? Select all that apply.

In some areas, homeowners have the option of choosing gas on-demand or tankless water heaters over HPWH when replacing their electric storage water heater.

While the decision to recommend or install HPWHs is often framed in relation to electric resistance storage water heaters, gas on-demand or tankless water heaters are also a replacement option in areas with gas service. Twelve percent of single-family homes with gas heating in the Northwest have an electric resistance water heater.[14] When asked about their typical replacement strategy for a large electric storage water heater (>55 gallons), 11% of installers said they installed a gas tankless water heater.

Installers view the ANSI/CTA-2045 standard negatively, expecting pushback from customers distrustful of the technology.

Among installers who work in Washington state (n=52), nearly two-thirds (65%) were aware of the new standard requiring all new electric storage water heaters to have a communication port. Only 12% said the new standard was a positive development, while over half (53%) said it was a negative development

[14] NEEA Residential Building Stock Assessment II, 2019. https://neea.org/data/residential-building-stock-assessment.

because they were concerned it increased cost for customers, could result in more service calls, or cause issues with customers who believe the technology is “listening in” on them. This new requirement applies to all electric water heaters – not just HPWH models. In theory, this should not negatively impact installers’ perceptions about HPWHs because the change is not unique to heat pump models, but it could add to their concerns about HPWHs, particularly regarding their higher incremental cost.

Appendix A HPWH Market Update

To ensure consistent tracking of market progress over time, the team developed updated estimates of the size of the HPWH market in the Northwest region for 2021, attempting to follow the methodology of MPERs #4, #5, and #6 as closely as possible. However, MPER #7 did not have access to the same primary data sources used in the previous MPERs, so the values shown here were primarily derived based on various assumptions, including the trends seen in previous MPERs. Accordingly, ***the market sizing values presented in this MPER are not as reliable as previous estimates and should be viewed with extreme caution.*** The market sizing assessment breaks down HPWH sales by the attributes shown in Table 5 and compares the results to those from MPER #4, MPER #5, and MPER #6.

Table 1: Attributes Included in Market Sizing Update

Attribute
State
Home type (new construction vs. existing home)
Supply channel (retail vs. distributor)
Replacement type (emergency vs. planned)
Tank size (≤ 55 or > 55 gallons)

METHODOLOGY

As previously noted, significantly less primary data was available for this MPER compared to the previous ones, as shipment and sales data from manufacturers normally available for MPERs was not available in time for this update. To size the markets for this study, the team primarily relied on data and analyses from NEEA, incorporating raw data from NEEA, completed analyses provided by NEEA, secondary data sources, and various MPER #7 survey results.

The team uses the term HPWH "market size" to represent an estimate of the number of electric water heaters installed each year. HPWH "market share" represents the percentage of the electric water market that HPWHs comprise. As with the past MPERs, this market update assumes that only negligible quantities of residential-sized HPWHs are installed outside of single-family homes. This assumption is supported by the lack of HPWHs in multifamily homes in the 2016-2017 RBSA and the previous MPER survey results.

Table 2 identifies the data sources on which the team based the market update, showing which data sources were used to inform the different attributes of the market update effort. The subsections that follow describe the specific ways that data sources (or trends from past MPERs) were used to inform the various attributes.

Table 2: Data Sources Informing Key Market Attributes for 2021

Data Source	State	New vs. Existing	Supply Channel	Utility Incentives	Emergency vs. Planned	Tank Size
Data provided by NEEA						
HPWH shipment estimates from distributors for the NW	●		●			
Utility-provided HPWH rebate counts				●		
Secondary data						
U.S. Census: 2017-2021 American Community Survey (ACS)[15]	●					
U.S. Census: 2017-2021 Building Permits Survey[16]	●	●			●	
NEEA 2018 Water Heater Market Characterization Report[17]	●	●				
2017 NEEA Residential Building Stock Assessment (RBSA)[18]		●				
Primary data from MPER #7						
Installer survey		●			●	●

[15] https://www.census.gov/programs-surveys/acs
[16] https://www.census.gov/construction/bps/
[17] https://neea.org/img/documents/water-heater-market-characterization-report.pdf
[18] https://neea.org/data/residential-building-stock-assessment

HPWH Market Share by State and Home Type. The team calculated HPWH market share as the ratio of HPWH shipments to the NEEA region to estimates of all electric water heater installations in the NEEA region. The formula below describes the calculation. Descriptions of each variable follow.

$$HPWH\ Market\ Share = \frac{HPWH\ Sales}{All\ Electric\ Water\ Heater\ Installations}$$

HPWH sales. NEEA provided estimates of shipments of HPWHs to distributors and retailers in the Northwest for 2021. For the most recent MPERs, manufacturers provided this raw data to NEEA for use in MPERs, but as noted, manufacturers did not provide data in time for MPER #7, and NEEA developed estimates based on trends from past data sets.

All electric water heater installations. The team reported on estimates of electric water heater installations in new and existing single-family homes, based on NEEA data. As in past MPERs, the electric water installation estimates were rounded to the nearest hundred.

- **New Construction.** NEEA New Homes program participation records indicate a 37% saturation rate for electric water heaters in new construction for 2018, which is similar to the 36.3% assumption NEEA used in the 2019 and 2020 ACE Model. The team applied the same 37% rate to the state-level Building Permits Survey (BPS) counts of new construction to estimate electric water heater installations in new, single-family homes for 2021 to Washington, Oregon, Montana, and Idaho.[19] Note that the 2022 Washington Residential Post-Code Market Research Report suggests a saturation rate of electric water heaters in new construction to be 86%, however the 2022 report was not used to make HPWH sales estimates for 2021.
- **Existing Homes.** The American Community Survey (ACS) provides state-level counts of single-family existing homes. The NEEA 2018 Water Heater Market Characterization study estimated electric water heater replacements for single-family and low-rise multifamily homes. The electric water heater estimates for the Market Characterization study were calibrated to 2021 housing estimates from the ACS and Council Housing Stock forecast. The team provided estimates of the count of multifamily installations using the estimates in the Council Housing Stock forecast for low-rise multifamily homes. Note that at the time of this study the Census did not provide data for 2022, leaving 2021 as the most recent year for market share estimates.

  The team used the following method to estimate water heater installations in existing single-family homes:

$$\begin{aligned} &Electric\ Installs\ in\ Existing\ SF\ Homes \\ &\quad = Total\ Electric\ Installs\ (NEEA\ Market\ Characterization\ Study) \\ &\quad - New\ Construction\ Electric\ Installs\ (BPS\ RNC\ counts) \\ &\quad - \ Existing\ MF\ Electric\ Installs\ (Council\ forecasts) \end{aligned}$$

[19] Note that MPER #4 relied on Council forecasts for single-family housing counts, but MPER #5 and MPER #6 deviated from this approach because Census data offered more accurate single-family home data, based on retrospective assessments of housing stock rather than on the Council's forward-looking forecasts made in 2012.

Supply Channel

The team used data provided by NEEA that was derived from past manufacturer shipment data to estimate the market share by supply channel for 2021. Manufacturer shipment data that were provided for past MPERs and used as the basis of the NEEA estimates included the counts of whether the purchaser was a retailer or a distributor.

Replacement Type

The team used the emergency replacement rate (37%) from NEEA's 2018 market characterization study to estimate the share of planned and emergency replacements in MPER #7 for all electric water heaters installed in existing homes. For HPWHs specifically, NMR relied on the installer survey from MPER #7 to estimate the percentage of HPWHs installed in emergency scenarios.

Tank Size

The team relied on the installer survey from MPER #7 to estimate the distribution of HPWH tank sizes.

HPWH Market Share By State

Table 3 provides HPWH market share figures from 2018 through 2021, which includes results from MPERs #5 through #7 (with the methodological caveats described previously). This table describes the number of electric water heaters installed, the subsets that were HPWHs, and the percentage of the electric water heater market represented by HPWHs (i.e., market share). Because the estimates of overall market size for 2018 through 2021 were developed from an amalgam of sources, they are not definitive. For this reason, minor changes over time in HPWH market share, which relies on overall market size as the denominator, should be interpreted with caution. In particular, the 2021 values developed for MPER #7 are speculative.

Bearing in mind these caveats, the data suggest that share of all electric water heater installations in existing, new, and manufactured single-family homes in the Northwest market that is represented by HPWHs (MPI 3a) remains low (14.6% in 2021). As shown in Table 3, this market share appears to be trending upward: (from around 8% in 2018, 10% in 2019, and 12% in 2020).[20] As noted above, however, minor changes in market share should be interpreted with caution. The estimated rates of adoption in Washington and Oregon continue to be far higher than in Idaho and Montana, which have negligible HPWH market share – no more than 2% in any given year, with most years well below that.

Table 3: Estimated Market Share of NW HPWH Installations, By State

State	2018 (MPER 5)			2019 (MPER 6)			2020 (MPER 6)			2021 (MPER 7)		
	Electric WH Installs	HPWH Installs	HPWH Market Share	Electric WH Installs	HPWH Installs	HPWH Market Share	Electric WH Installs	HPWH Installs	HPWH Market Share	Electric WH Installs	HPWH Installs	HPWH Market Share
Total	***151,600***	***11,693***	***7.7%***	***148,700***	***15,217***	***10.2%***	***150,100***	***17,442***	***11.6%***	***155,100***	***22,598***	***14.6%***
WA	84,100	8,117	9.7%	82,700	9,198	11.1%	83,400	10,543	12.6%	84,800	16,038	18.9%
OR	38,700	3,450	8.9%	37,500	5,831	15.5%	38,300	6,684	17.5%	40,800	6,147	15.1%
MT	12,000	77	0.6%	11,900	28	0.2%	11,700	32	0.3%	12,500	61	0.5%
ID	16,800	49	0.3%	16,600	160	1.0%	16,800	183	1.1%	17,000	352	2.1%

[20] MPER #6 included updates for both 2019 and 2020 because the MPER covered two years of market update data.

New vs. Existing Construction

HPWHs have become common in new homes in the Northwest, representing two-thirds (67%) of electric water heater installations in new homes in 2021 (Table 4). Historical trends suggest that the new construction market for HPWHs in the region has been growing steadily, rising from around 9,000 in 2019, to 11,400 in 2020 and 11,700 in 2021. NEEA estimates indicate – again, with the caveats previously noted about 2021 values being speculative – that installations in existing homes have increased from just over 6,000 annual installations in 2019 and 2020 to about 10,800 in 2021. However, those estimates still indicate that HPWHs continue to represent a low percentage of the retrofit market – about 7% in 2021. The market for electric water heaters in existing homes is estimated to be over six times larger than the new construction market. However, HPWH installations in new construction appear to be increasingly outpacing HPWH installations in existing homes, both in terms of market share percentage and installation volumes. In 2021, the study estimates that 52% of HPWHs were installed in new homes and 48% were in existing homes.

In 2019 and 2020, the MPER #6 HPWH purchaser survey results estimated that 8% of HPWH installations in existing homes were in true emergency placement scenarios (i.e., the unit has completely failed and no longer provides hot water). Using the updated MPER #7 HPWH installer survey results, MPER #7 estimates this at 44%. These changes should be interpreted with caution, as MPER #7 relied on a survey from installers while MPER #6 results were derived from a limited selection of utility incentive participant lists (mostly from downstream incentive programs).

Table 4: Market Share of HPWH Installations in the NW – New vs. Existing Homes

Install Type	2019 (MPER 6)				2020 (MPER 6)				2021 (MPER 7)			
	Electric Water Heater Market	HPWH Installs	Relative Market Share	Overall Market Share	Electric Water Heater Market	HPWH Installs	Relative Market Share	Overall Market Share	Electric Water Heater Market	HPWH Installs	Relative Market Share	Overall Market Share
Total	***148,700***	***15,217***	***10.2%***	***10.2%***	***150,200***	***17,442***	***11.6%***	***11.6%***	***155,100***	***22,598***	***14.6%***	***14.6%***
New	**18,300**	**9,022**	**49.3%**	**6.1%**	**19,200**	**11,413**	**59.4%**	**7.6%**	**17,500**	**11,751**	**67.1%**	**7.6%**
Existing	**130,400**	**6,195**	**4.8%**	**4.2%**	**131,000**	**6,029**	**4.6%**	**4.0%**	**137,600**	**10,847**	**7.9%**	**7.0%**
Planned replacements	*82,142*	*5,692*	*6.9%*	*3.8%*	*82,530*	*5,902*	*7.2%*	*3.9%*	*86,688*	*6,074*	*7.0%*	*3.9%*
Emergency replacements	*48,248*	*503*	*1.0%*	*0.3%*	*48,470*	*490*	*1.0%*	*0.3%*	*50,912*	*4,773*	*9.4%*	*3.1%*

Sources: NEEA market analyses (2021 data), HPWH shipment counts from manufacturers in the Northwest (pre-2021), U.S. Census: 2015-2021 Building Permits Survey, NEEA 2018 Water Heater Market Characterization Report, and 2017 NEEA Residential Building Stock Assessment (RBSA)

The MPER #7 HPWH installer survey allowed respondents to make a granular assessment of the condition of the old water heaters they replaced with HPWHs, as HPWH purchasers also reported about

their units in MPER #6.[21] Installers estimated that 44% of their installations were replacing old units that had completely failed – a true "emergency replacement" scenario in line with the definitions of past MPERs. Another 25% said that the water heaters they replaced were old, in need of repair, or close to failure. This customer segment technically falls into the planned replacement category described above, but some of these customers may be more akin to true emergency replacement customers than the smaller percentage of early replacement customers who replaced systems in good repair (31%). Table 5 provides the MPER #7 estimates which rely on installer survey responses, in comparison to the MPER #6 values that relied on HPWH purchaser responses. Readers should note the methodological differences when considering the difference between results.

Table 5: HPWH Installations in Existing Homes in the NW – Condition of Old Water Heater

Install Type	2019 (MPER 6)		2020 (MPER 6)		2021 (MPER 7)	
Total	***15,217***		***17,442***		***22,598***	
Installations in existing homes	**6,195**		**6,029**		**10,847**	
Previous water heater fully functioning (Planned replacements)	*3,531*	*57%*	*3,437*	*57%*	*3,363*	*31%*
Previous water heater near failure (Planned replacements)	*2,168*	*35%*	*2,110*	*35%*	*2,712*	*25%*
Previous water heater failed completely (Emergency replacements)	*496*	*8%*	*482*	*8%*	*4,773*	*44%*

Sources: NEEA market analyses (2021 data), HPWH shipment counts from manufacturers in the Northwest (pre-2021), Q36 "Why did you purchase a new water heater" from the MPER #6 purchaser survey, and Q27 "Thinking about *all of the heat pump water heaters your company installed in 2022*, about what percent of units were to customers who were replacing a failed water heater, replacing an old/near-failure water heater, and replacing a fully functioning water heater?" from the MPER #7 installer survey.

Utility Incentives

In 2021, 61% of HPWH installations received incentives (Table 6). This is higher than the 49% in 2020 but similar to the 2019's estimate that 59% of units were incentivized.

[21] MPER #6 asked purchasers to describe their specific installations, while MPER #7 relied on installers describing their total installations. The installer figures could potentially better describe the market on the whole, but these numbers are not directly comparable given the difference in data sources.

Table 6: HPWH Installations by Utility Incentive Status in the NW

Install Type	2019 (MPER 6)		2020 (MPER 6)		2021 (MPER 7)	
Total	***15,217***		***17,442***		***22,598***	
Non-incentivized units	**6,298**	**41%**	**8,811**	**51%**	**8,758**	**39%**
Incentivized units	**8,919**	**59%**	**8,631**	**49%**	**13,840**	**61%**
		% of incentives		*% of incentives*		*% of incentives*
Existing homes	*5,520*	*62%*	*3,723*	*43%*	*8,673*	*63%*
New homes	*3,399*	*38%*	*4,908*	*57%*	*5,077*	*37%*

Sources: HPWH shipment estimates from NEEA and Utility-provided HPWH incentive counts

Table 7 shows that the majority of HPWHs installed in retrofit applications received an incentive in 2021 (80%), a similar finding to 2019 (89%). The 2021 estimate is higher than 2020 nearly two-thirds of retrofit HPWHs (62%) were incentivized. From 2020 to 2021 the incentivized HPWHs installed in new homes remained about the same (44% in 2020 and 43% in 2021).

Table 7: Utility Incentives in New vs. Existing Homes in the NW

Install Type	2019 (MPER 6)	2020 (MPER 6)	2021 (MPER 7)
Total	***15,217***	***17,442***	***22,598***
Installations in new homes	**9,022**	**11,413**	**11,751**
Incentivized units	*3,390*	*4,980*	*5,077*
% incentivized	*38%*	*44%*	*43%*
Installs in existing homes	**6,195**	**6,029**	**10,847**
Incentivized units	*5,520*	*3,723*	*8,673*
% incentivized	*89%*	*62%*	*80%*

Sources: HPWH shipment estimates from NEEA and Utility-provided HPWH incentive counts

Supply Channel

Table 8 shows estimates of HPWH installations by supply channel. The portion of residential HPWHs moving through wholesale distributors is estimated at 72% of manufacturer sales in MPER #7, while the portion moving through retailers is estimated at 28% (MPI 3a). Washington, Idaho, and Montana had higher percentages of HPWHs moving through distributors (99%, 80% and 63%, respectively); the retail supply channel was proportionally larger in Oregon in 2019. The percentages in Idaho and Montana are based on negligible sales volumes (fewer than 200 in Idaho and fewer than 30 in Montana).

Table 8: HPWH Installations by Supply Channel – Retail vs. Distributor by State

State	MPER 7	
	Retail	Distributor
Region Total	***28% (6,439)***	***72% (16,159)***
Washington	1%	99%
Oregon	72%	28%
Montana	17%	83%
Idaho	14%	86%

Source: NEEA market analyses (2021)

TANK SIZE

Across the four states, MPER #7 estimates indicate that almost half (46%) of the HPWHs installed were 55 gallons or less, while more than half (54%) were larger than 55 gallons (Table 9). Given data limitations, the tank size breakdown by state was not available for 2021.

Table 9: HPWH Installations by Tank Size

State	MPER 6 (2019)			MPER 7 (2021)*		
	HPWH Installations	≤ 55 Gallons	> 55 Gallons	HPWH Installations	≤ 55 Gallons	> 55 Gallons
Region Total	***15,217***	***68%***	***32%***	***22,598***	***46%***	***54%***
Washington	9,198	75%	25%	16,038	--	--
Oregon	5,831	57%	43%	6,147	--	--
Montana	28	50%	50%	61	--	--
Idaho	160	81%	19%	352	--	--

*2021 data not available by state

Appendix B Installer Survey

As part of if this MPER, NMR surveyed HPWH installers to better understand the circumstances under which they recommend HPWHs to customers and the current barriers to adoption and installation, and to inform the market share estimates for heat pump water heaters. This appendix describes the detailed methodology and findings from that effort.

METHODOLOGY

NMR conducted a survey with 101 HPWH installers in the Northwest. BR Interviewing fielded the survey from April through May 2023 via web (35%) and phone (65%). The initial sample frame comprised 5,742 plumbing, heating, and air conditioning contracts (NAICS code 238220) purchased from the NAICS Association. NMR removed obvious non-water heater installers (e.g., fire sprinkler installers) from the sample frame and added NEEA-trained installers not already on the list. Participants received $50 gift cards for completing the survey. As shown in Table 3, the survey effort was able to exceed its initial state-level targets for all but Montana, an indication of the value of persistent outreach and a multi-modal response option (phone and web).

Table 10: Overall Survey Disposition

State	Eligible Sample Frame	Target	Achieved
Washington	2,390	45	52
Oregon	1,469	30	37
Idaho	724	15	18
Montana	482	10	9
Total	**5,065**	**100**	**101**

Notes: State-level counts do not sum to 101 because 14 respondents worked in more than one state.

Additional sample details are shown in Table 11. The team classified installers as urban or rural based on the county their primary business address was located in.[22] While some installers likely have service territories that cover multiple counties and/or multiple branches, this classification is consistent with methodology from MPER #6. Installers located in rural counties are likely to serve rural communities. Most NEEA-trained installers are located in Washington and Oregon.

[22] U.S. Department of Agriculture Economic Research Service. *Rural-Urban Continuum Codes.* December 10, 2020. https://ww.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx.

Table 11: Sample Composition

State	Urban	Rural	Trained	Total
Washington	2,106	246	43	2,390
Oregon	1,164	307	51	1,469
Idaho	445	279	1	724
Montana	219	263	9	482
Total	**3,934**	**1,095**	**104**	**5,065**

The sample was developed proportionally based on state population (Table 12).

Table 12: Sample Design

State	Urban	Rural	Trained	Total
Washington	40	5	7	45
Oregon	25	5	3	30
Idaho	7	8	1	15
Montana	4	6	1	10
Total	**76**	**24**	**12**	**100**

BR Interviewing conducted five waves of targeted outreach to meet survey targets, contacting 4,920 of 5,065 firms at least once. Contacts were randomly assigned to waves to reduce sampling bias. Most of the companies in the sample had multiple contacts listed, but only one response was accepted per company.

Nineteen percent of the sample had at least one email address. Contacts with an email address received at least one email invitation.[23] If the contacts who received an email invitation did not respond to the web survey, BR interviewing contacted them by phone. Installers without an email address were contacted at least once by phone.

Table 13 shows the number of completes achieved. Survey quotas were relaxed towards the end of survey fielding to reach statewide targets. The team did not turn away anyone who received a survey invitation, resulting in a slight oversample of trained installers.

[23] Contacts in Waves 1 through 3 received an initial invitation and at least one reminder, while most of the contacts with email address in Waves 4 and 5 received one email invitation.

Table 13: Survey Completes Achieved

State	Urban	Rural	Trained	Total*
Washington	40	7	12	47
Oregon	26	5	7	31
Idaho	10	4	0	14
Montana	3	6	1	9
Total	**79**	**22**	**20**	**101**

Notes: State totals are shown for primary business address; Table 10 state totals reflect that some installers work in multiple states.

All survey respondents were asked if they, or someone else at their company, had ever participated in a Hot Water Solutions training or orientation session about HPWH sponsored by the Northwest Energy Efficiency Alliance. As shown in Table 14, four of the 20 trained installers did not recall the training, while nine installers not on the HWS training list recalled attending a HWS training.

Table 14: Recall of HWS Training

Self-Reported Training	HWS-Trained (Sample Flag)	Not on HWS-Trained Installer List	Total
Recalled HWS Training	14	9	23
Did not recall training	4	66	70
Don't know	2	6	8
Total	**20**	**81**	**101**

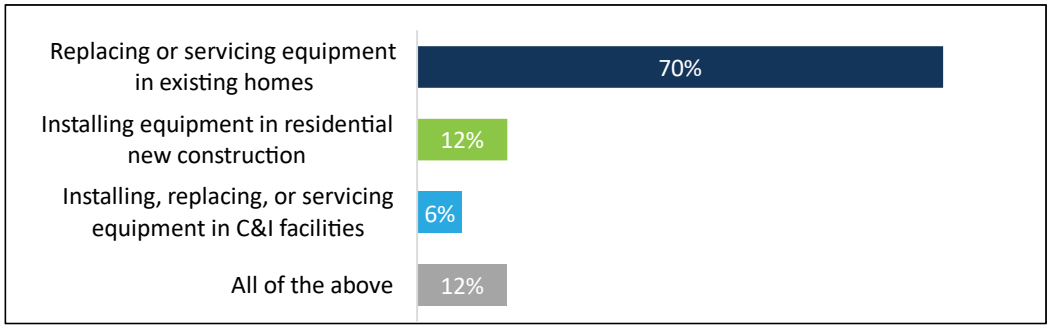
Q50. Have you, or has someone else at your company, ever participated in a Hot Water Solutions training or orientation session about heat pump water heaters sponsored by the Northwest Energy Efficiency Alliance? (Hot Water Solutions trainings have been offered in-person and via webinar, so you may have attended in person or online.)

NMR observed installer focus groups conducted by a third-party research firm on behalf of NEEA on HPWH installation practices and barriers and incorporated additional questions into the installer survey to quantify some of the themes of this qualitative, in-depth research effort.

FIRMOGRAPHICS

Over two-thirds (70%) of respondents said their company's primary function was replacing or servicing equipment in existing homes (Figure 9). Respondents' companies ranged in size from 1 to 650 employees, with an average of 29. Eighty-eight percent of respondents operated out of a single location.

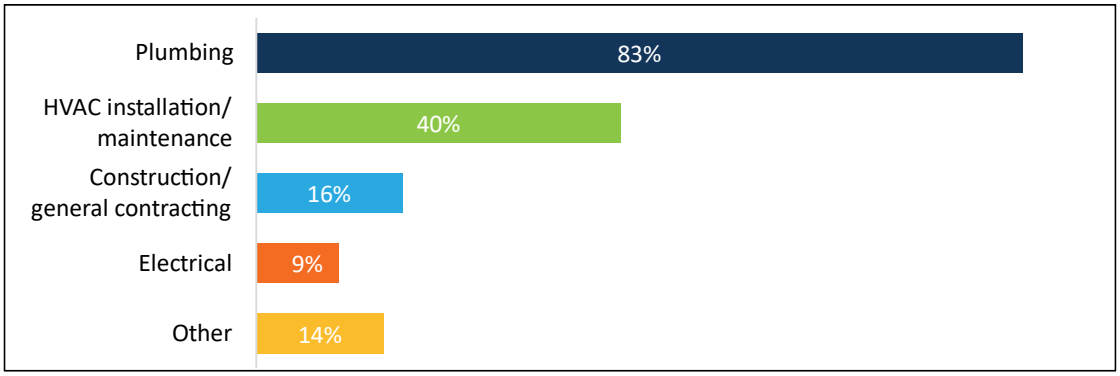
Figure 9: Primary Company Function (n=101)



Q2. Which of the following activities represents your company's main line of work?

Over four-fifths (83%) of respondents' companies offered plumbing in addition to water heater installation and maintenance, and two-fifths (40%) also offered HVAC installation and maintenance (Figure 10). On average, installers estimated that sales and installations of water heaters represented 15% of their company's business revenues, 12% of which were from HPWH (or 2% overall).

Figure 10: Other Company Services (n=101)



Q4. Besides installing water heating equipment, what other services does your company provide? Please select all that apply.

Over one-quarter (28%) of respondents had heard of the Hot Water Solutions website. Just under one-quarter (23%) of respondents said that they, or someone else at their company, had participated in a Hot Water Solutions training or orientation session about heat pump water heaters.[24]

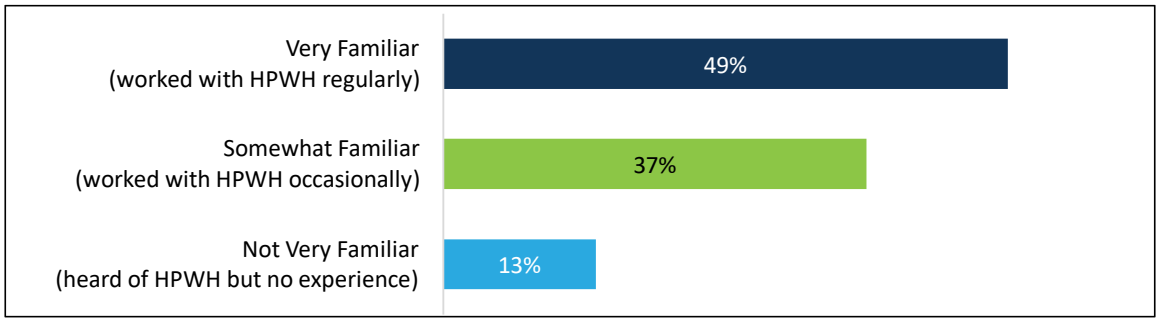
[24] MPER #5 also surveyed water heater installers and focused more on the differences between trained and untrained respondents.

FAMILIARITY WITH HPWHS

Virtually all installers are aware of HPWHs. Ninety-six percent of respondents had heard of "heat pump water heaters" or "hybrid water heaters" (MPI 1a). All (100%) respondents who had self-reported participating in a Hot Water Solutions (HWS) training (n=23) had heard of "heat pump water heaters" or "hybrid water heaters" (MPI 1a).

Most installers are familiar with HPWHs. Nearly three-quarters (71%) of respondents said their companies installed HPWHs in residential homes (MPI 1c). Figure 11 shows that almost one-half (49%) of respondents were very familiar with them and worked with them regularly. An additional 37% of respondents were somewhat familiar with them and worked with them occasionally.

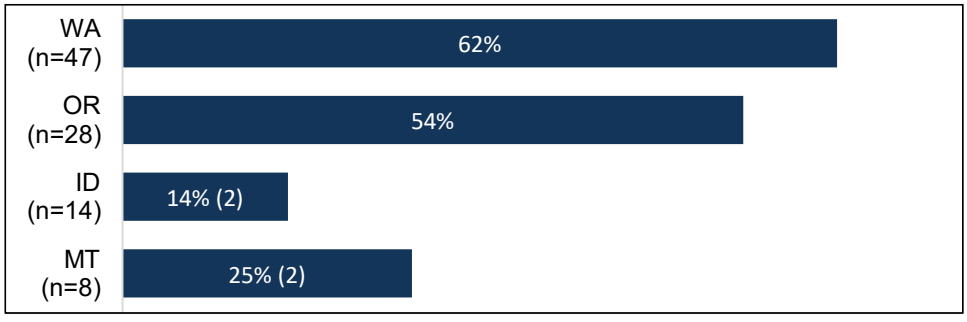
Figure 11: Familiarity with HPWHs (n=97)



Q4. Besides installing water heating equipment, what other services does your company provide? Please select all that apply.

Figure 12 displays the percentage of respondents who were very familiar with HPWHs by state. Installers in Washington (62%) and Oregon (54%) were more likely to say they were very familiar with HPWHs than those in Idaho (14%) and Montana (25%).

Figure 12: Very Familiar with HPWHs, by State

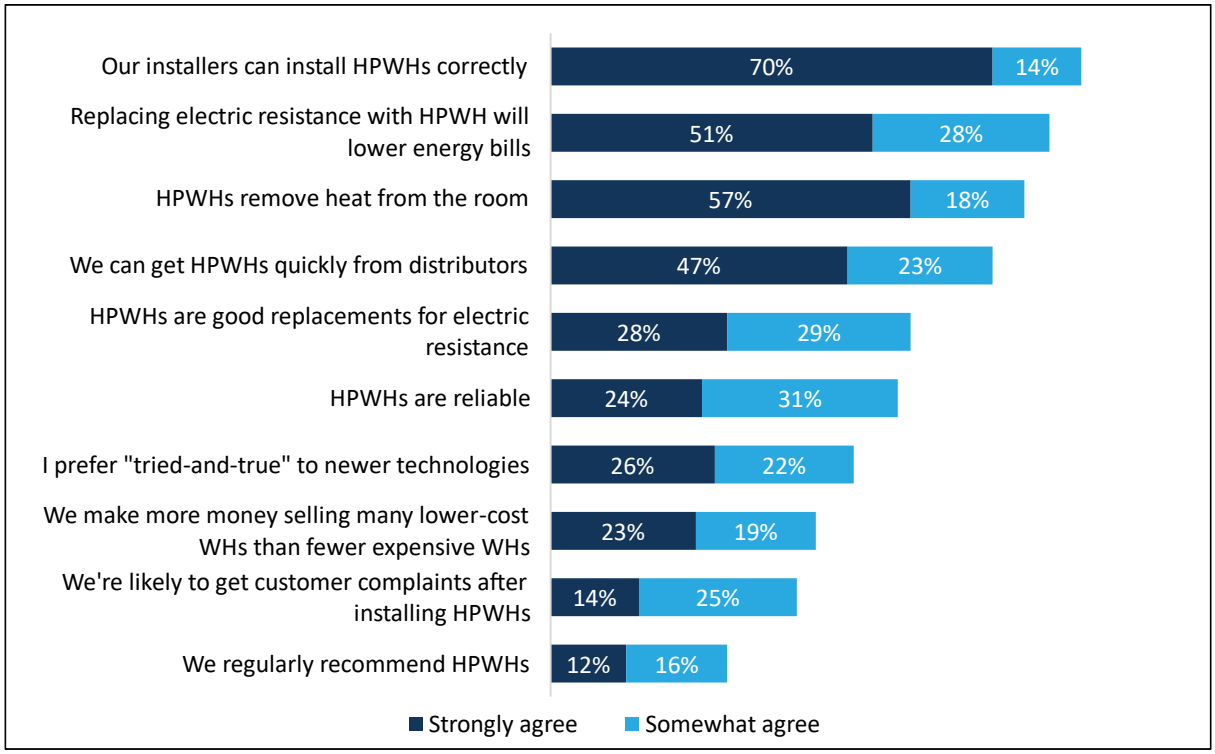


Q11. Before this survey, which of the following best describes your level of familiarity with heat pump water heaters?

Installers are comfortable installing HPWHs but do not regularly recommend them. Figure 13 displays the percentage of respondents that agreed with various statements. The majority of respondents agreed that their company's installers could install HPWHs correctly (84%) and that replacing an electric

resistance water heater with a HPWH would lower overall energy bills (79%). However, only around one-half (55%) of respondents agreed that HPWHs are reliable and fewer than one-third (28%) regularly recommended them.

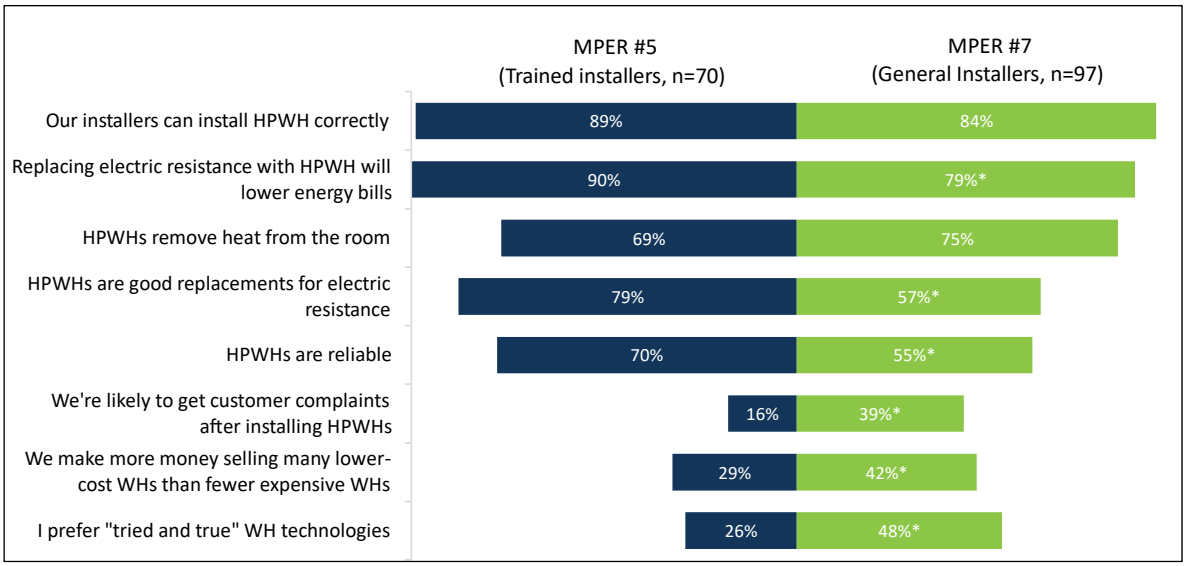
Figure 13: Attitudes about HPWHs (n=97)



Q15. Please assess how much you agree or disagree with the following statements.

HWS-trained installers have a more positive opinion on HPWHs and their benefits. Compared to the trained installers surveyed in MPER #5, installers in the general population (MPER #7) were less likely to agree that HPWHs are reliable, will lower energy bills, and are a good replacement for electric resistance water heaters (Figure 14). This suggests that HWS-trained installers have a more positive opinion of HPWH performance (MPI 1a).

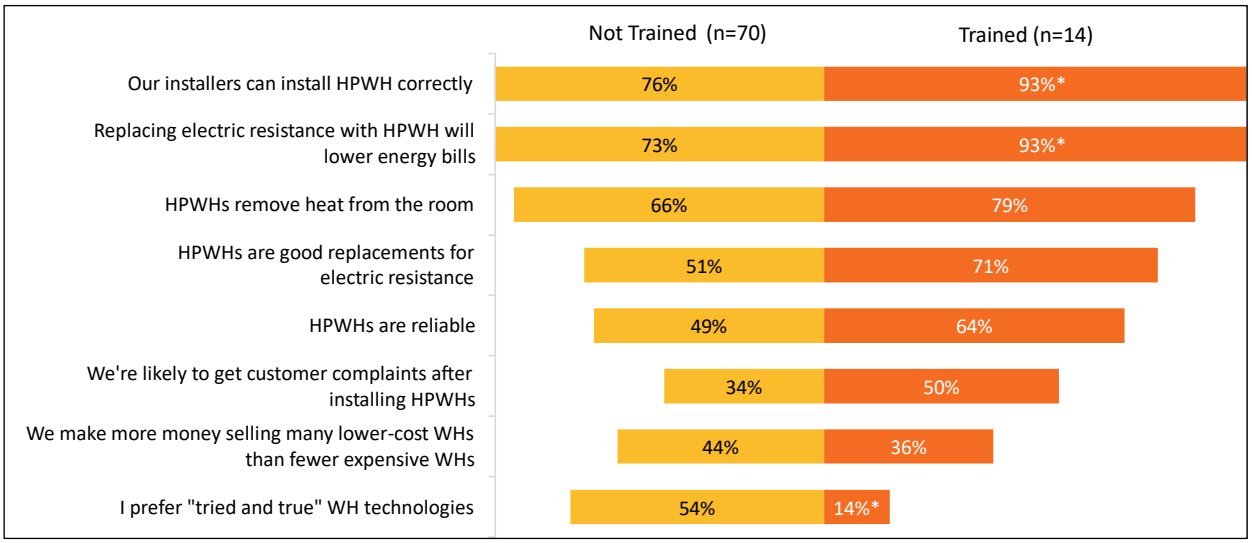
Figure 14: Attitudes about HPWH (MPER #5 vs MPER #7)



Notes: Figure shows percentage of respondents that "somewhat agree" or "strongly agree" with the statements about HPWH.
**Significantly different from MPER #5 at the 90% confidence level.*
Q15. Please assess how much you agree or disagree with the following statements.

The MPER #7 installer survey was a general installer survey and was not designed for comparisons between trained and untrained respondents, though the sample was designed to ensure a representative number of trained installers were surveyed. Twenty of the 101 individual installers and/or their company were on the HWS training list; however, only 14 of those 20 installers recalled that they or someone else at their company had attended the training. Figure 15 shows that HWS-trained installers are more likely to say that their technicians can install HPWHs correctly and the technology is efficient, reliable, and will save their customers money.

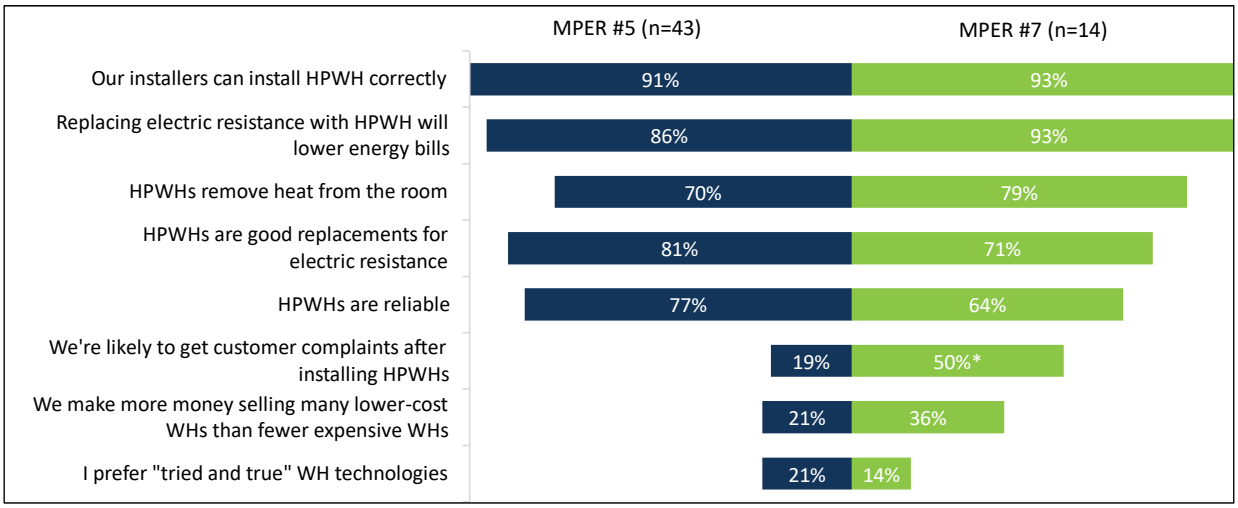
Figure 15: HPWH Attitudes Among HWS-Trained Installers (MPER #7)



Notes: Figure shows percentage of respondents that "somewhat agree" or "strongly agree" with the statements about HPWH.
**Significantly different from non-HWS trained installers at the 90% confidence level.*
Q15. Please assess how much you agree or disagree with the following statements.

HPWH knowledge and attitudes about HPWHs among HWS-trained installers were similar to findings from MPER #5. Figure 16 compares the responses from respondents who recalled that they or someone else from their company attended a HWS training.[25] Responses are generally similar between the surveys, suggesting that HWS-trained installers continue to report high confidence in HPWH technology.

Figure 16: Attitudes about HPWHs among HWS-Trained Installers (2019 – 2023)

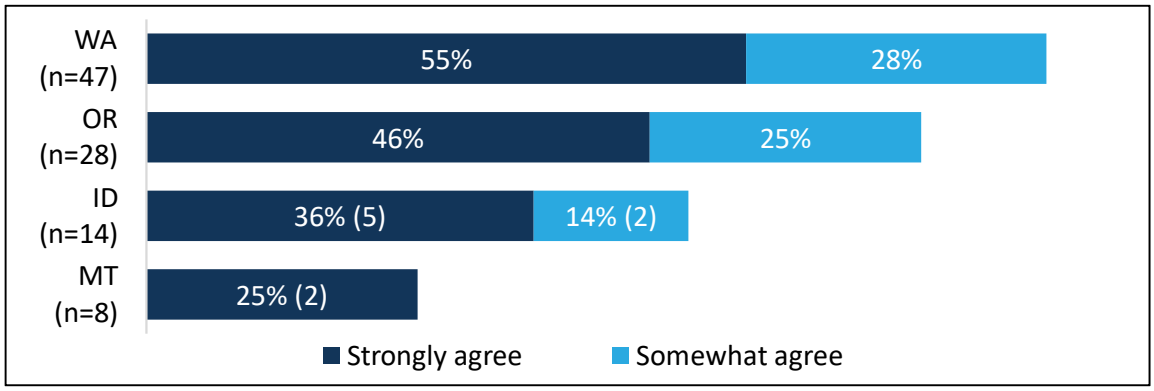


Notes: Figure shows percentage of respondents that "somewhat agree" or "strongly agree" with the statements about HPWH.
**Significantly different from MPER #5 at the 90% confidence level.*
Q15. Please assess how much you agree or disagree with the following statements.

[25] The installer survey conducted as part of MPER #5 was of installers who had attended a HWS training. When contacted for the survey, not all installers recalled the training; Figure 16 shows installers from both MPER #5 and MPER #7 whose companies were both verified to have participated in a training and who recalled attendance at the training when prompted during the survey.

Installers in Idaho, Montana, and rural areas have more limited access to HPWHs. As Figure 13 above shows, around two-thirds (70%) of respondents agreed that they can get HPWHs quickly from distributors – a key factor in whether this technology is suitable for emergency replacement customers who do not want to wait long for hot water while they wait for a new water heater. Figure 17 shows that respondents in Washington (83%) and Oregon (71%) were more likely to agree than those in Idaho (49%) and Montana (25%). Across all states, respondents in urban areas (74%) were more likely to agree that they could get HPWHs quickly from distributors than respondents in rural areas (55%).

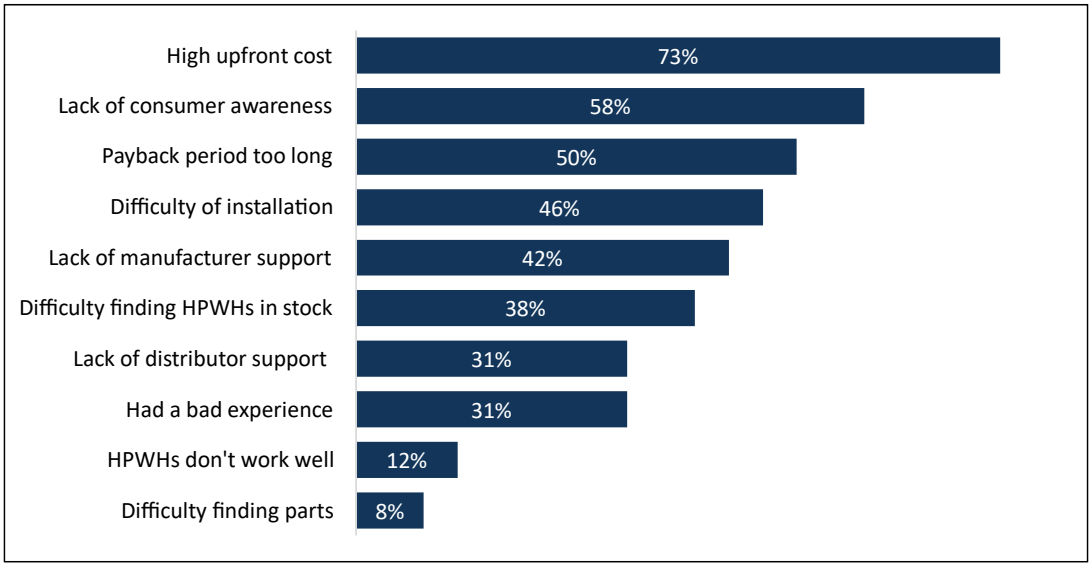
Figure 17: Can Get HPWHs Quickly from Distributors



Q15. Please assess how much you agree or disagree with the following statements: I can get heat pump water heaters quickly from local distributors.

Installers perceive high upfront cost and lack of consumer awareness as key barriers to HPWH adoption. Just over one-half (57%) of installers agreed that HPWHs are good replacements for electric resistance water heaters. Those who disagreed cited high upfront costs (73%), lack of consumer awareness (58%), and the long payback period (50%) as primary reasons.

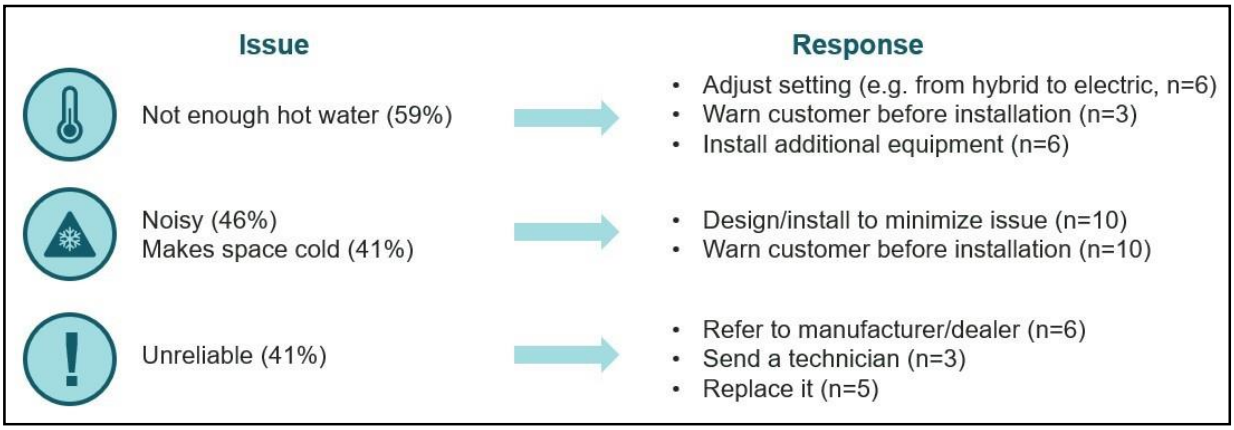
Figure 18: Why HPWHs are not Good Replacements for Electric Resistance (n=26)



Notes: Question was asked of respondents who responded "strongly disagree" or "somewhat disagree" with the statement that "Heat pump water heaters are not good replacements for traditional electric resistance water heaters" (Q15c).
Q18. Why do you feel that heat pump water heaters are not good replacements for electric resistance water heaters? Select all that apply.

A substantial minority of installers anticipate customer complaints after installing HPWHs. Two-fifths (39%) of respondents that were aware of HPWHs (n=97) agreed that they were likely to get customer complaints or service requests after installing a HPWH.[26] Figure 19 displays the customer complaints respondents have received, or would expect to receive, and how they would respond. The most common customer complaint reported was not enough hot water, mentioned by nearly three-fifths (59%) of respondents, or 25% of HPWH installers. Installers dealt with complaints by attempting to avert them or making adjustments after the fact.

Figure 19: Common Customer Complaints (n=37)



Notes: Question asked of respondents who were aware of HPWHs and responded "strongly agree" or "somewhat agree" to the statement "My company is likely to get customer complaints or service requests soon after installing a heat pump water heater" (Q15e).
Q16. What are the common customer complaints you [expect to] receive after installing HPWHs, if any?
Q17. For each of the customer complaints you identified, please explain how you would generally respond to the issue.

HPWH Installation

Most HPWH installations require changes to the installation area. On average, respondents estimated that fewer than one-third (29%) of homes could accommodate a HPWH without making more changes to the installation area than is typical for a storage water heater (n=97). On average, installers in the Challenging Installation study estimated that a HPWH would not fit in 38% of existing homes, corroborating the results of this survey.

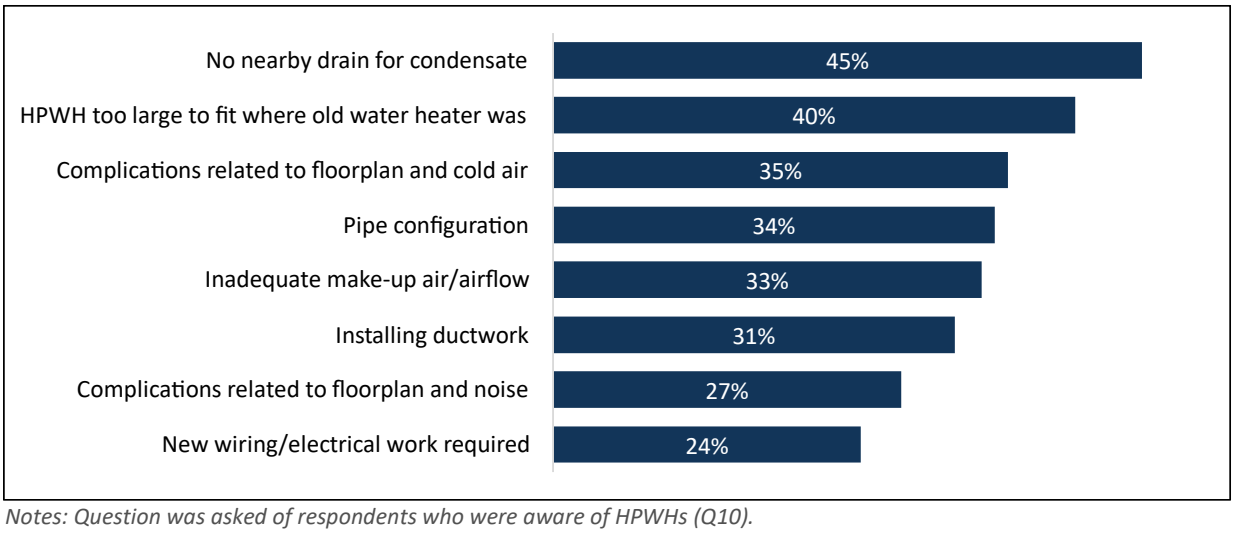
[26] This question was asked of all installers that were aware of HPWH (n=97) to assess whether installers perceived HPWHs as having a high rate of callbacks, even if the installer did not have any personal experience installing HPWH. Only one of the installers that were aware of HPWH but did not have any experience installing them (n=12) agreed with the statement "My company is likely to get customer service complaints or service requests soon after installing a HPWH," and this installer did not respond to the follow-up question about what types of customer complaints they would expect to receive. As such, the results for this question reflect the actual experience of HPWH installers and not speculation from inexperienced installers.

HPWHs require at least one to three additional hours of installation time, especially if ductwork is required. Respondents estimated the average time to install an electric resistance water heater in a typical home was 2.5 hours. In comparison, respondents estimated 3.8 hours for a HPWH with no ducting or 5.7 hours for a ducted HPWH. These results line up with findings from the Challenging Installations Scenarios study,[27] where installers estimated that HPWH require 1.6 to 2.0 more hours to install than a "typical" water heater, while ducting requires 3.2 hours more labor, on average.

The most common installation challenge is no nearby drain for condensate, followed by space challenges. Figure 20 displays the percentage of respondents that frequently encountered various installation challenges. Nearly one-half (45%) of respondents said they frequently encountered the challenge of not having a nearby drain for condensate. Two-fifths (40%) of respondents said they frequently found the HPWH too large to fit in the old water heater's place. Installers and manufacturers surveyed as part of the Challenging Installation study identified tight spaces as the most challenging installation scenario.

Around one-third of respondents said they frequently encountered challenges involving complications related to the floorplan and cold air (35%), pipe configuration (34%), or inadequate make-up air or airflow (33%). Just under one-third (31%) of respondents said they frequently need to install ductwork when installing a HPWH.

Figure 20: HPWH Installation Challenges (n=97)



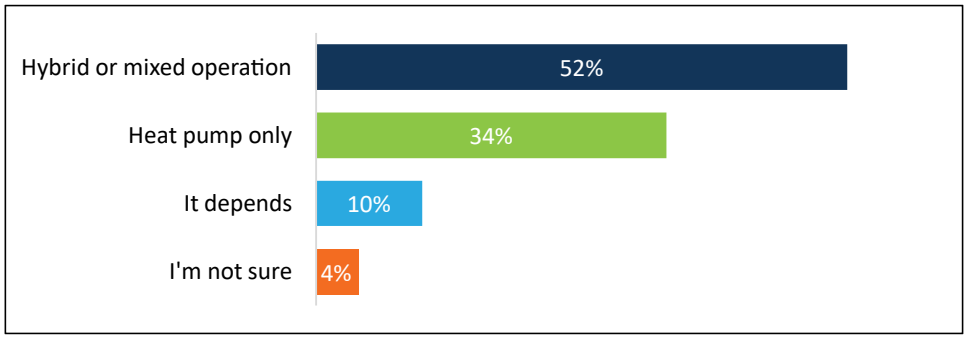
Notes: Question was asked of respondents who were aware of HPWHs (Q10).
Q19. How frequently do installation technicians face challenges with the following aspects of a heat pump water heater installation?

Installers generally recommend hybrid or mixed operation mode. Around one-half of respondents (52%) recommended hybrid or mixed operation when installing a HPWH in a customer's home—which is

[27] Cadeo Group. "Heat Pump Water Heater Market Research: Challenging Installation Scenarios." April 20, 2023. https://neea.org/resources/heat-pump-water-heater-market-research-challenging-installations-scenarios.

likely the setting generally recommended by manufacturers to balance energy savings with ensuring customers do not run out of hot water. One-third (34%) recommended heat pump-only mode. Ten percent of respondents said what they recommended depended on factors such as the customers' needs or ambient temperatures. The primary reason for recommending hybrid or mixed operation was to avoid running out of hot water.

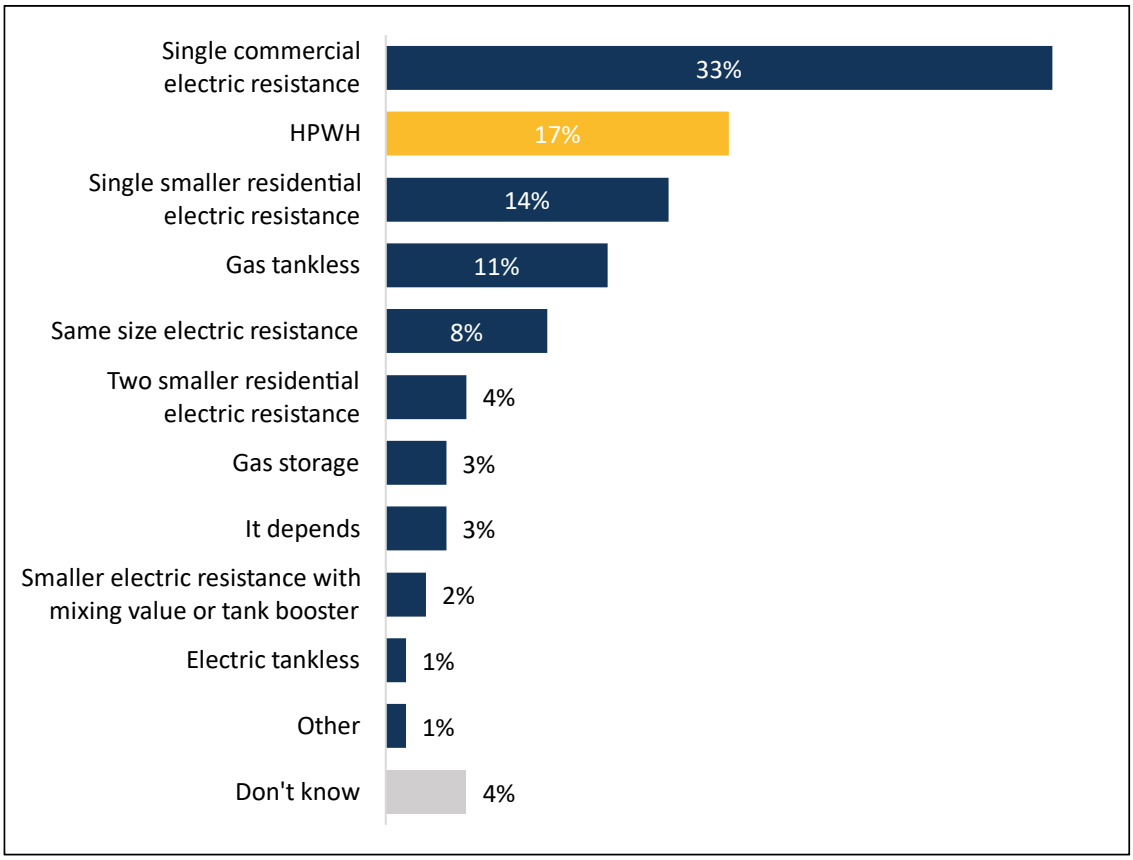
Figure 21: Recommended HPWH Mode (n=97)



Notes: Question was asked of respondents who were aware of HPWHs (Q10).
Q22. When installing a heat pump water heater in a customer's home, what mode would you usually recommend to the customer?

HPWHs are the typical replacement option for fewer than one-fifth (17%) of installers for large-capacity electric resistance storage water heaters. Figure 22 shows respondents' typical replacement strategies for replacing a large capacity (>55 gallons) electric resistance storage water heater for a residential customer. The most common strategy, cited by one-third (33%) of respondents, is to install a single commercial electric resistance storage water heater. Installing a HPWH was the second most common replacement strategy, cited by fewer than one-fifth (17%) of respondents.

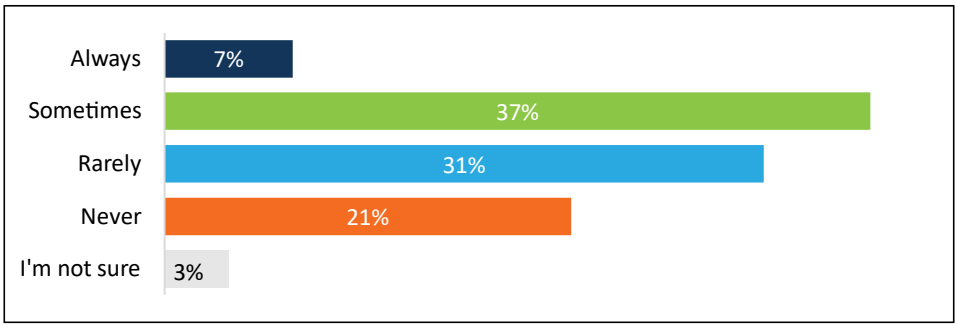
Figure 22: Large Capacity Water Heater Replacement Strategy (n=101)



Q30. When you replace a large capacity (⩾55 gallons) electric resistance storage water heater for a residential customer, what is your typical replacement strategy?

One in ten respondents (10%) install mixing valves on smaller electric resistance storage water heaters to avoid installing a HPWH. Figure 23 displays how often respondents reported installing mixing valves to increase the amount of hot water produced by smaller (<55 gallons) electric resistance storage water heaters. Over two-fifths (44%) said they installed mixing valves on smaller electric resistance tanks sometimes or always. Around one-quarter (23%) of these respondents said they did it to avoid installing a HPWH – the technology essentially required for all large, residential electric water heaters given the 2015 NAECA updates that increased the efficiency requirements for those systems.

Figure 23: Install Mixing Valves to Increase Production (n=89)



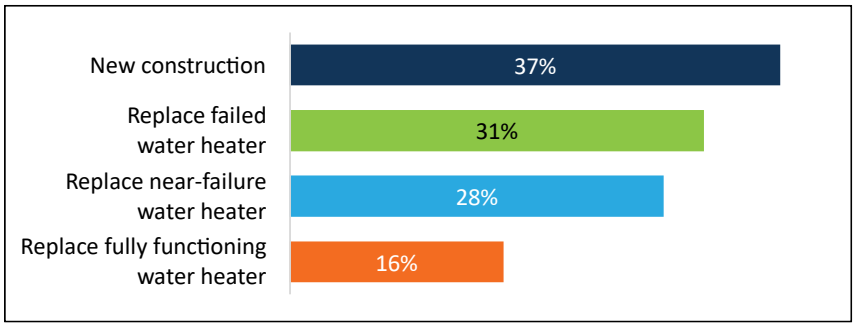
Notes: This question was asked only to respondents who reported installing electric resistance storage water heaters (Q12).
Q30. When installing smaller electric resistance storage tank water heaters (<55 gallons), how often do you install mixing valves in order to increase the amount of hot water produced by the smaller tank?

HPWH Recommendations

HPWHs are more likely to be recommended in new construction. Figure 24 displays the average percentage of time respondents would recommend HPWH in various scenarios. Respondents were most likely to recommend HPWHs for new construction at an average of 37% of the time. On average, respondents would recommend a HPWH to replace a failed water heater 31% of the time (MPI 1d) and a near-failure water heater 28% of the time.[28] Respondents indicated new construction customers acted on the recommendation by installing a HPWH around one-half (53%) of the time. In contrast, customers to whom a HPWH had been recommended in a near-failure or complete-failure scenario installed one around one-third of the time (32% and 35%, respectively.) This is comparable to findings from MPER #5, where installers estimated that customers accept their recommendation to install a HPWH to replace a failed water heater 33% of the time and a near-failure water heater 32% of the time.

[28] Figure 24 displays average recommendation rates. Median recommendation rates were as follows: install in a new construction scenario, 10%; to replace a failed water heater, 10%; to replace an old/near failure water heater, 10%; and to replace a fully functioning water heater, 0%.

Figure 24: Percentage of Time Installers Recommend HPWH by Scenario (n=97)



Notes: This question was asked only to respondents who reported installing at least one HPWH in 2022 (Q25). Q27. Thinking about all the heat pump water heaters your company installed in 2022, about what percent of units were to customers who were [installation scenarios].

Average HPWH recommendation rates did not vary much by state (Table 15), particularly when looking at median recommendation rates (Table 16). Installers in Washington recommended HPWHs half of the time, which is notably higher than installers in other states. Recommendation rates for other scenarios were comparable across states.

Table 15: Percentage of Time Installers Recommend HPWH in Each Scenario (Mean)

State	New construction	Replace failed water heater	Replace near-failure water heater	Replace fully-functioning water heater
Washington (n=47)	48%	36%	32%	19%
Oregon (n=28)	30%	29%	26%	17%
Idaho (n=13)	25%	27%	18%	14%
Montana (n=8)	12%	22%	25%	2%
Total	**37%**	**31%**	**28%**	**16%**

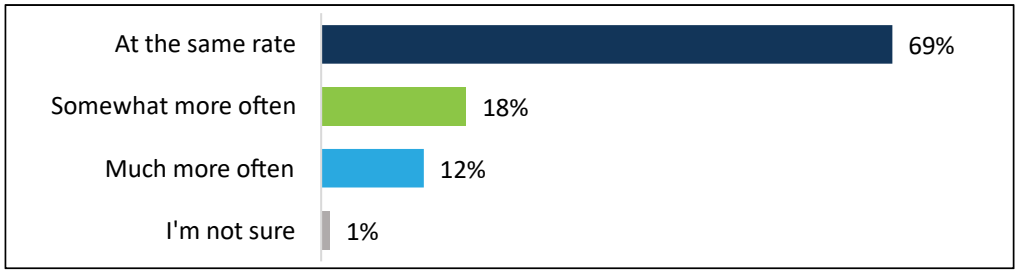
Table 16: Percentage of Time Installers Recommend HPWH in Each Scenario (Median)

State	New construction	Replace failed water heater	Replace near-failure water heater	Replace fully-functioning water heater
Washington (n=47)	50%	10%	10%	2%
Oregon (n=28)	6%	15%	19%	1%
Idaho (n=13)	1%	15%	6%	0%
Montana (n=8)	1%	6%	15%	0%
Total	**10%**	**10%**	**10%**	**0%**

Almost one-third (30%) of installers expect to recommend HPWHs to customers more often over the next two years. Around two-thirds (69%) of respondents expect to recommend HPWHs at the same rate over the next two years, while nearly one-third (30%) expect to recommend them more often (Figure 25). This finding is similar to MPER #5, in which 39% of respondents indicated they planned to install HPWHs "somewhat" or "much more often" in the future than they did at the time of the survey. MPER #5 was a survey of HWS-trained installers who would be more likely to install HPWHs than the general population of water heater installers.

Reasons MPER #7 respondents gave for expecting to recommend HPWHs in the future at the same rate as currently was because they were too expensive or not cost-effective (31%), building code requirements (20%), the respondent already recommended them most or all of the time (12%), or the respondent preferred other types of water heaters (9%, n=65). Respondents who expected to recommend HPWHs more often in the future cited as reasons building code requirements (31%), increased installer familiarity with HPWHs (21%), HPWH rebates and tax credits (14%), improvements in HPWH performance (14%), and increased customer demand (10%) (n=29).

Figure 25: Expected Frequency of Recommending HPWH in the Future (n=97)

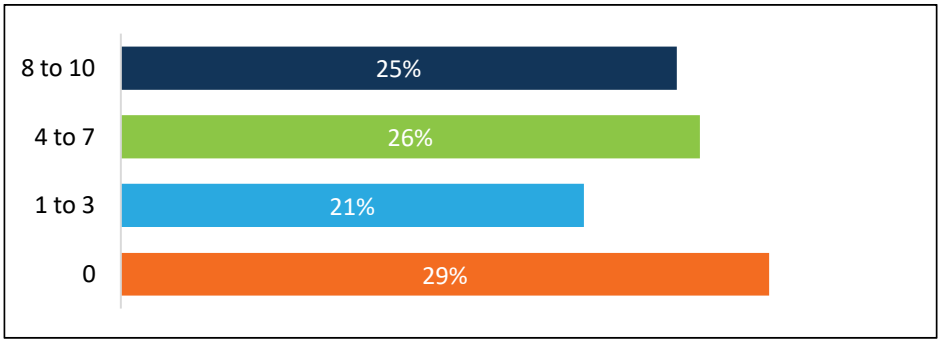


Notes: This question was asked only to respondents who were aware of HPWHs (Q10).
Q41. In the next year or two, how often do you expect you will you recommend heat pump water heaters to your customers?

Installers are unlikely to recommend HPWHs to friends and colleagues. For the first time in a HPWH MPER, respondents were asked how likely they were to recommend a HPWH to a friend or colleague, using a score of 0 to 10, where 0 meant "not at all likely" and 10 meant "extremely likely." As shown in

Figure 26, over one-quarter (29%) of respondents indicated they were not at all likely to recommend a HPWH to a friend or colleague by providing a score of 0. An additional 21% of respondents indicated they were unlikely to recommend HPWHs by providing a score from 1 to 3. Only one-quarter (25%) of respondents indicated they were likely to recommend a HPWH to a friend or colleague by providing a score from 8 to 10.

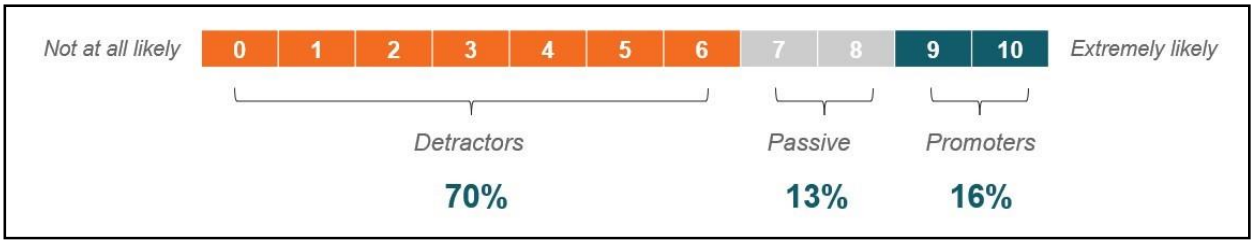
Figure 26: Likelihood of Recommending HPWH (n=97)



Notes: This question was asked only to respondents who were aware of HPWHs (Q10).
Q52. In closing, how likely are you to recommend heat pump water heaters to a friend or colleague? Please use a score of 0 to 10 where 0 is "not at all likely" and 10 is "extremely likely".

The responses to this question can be used to calculate a *net promoter score*. A net promoter score is calculated by subtracting the percentage of *promotors* (respondents who provided an answer of 9 or 10) from the percentage of detractors (respondents who provided an answer from 0 to 6, Figure 27). A net promoter score below zero means there are more detractors than promoters. The responses to this question produce a net promoter score of -27%. This result is not particularly surprising given that it is a relatively new technology with some adoption barriers, but this metric can be used to track changing attitudes over time.

Figure 27: Net Promoter Score (n=97)



Q52. In closing, how likely are you to recommend heat pump water heaters to a friend or colleague? Please use a score of 0 to 10 where 0 is "not at all likely" and 10 is "extremely likely".

Water Heater Sales and Revenue

Installers estimated that 12% of electric resistance water heaters installed in 2022 were HPWH.
Responding installers estimated their companies had installed 224 electric storage water heaters, on

average, in 2022. Table 17 shows HPWH installations in 2022 as a percentage of electric storage water heater installations. On average, installers reported that 19% of electric storage water heaters installed in 2022 were HPWH; when weighted by units, the estimate is 12%. Looking at the subset of respondents that attended and/or self-reported attending a HWS training (n=29), 13% of electric storage water heaters installed in 2022 were HPWHs (unit-weighted; MPI 1b).

The average number of HPWHs installed in 2022 per company was 22, with a median value of 2 HPWH installations (Table 18). Installers whose companies had installed at least one HPWH (n=64) indicated that HPWHs made up about 12% of their company's revenues from sales and installations of water heaters in 2022, on average.

Table 17: HPWH Installed in 2022 As a Percentage of Electric Storage Water Heaters

State	Unit-Weighted*	Mean	Median
Washington (n=42)	14%	28%	10%
Oregon (n=27)	10%	15%	2%
Idaho (n=13)	3%	6%	0%
Montana (n=9)	3%	3%	0%
Total	**12%**	**19%**	**3%**

*Notes: This question was only asked of respondents who installed at least one electric storage water heater in 2022 (Q24). Q25. Of the residential electric storage water heaters your company installed in 2022, about what percent were HPWHs? *Removed two outliers who claimed to have installed over 70x the median number of HPWHs in 2022, nearly all in new construction.*

Table 18: HPWH Units Installed Per Company in 2022

State	Mean	Median
Washington (n=42)	38	8
Oregon (n=27)	13	<1
Idaho (n=13)	4	0
Montana (n=9)	2	0
Total	**22**	**2**

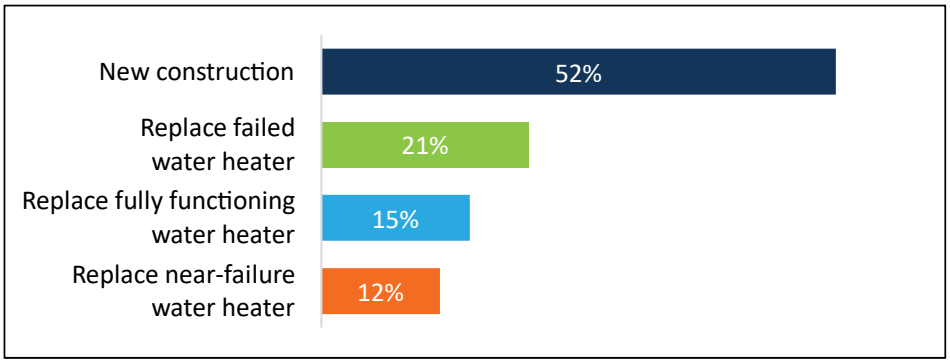
Notes: This question was only asked of respondents who installed at least one electric storage water heater in 2022 (Q24). Q25. Of the residential electric storage water heaters your company installed in 2022, about what percent were HPWHs?

Installers in Washington and Oregon reporting installing more HPWHs in 2022 than those in Idaho or Montana. More than half of the installers in Montana (five of nine) and Idaho (eight of 13 installers) reported that their company did not install any HPWHs in 2022.

HPWH installations in 2022 were split between new construction and existing homes. Just over one-half of HPWHs installed in 2022 (52%) by the surveyed installers were installed in new construction (Figure 28). This finding mirrors the market update; 52% of HPWHs installed in the NW in 2021 were

installed in new construction (Table 4). Among HPWHs installed in existing homes (48% overall), 21% were installed to replace failed water heaters (emergency replacements, MPER 1e).

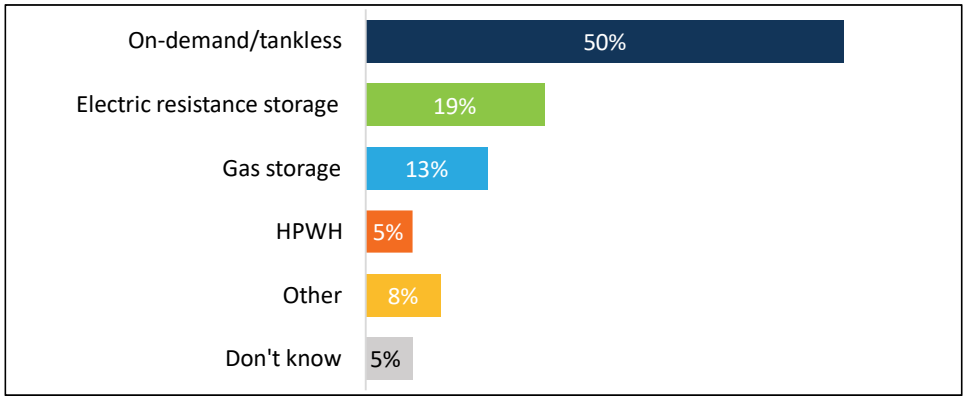
Figure 28: Unit-Weighted* Sales of HPWHs by Replacement Scenario (n=62)



Notes: This question was only asked of respondents that installed at least 1 HPWH in 2022 (Q25).
**Removed two outliers who claimed to have installed over 70x the median number of HPWHs in 2022, nearly all in new construction.*
Q27. Thinking about all the HPWHs your company installed in 2022, what percent of units were to customers who were… [installation scenario].

On-demand/tankless water heaters are the most profitable to install because they take longer to install. Figure 29 displays the distribution of installers' responses to the question, "What is the most profitable type of water heater for your company to install in residential homes?" The most common response, provided by one-half of respondents (50%), was on-demand/tankless water heaters. Around one-half (51%) of respondents who said on-demand/tankless water heaters were the most profitable explained they were the most labor intensive to install; therefore, they charged more per installation. Only one in 20 respondents (5%) said HPWHs were the most profitable type for their company to install.

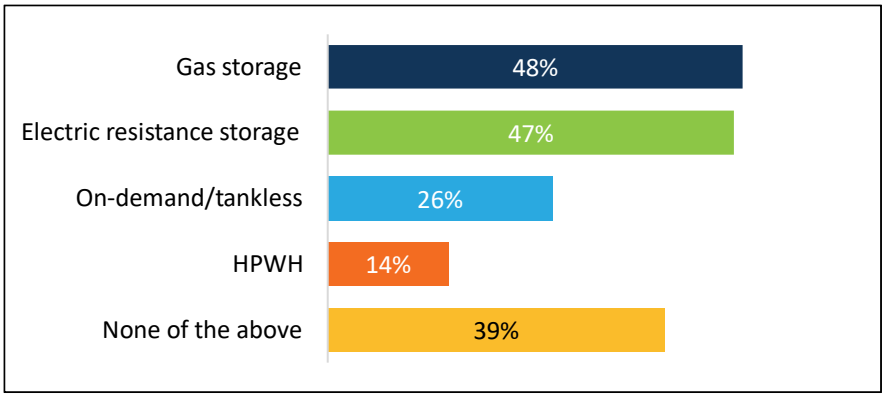
Figure 29: Most Profitable Water Heater (n=101)



Notes: Respondents were only shown options for water heaters their company installs (Q12).
Q13. What is the most profitable type of water heater for your company to install in residential homes?

Most installers do not keep HPWHs on hand for emergency replacements. Only 14% of respondents kept HPWHs on hand for emergency replacements (Figure 30). Installers with HPWH on hand recommend HPWH to replace a failed water heater twice as often as other installers: 42% of the time, on average, compared to 19% of the time. One might expect that installers who have more favorable opinions of HPWHs would be the ones more likely to keep them on hand. However, those installers who keep HPWHs on hand were *not* more likely to agree that HPWHs are good replacements for electric resistance storage water heaters.

Figure 30: Water Heaters On Hand for Emergency Replacement (n=101)

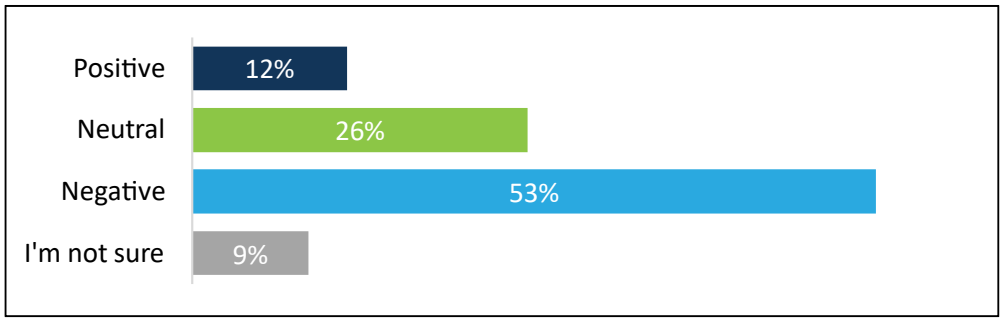


Q33. What types of water heating equipment does your company typically keep on hand for emergency replacements? Select all that apply.

Updated Standards and Access to Information

Installers are generally not in favor of communications ports on water heaters. Around two-thirds (65%) of respondents working in Washington (n=52) had heard of ANSI/CTA-2045, which requires electric storage water heaters manufactured after January 1, 2023 (electric resistance and HPWHs alike) to have a communications port. Over one-half (53%) of these respondents viewed it as a negative development (Figure 31), citing reasons such as increased water heater costs (39%), giving utilities or government control over water heaters (22%), no tangible benefits to customers (17%), and privacy concerns (17%, n=18).

Figure 31: Installer Perception of ANSI/CTA-2045 (n=34)



Notes: Only respondents that work in WA and had heard of ANSI/CTA-2045 (Q43) were asked the question.
Q44. Do you think the new standard is a positive or negative development?

DETAILED RESULTS

This section contains full results for all installer survey questions. All results are unweighted.

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
1 (n=101) Did your company install any residential water heating equipment in any of the following states in 2022? Select all that apply.	Oregon	37	32%	31	100%	5	11%	1	7%	0	0%	32	41%	5	23%
	Washington	52	45%	2	6%	47	100%	3	21%	0	0%	42	53%	10	45%
	Idaho	18	16%	0	0%	4	9%	0	100%	14	0%	13	16%	5	23%
	Montana	9	8%	0	0%	0	0%	0	0%	9	100%	3	4%	6	27%
2 (n=101) Which of the following activities represents your company's main line of work?	Installing equipment in residential new construction (newly built homes that are not yet occupied)	12	12%	2	6%	8	17%	2	14%	0	0%	11	14%	1	5%
	Replacing or servicing equipment in existing homes	71	70%	23	74%	31	66%	10	71%	7	78%	56	71%	15	68%
	Installing, replacing, or servicing equipment in commercial or industrial facilities	6	6%	2	6%	2	4%	1	7%	1	11%	4	5%	2	9%
	Something else:	12	12%	4	13%	6	13%	1	7%	1	11%	8	10%	4	18%
4 (n=101) Besides installing water heating equipment, what other services does your company provide? Please select all that apply.	HVAC installation and/or maintenance	40	40%	14	45%	16	34%	7	50%	3	33%	30	38%	10	45%
	Plumbing	84	83%	25	81%	40	85%	10	71%	9	100%	64	81%	20	91%
	Electrical	9	9%	2	6%	6	13%	0	0%	1	11%	5	6%	4	18%
	Construction or general contracting services	16	16%	6	19%	5	11%	3	21%	2	22%	10	13%	6	27%
	Other:	14	14%	4	13%	7	15%	3	21%	0	0%	11	14%	3	14%
	No other services	1	1%	0	0%	1	2%	0	0%	0	0%	1	1%	0	0%
5 (n=101) Which of the following best	A business with a single location	89	88%	27	87%	40	85%	14	100%	8	89%	69	87%	20	91%
	A company with multiple locations	10	10%	3	10%	6	13%	0	0%	1	11%	8	10%	2	9%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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describes your company?	Other:	2	2%	1	3%	1	2%	0	0%	0	0%	2	3%	0	0%
7 (n=101) Approximately how many people in total work for your company?	1 to 5	36	36%	2	6%	8	17%	2	14%	0	0%	11	14%	1	5%
	6 to 10	27	27%	23	74%	31	66%	10	71%	7	78%	56	71%	15	68%
	11 to 50	27	27%	2	6%	2	4%	1	7%	1	11%	4	5%	2	9%
	More than 50	11	11%	4	13%	6	13%	1	7%	1	11%	8	10%	4	18%
8 (n=101) Please indicate your role(s) at the company. Select all that apply.	I own the company	62	61%	21	68%	26	55%	10	71%	5	56%	47	59%	15	68%
	I install or service water heaters	51	50%	17	55%	21	45%	10	71%	3	33%	39	49%	12	55%
	I make recommendations about what customers should install	70	69%	22	71%	29	62%	14	100 %	5	56%	54	68%	16	73%
	I manage installation technicians	69	68%	22	71%	29	62%	11	79%	7	78%	51	65%	18	82%
	I am in a sales position	56	55%	17	55%	24	51%	12	86%	3	33%	44	56%	12	55%
	Another role:	18	18%	6	19%	7	15%	10	29%	1	11%	14	18%	4	18%
9 (n=101) Before today,	Yes	99	98%	29	94%	47	100%	14	1000 %	9	100%	78	99%	21	95%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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had you heard the term "heat pump water heater" or "hybrid water heater"?	No	2	2%	2	6%	0	0%	0	0%	0	0%	1	1%	1	5%
10 (n=101) As you may already be aware, heat pump water heaters, also known as electric hybrid water heaters, use an electric heat pump to transfer heat from the air outside of the unit to the water in the tank. They work like a refrigerator, but in reverse. They are not the same as a tankless water	Yes	97	96%	28	90%	47	100%	14	100 %	8	89%	77	97%	20	91%
	No	4	4%	3	10%	0	0%	0	0%	1	11%	2	3%	2	9%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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heater. A heat pump water heater has a cylinder-shaped water storage tank, like a standard water heater. A tankless water heater has a smaller metal box mounted on a wall, with no storage tank. Based on that description, have you heard of "heat pump water heaters" or "hybrid water heaters"?															
11 (n=97) Before this survey, which of the following best describes your level of	Not very familiar - I've heard of them but never worked with them	13	13%	2	7%	2	4%	6	43%	3	38%	10	13%	3	15%
	Somewhat familiar - I've worked with them occasionally, or	36	37%	11	39%	16	34%	6	43%	3	38%	28	36%	8	40%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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familiarity with heat pump water heaters?	Very familiar - I've worked with them regularly	48	49%	15	54%	29	62%	2	14%	2	25%	39	51%	9	45%
12 (n=101) What types of water heaters does your company install in residential homes? Please select all that apply.	Electric resistance storage	89	88%	27	87%	42	89%	12	86%	8	89%	70	89%	19	86%
	Gas storage	91	90%	28	90%	41	87%	14	100 %	8	89%	72	91%	19	86%
	On-demand tankless	92	91%	29	94%	42	89%	12	86%	9	100%	72	91%	20	91%
	Heat pump water heater	72	71%	21	68%	39	83%	6	43%	6	67%	57	72%	15	68%
	Another type:	15	15%	3	10%	5	11%	3	21%	4	44%	11	14%	4	18%
13 (n=101) What is the most profitable type of water heater for your company to install in residential homes?	Electric resistance storage	19	19%	5	16%	10	21%	3	21%	1	11%	14	18%	5	23%
	Gas storage	13	13%	8	26%	3	6%	1	7%	1	11%	11	14%	2	9%
	On-demand/tankless	51	50%	13	42%	25	53%	8	57%	5	56%	37	47%	14	64%
	Heat pump water heater	5	5%	2	6%	3	6%	0	0%	0	0%	5	6%	0	0%
	Another type:	8	8%	2	6%	2	4%	2	14%	2	22%	7	9%	1	5%
	Don't know	5	5%	1	3%	4	9%	0	0%	0	0%	5	6%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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14 (n=95) Why is that?	Most labor-intensive installation	29	31%	4	13%	16	37%	5	38%	4	44%	20	27%	9	41%
	Easiest installation	25	26%	9	30%	12	28%	1	8%	3	33%	20	27%	5	23%
	Highest customer demand	13	14%	5	17%	5	12%	3	23%	0	0%	9	12%	4	18%
	Highest profit margin	12	13%	4	13%	4	9%	2	15%	2	22%	11	15%	1	5%
	Just the most common here	5	5%	2	7%	2	5%	1	8%	0	0%	5	7%	0	0%
	It's all we do	3	3%	2	7%	1	2%	0	0%	0	0%	2	3%	1	5%
	Fewest callbacks	2	2%	1	3%	0	0%	1	8%	0	0%	0	0%	2	9%
	Most service requests	1	1%	0	0%	1	2%	0	0%	0	0%	1	1%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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	Other	5	5%	3	10%	2	5%	0	0%	0	0%	5	7%	0	0%
15a (n=101) Please assess how much you agree or disagree with the following statements. I prefer installing "tried-and-true" water heaters to newer water heater technologies.	Strongly disagree	11	11%	2	6%	7	15%	1	7%	1	11%	9	11%	2	9%
	Somewhat disagree	15	15%	4	13%	7	15%	2	14%	2	22%	10	13%	5	23%
	Neither agree nor disagree	26	26%	8	26%	14	30%	2	14%	2	22%	19	24%	7	32%
	Somewhat agree	22	22%	7	23%	9	19%	5	36%	1	11%	18	23%	4	18%
	Strongly agree	26	26%	10	32%	10	21%	3	21%	3	33%	22	28%	4	18%
	Don't know	1	1%	0	0%	0	0%	1	7%	0	0%	1	1%	0	0%
15b (n=97) Please assess how much you agree or disagree with the following statements. Heat pump water heaters are reliable.	Strongly disagree	6	6%	3	11%	3	6%	0	0%	0	0%	4	5%	2	10%
	Somewhat disagree	16	16%	5	18%	9	19%	2	14%	0	0%	12	16%	4	20%
	Neither agree nor disagree	16	16%	5	18%	4	9%	1	7%	6	75%	13	17%	3	15%
	Somewhat agree	30	31%	9	32%	13	28%	7	50%	1	13%	25	32%	5	25%
	Strongly agree	23	24%	6	21%	14	30%	3	21%	0	0%	19	25%	4	20%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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	Don't know	6	6%	0	0%	4	9%	1	7%	1	13%	4	5%	2	10%
15c (n=97) Please assess how much you agree or disagree with the following statements. Heat pump water heaters are good replacements for traditional electric resistance water heaters.	Strongly disagree	16	16%	5	18%	9	19%	1	7%	1	13%	10	13%	6	30%
	Somewhat disagree	10	10%	2	7%	5	11%	1	7%	2	25%	8	10%	2	10%
	Neither agree nor disagree	13	13%	5	18%	5	11%	2	14%	1	13%	10	13%	3	15%
	Somewhat agree	28	29%	6	21%	13	28%	7	50%	2	25%	25	32%	3	15%
	Strongly agree	27	28%	9	32%	13	28%	3	21%	2	25%	21	27%	6	30%
	Don't know	3	3%	1	4%	2	4%	0	0%	0	0%	3	4%	0	0%
15d (n=97) Please assess how much you agree or disagree with the following statements. My company's	Strongly disagree	5	5%	2	7%	1	2%	1	7%	1	13%	4	5%	1	5%
	Somewhat disagree	4	4%	1	4%	2	4%	1	7%	0	0%	4	5%	0	0%
	Neither agree nor disagree	4	4%	1	4%	1	2%	1	7%	1	13%	2	3%	2	10%
	Somewhat agree	14	14%	3	11%	5	11%	4	29%	2	25%	12	16%	2	10%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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installation technicians can easily install heat pump water heaters correctly.	Strongly agree	68	70%	20	71%	37	79%	7	50%	4	50%	53	69%	15	75%
	Don't know	2	2%	1	4%	1	2%	0	0%	0	0%	2	3%	0	0%
15e (n=97) Please assess how much you agree or disagree with the following statements. My company is likely to get customer complaints or service requests soon after installing a heat pump water heater.	Strongly disagree	28	29%	7	25%	14	30%	4	29%	3	38%	21	27%	7	35%
	Somewhat disagree	12	12%	3	11%	5	11%	3	21%	1	13%	9	12%	3	15%
	Neither agree nor disagree	15	15%	5	18%	3	6%	5	36%	2	25%	12	16%	3	15%
	Somewhat agree	24	25%	9	32%	13	28%	1	7%	1	13%	22	29%	2	10%
	Strongly agree	14	14%	3	11%	10	21%	1	7%	0	0%	10	13%	4	20%
	Don't know	4	4%	1	4%	2	4%	0	0%	1	13%	3	4%	1	5%
15f (n=97) Please assess how much you agree or	Strongly disagree	29	30%	11	39%	11	23%	5	36%	2	25%	20	26%	9	45%
	Somewhat disagree	21	22%	4	14%	9	19%	5	36%	3	38%	19	25%	2	10%
	Neither agree nor disagree	18	19%	5	18%	8	17%	3	21%	2	25%	13	17%	5	25%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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disagree with the following statements. My company regularly recommends heat pump water heaters to customers.	Somewhat agree	16	16%	5	18%	10	21%	1	7%	0	0%	14	18%	2	10%
	Strongly agree	12	12%	3	11%	9	19%	0	0%	0	0%	11	14%	1	5%
	Don't know	1	1%	0	0%	0	0%	0	0%	1	13%	0	0%	1	5%
15g (n=97) Please assess how much you agree or disagree with the following statements. Heat pump water heaters remove heat from the room where they are located.	Strongly disagree	7	7%	5	18%	1	2%	1	7%	0	0%	5	6%	2	10%
	Somewhat disagree	4	4%	0	0%	2	4%	1	7%	1	13%	2	3%	2	10%
	Neither agree nor disagree	9	9%	3	11%	2	4%	2	14%	2	25%	8	10%	1	5%
	Somewhat agree	17	18%	1	4%	10	21%	4	29%	2	25%	12	16%	5	25%
	Strongly agree	55	57%	18	64%	29	62%	5	36%	3	38%	46	60%	9	45%
	Don't know	5	5%	1	4%	3	6%	1	7%	0	0%	4	5%	1	5%
15h (n=97) Please assess how much you agree or	Strongly disagree	3	3%	1	4%	2	4%	0	0%	0	0%	1	1%	2	10%
	Somewhat disagree	4	4%	1	4%	2	4%	0	0%	1	13%	3	4%	1	5%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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disagree with the following statements. Replacing an electric resistance water heater with a heat pump water heater will lower a customer's overall energy bill.	Neither agree nor disagree	12	12%	4	14%	3	6%	2	14%	3	38%	7	9%	5	25%
	Somewhat agree	27	28%	9	32%	13	28%	3	21%	2	25%	22	29%	5	25%
	Strongly agree	49	51%	13	46%	26	55%	8	57%	2	25%	42	55%	7	35%
	Don't know	2	2%	0	0%	1	2%	1	7%	0	0%	2	3%	0	0%
15i (n=101) Please assess how much you agree or disagree with the following statements. My company makes more money when we sell a larger	Strongly disagree	13	13%	3	10%	9	19%	1	7%	0	0%	9	11%	4	18%
	Somewhat disagree	20	20%	7	23%	9	19%	1	7%	3	33%	15	19%	5	23%
	Neither agree nor disagree	23	23%	9	29%	10	21%	3	21%	1	11%	20	25%	3	14%
	Somewhat agree	19	19%	5	16%	7	15%	5	36%	2	22%	15	19%	4	18%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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number of low-cost water heaters than when we sell a smaller number of high-cost water heaters.	Strongly agree	23	23%	7	23%	9	19%	4	29%	3	33%	17	22%	6	27%
	Don't know	3	3%	0	0%	3	6%	0	0%	0	0%	3	4%	0	0%
15j (n=101) Please assess how much you agree or disagree with the following statements. I can get heat pump water heaters quickly from local distributors.	Strongly disagree	5	5%	1	4%	2	4%	1	7%	1	13%	3	4%	2	10%
	Somewhat disagree	12	12%	4	14%	3	6%	3	21%	2	25%	9	12%	3	15%
	Neither agree nor disagree	5	5%	2	7%	1	2%	0	0%	2	25%	3	4%	2	10%
	Somewhat agree	22	23%	7	25%	13	28%	2	14%	0	0%	20	26%	2	10%
	Strongly agree	46	47%	13	46%	26	55%	5	36%	2	25%	37	48%	9	45%
	Don't know	7	7%	1	4%	2	4%	3	21%	1	13%	5	6%	2	10%
16 (n=37) What are the common customer complaints you receive/would expect to receive after	Not enough hot water	22	59%	4	33%	17	77%	1	50%	0	0%	18	58%	4	67%
	Noisy	17	46%	8	67%	9	41%	0	0%	0	0%	16	52%	1	17%
	Makes space cold	15	41%	4	33%	11	50%	0	0%	0	0%	13	42%	2	33%
	Unreliable	15	41%	4	33%	10	45%	1	50%	0	0%	8	26%	7	117 %

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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installing heat pump water heaters?	Too expensive	8	22%	3	25%	4	18%	1	50%	0	0%	8	26%	0	0%
	Too big	7	19%	0	0%	6	27%	0	0%	1	100%	7	23%	0	0%
	Installation complications	5	14%	0	0%	4	18%	0	0%	1	100%	5	16%	0	0%
	Maintenance requirements	3	8%	1	8%	2	9%	0	0%	0	0%	2	6%	1	17%
	Other	4	11%	3	25%	0	0%	0	0%	1	100%	3	10%	1	17%
17 (n=37) For each of the customer complaints you identified, please explain how you would generally respond to the issue.	Contact manufacturer	17	46%	1	8%	13	59%	1	50%	2	200%	13	42%	4	67%
	Warn customer before installation	12	32%	4	33%	8	36%	0	0%	0	0%	12	39%	0	0%
	Design/install to minimize	10	27%	3	25%	7	32%	0	0%	0	0%	9	29%	1	17%
	Explain this can happen with HPWHs	10	27%	4	33%	6	27%	0	0%	0	0%	7	23%	3	50%
	Contact manufacturer	7	19%	4	33%	3	14%	0	0%	0	0%	7	23%	0	0%
	Explain this is a trade-off for energy savings	7	19%	2	17%	5	23%	0	0%	0	0%	6	19%	1	17%
	Adjust setting (e.g. from hybrid to electric)	6	16%	1	8%	4	18%	1	50%	0	0%	5	16%	1	17%
	Install additional equipment	6	16%	1	8%	5	23%	0	0%	0	0%	6	19%	0	0%
	Refer customer to manufacturer/dealer	6	16%	2	17%	4	18%	0	0%	0	0%	2	6%	4	67%
	Replace it	5	14%	1	8%	3	14%	1	50%	0	0%	3	10%	2	33%
	Recommend other type of water heater	4	11%	0	0%	4	18%	0	0%	0	0%	4	13%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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	Send a technician	3	8%	2	17%	1	5%	0	0%	0	0%	3	10%	0	0%
	Other	3	8%	1	8%	1	5%	0	0%	1	100%	3	10%	0	0%
18 (n=26) Why do you feel that heat pump water heaters are not good replacements for electric resistance water heaters? Select all that apply.	Lack of product support at the manufacturer level	11	42%	3	43%	6	43%	1	50%	1	33%	7	39%	4	50%
	Lack of product support at the distributor level	8	31%	3	43%	3	21%	1	50%	1	33%	7	39%	1	13%
	Lack of consumer awareness	15	58%	5	71%	8	57%	0	0%	2	67%	11	61%	4	50%
	My company had a bad experience with a heat pump water heater installation in the past	8	31%	3	43%	3	21%	2	100 %	0	0%	5	28%	3	38%
	The difficulty of installation	12	46%	4	57%	6	43%	1	50%	1	33%	9	50%	3	38%
	High upfront cost	19	73%	4	57%	11	79%	1	50%	3	100%	14	78%	5	63%
	Payback period is too long	13	50%	4	57%	6	43%	1	50%	2	67%	9	50%	4	50%
	Difficulty finding heat pump water heaters in stock	10	38%	4	57%	3	21%	1	50%	2	67%	8	44%	2	25%
	They don't work well	3	12%	1	14%	2	14%	0	0%	0	0%	2	11%	1	13%
	Difficulty finding replacement parts	2	8%	1	14%	1	7%	0	0%	0	0%	1	6%	1	13%
19a (n=97) How frequently do installation	Always	11	11%	3	11%	5	11%	1	7%	2	25%	8	10%	3	15%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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technicians face challenges with the following aspects of a heat pump water heater installation? Pipe configuration	Very frequently	22	23%	9	32%	10	21%	2	14%	1	13%	21	27%	1	5%
	Occasionally	28	29%	8	29%	12	26%	6	43%	2	25%	20	26%	8	40%
	Rarely	18	19%	4	14%	8	17%	3	21%	3	38%	15	19%	3	15%
	Very rarely	7	7%	1	4%	4	9%	2	14%	0	0%	4	5%	3	15%
	Never	6	6%	1	4%	5	11%	0	0%	0	0%	5	6%	1	5%
	Don't know	5	5%	2	7%	3	6%	0	0%	0	0%	4	5%	1	5%
19b (n=97) How frequently do installation technicians face challenges with the following aspects of a heat pump	Always	7	7%	2	7%	4	9%	1	7%	0	0%	7	9%	0	0%
	Very frequently	37	38%	12	43%	18	38%	4	29%	3	38%	31	40%	6	30%
	Occasionally	21	22%	4	14%	10	21%	4	29%	3	38%	15	19%	6	30%
	Rarely	15	15%	2	7%	7	15%	4	29%	2	25%	11	14%	4	20%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
water heater installation? No nearby drain for condensate	Very rarely	4	4%	3	11%	0	0%	1	7%	0	0%	3	4%	1	5%
	Never	9	9%	3	11%	6	13%	0	0%	0	0%	7	9%	2	10%
	Don't know	4	4%	2	7%	2	4%	0	0%	0	0%	3	4%	1	5%
19c (n=97) How frequently do installation technicians face challenges with the following aspects of a heat pump water heater installation? New wiring/electrical work required	Always	7	7%	2	7%	2	4%	2	14%	1	13%	3	4%	4	20%
	Very frequently	16	16%	7	25%	6	13%	3	21%	0	0%	14	18%	2	10%
	Occasionally	31	32%	9	32%	13	28%	5	36%	4	50%	25	32%	6	30%
	Rarely	19	20%	4	14%	11	23%	2	14%	2	25%	16	21%	3	15%
	Very rarely	8	8%	2	7%	5	11%	1	7%	0	0%	5	6%	3	15%
	Never	10	10%	2	7%	7	15%	1	7%	0	0%	9	12%	1	5%
	Don't know	6	6%	2	7%	3	6%	0	0%	1	13%	5	6%	1	5%
19d (n=97) How frequently do installation technicians face challenges with the following	Always	4	4%	0	0%	4	9%	0	0%	0	0%	2	3%	2	10%
	Very frequently	28	29%	10	36%	13	28%	1	7%	4	50%	21	27%	7	35%
	Occasionally	32	33%	6	21%	16	34%	8	57%	2	25%	28	36%	4	20%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
aspects of a heat pump water heater installation? Inadequate make-up air/airflow	Rarely	18	19%	6	21%	8	17%	3	21%	1	13%	16	21%	2	10%
	Very rarely	2	2%	0	0%	1	2%	1	7%	0	0%	1	1%	1	5%
	Never	8	8%	3	11%	3	6%	1	7%	1	13%	5	6%	3	15%
	Don't know	5	5%	3	11%	2	4%	0	0%	0	0%	4	5%	1	5%
19e (n=97) How frequently do installation technicians face challenges with the following aspects of a heat pump water heater installation? Heat pump water heater too large to fit where old water heater was	Always	3	3%	1	4%	2	4%	0	0%	0	0%	3	4%	0	0%
	Very frequently	36	37%	8	29%	20	43%	4	29%	4	50%	30	39%	6	30%
	Occasionally	36	37%	10	36%	18	38%	6	43%	2	25%	27	35%	9	45%
	Rarely	10	10%	3	11%	3	6%	3	21%	1	13%	7	9%	3	15%
	Very rarely	3	3%	2	7%	0	0%	1	7%	0	0%	2	3%	1	5%
	Never	2	2%	1	4%	1	2%	0	0%	0	0%	2	3%	0	0%
	Don't know	7	7%	3	11%	3	6%	0	0%	1	13%	6	8%	1	5%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
19f (n=97) How frequently do installation technicians face challenges with the following aspects of a heat pump water heater installation? Complications related to floorplan and noise (noise from heat pump water heater would be a nuisance in desired installation location)	Always	4	4%	2	7%	1	2%	1	7%	0	0%	4	5%	0	0%
	Very frequently	22	23%	4	14%	13	28%	2	14%	3	38%	18	23%	4	20%
	Occasionally	37	38%	15	54%	15	32%	6	43%	1	13%	28	36%	9	45%
	Rarely	15	15%	1	4%	6	13%	4	29%	4	50%	11	14%	4	20%
	Very rarely	3	3%	0	0%	3	6%	0	0%	0	0%	3	4%	0	0%
	Never	9	9%	2	7%	7	15%	0	0%	0	0%	7	9%	2	10%
	Don’t know	7	7%	4	14%	2	4%	1	7%	0	0%	6	8%	1	5%
19g (n=97) How frequently do installation technicians face challenges with the following	Always	9	9%	3	11%	6	13%	0	0%	0	0%	7	9%	2	10%
	Very frequently	25	26%	7	25%	13	28%	4	29%	1	13%	20	26%	5	25%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
aspects of a heat pump water heater installation? Complications related to floorplan and cold air (cold air generated by heat pump water heater would be a nuisance in desired installation location)	Occasionally	39	40%	8	29%	21	45%	6	43%	4	50%	31	40%	8	40%
	Rarely	12	12%	3	11%	3	6%	3	21%	3	38%	8	10%	4	20%
	Very rarely	1	1%	0	0%	1	2%	0	0%	0	0%	1	1%	0	0%
	Never	4	4%	3	11%	1	2%	0	0%	0	0%	4	5%	0	0%
	Don't know	7	7%	4	14%	2	4%	1	7%	0	0%	6	8%	1	5%
19h (n=97) How frequently do installation technicians face challenges with the following aspects of a heat pump water heater installation?	Always	8	8%	5	18%	2	4%	0	0%	1	13%	5	6%	3	15%
	Very frequently	22	23%	6	21%	11	23%	2	14%	3	38%	20	26%	2	10%
	Occasionally	31	32%	5	18%	20	43%	4	29%	2	25%	22	29%	9	45%
	Rarely	15	15%	5	18%	6	13%	3	21%	1	13%	14	18%	1	5%
	Very rarely	5	5%	2	7%	2	4%	1	7%	0	0%	2	3%	3	15%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
Installing ductwork	Never	9	9%	3	11%	3	6%	2	14%	1	13%	8	10%	1	5%
	Don’t know	7	7%	2	7%	3	6%	2	14%	0	0%	6	8%	1	5%
20a (n=97) On average, how many hours does it take to install each of the following water heaters in a typical home: Electric resistance storage tank	One	14	14%	2	7%	9	19%	2	14%	1	13%	10	13%	4	20%
	Two	35	36%	8	29%	18	38%	5	36%	4	50%	30	39%	5	25%
	Three	33	34%	13	46%	13	28%	5	36%	2	25%	27	35%	6	30%
	Four or more	12	12%	3	11%	6	13%	2	14%	1	13%	8	10%	4	20%
	Don't know	3	3%	2	7%	1	2%	0	0%	0	0%	2	3%	1	5%
20b (n=97) On average, how many hours does it take to install each of the following water heaters in a typical home: Un-ducted heat pump water heater	One	4	4%	1	4%	3	6%	0	0%	0	0%	4	5%	0	0%
	Two	16	16%	5	18%	8	17%	3	21%	0	0%	12	16%	4	20%
	Three	21	22%	5	18%	11	23%	4	29%	1	13%	17	22%	4	20%
	Four or more	45	46%	13	46%	23	49%	5	36%	4	50%	35	45%	10	50%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	Don't know	11	11%	4	14%	2	4%	2	14%	3	38%	9	12%	2	10%
20c (n=97) On average, how many hours does it take to install each of the following water heaters in a typical home: ducted heat pump water heater	1 to 2	6	6%	1	4%	4	9%	1	7%	0	0%	6	8%	0	0%
	3 to 4	24	25%	6	21%	11	23%	7	50%	0	0%	17	22%	7	35%
	5 to 6	22	23%	5	18%	13	28%	2	14%	2	25%	19	25%	3	15%
	7 to 8	16	16%	7	25%	6	13%	2	14%	1	13%	14	18%	2	10%
	More than 8	10	10%	4	14%	5	11%	0	0%	1	13%	7	9%	3	15%
	Don't know	19	20%	5	18%	8	17%	2	14%	4	50%	14	18%	5	25%
21 (n=97) Please estimate what percentage of heat pump water heater installations	Zero	5	5%	3	11%	1	2%	0	0%	1	13%	3	4%	2	10%
	1 to 25%	32	33%	10	36%	17	36%	4	29%	1	13%	26	34%	6	30%
	26 to 50%	22	23%	8	29%	10	21%	2	14%	2	25%	18	23%	4	20%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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require ducting to be installed.	51 to 75%	8	8%	2	7%	5	11%	1	7%	0	0%	6	8%	2	10%
	76 to 100%	7	7%	2	7%	5	11%	0	0%	0	0%	4	5%	3	15%
	Don't know	23	24%	3	11%	9	19%	7	50%	4	50%	20	26%	3	15%
21 (n=97) Heat pump water heaters can be set in different modes: heat pump only (most efficient), hybrid or mixed operation (primarily operates in heat pump mode but uses electric resistance as backup), or electric resistance only (least efficient).	Heat pump only	33	34%	13	46%	15	32%	5	36%	0	0%	29	38%	4	20%
	Hybrid or mixed operation	50	52%	10	36%	25	53%	9	64%	6	75%	35	45%	15	75%
	It depends	10	10%	3	11%	6	13%	0	0%	1	13%	9	12%	1	5%
	I'm not sure	4	4%	2	7%	1	2%	0	0%	1	13%	4	5%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
When installing a heat pump water heater in a customer's home, what mode would you usually recommend to the customer?															
23 (n=58) Why do you say that?	To avoid running out of hot water	20	34%	3	25%	13	42%	3	33%	1	17%	15	36%	5	31%
	Heat pumps don't work well in cold temperatures	8	14%	2	17%	4	13%	1	11%	1	17%	6	14%	2	13%
	Best setting to start with	6	10%	1	8%	4	13%	0	0%	1	17%	4	10%	2	13%
	To save energy	6	10%	2	17%	3	10%	1	11%	0	0%	6	14%	0	0%
	To have a backup	4	7%	1	8%	0	0%	2	22%	1	17%	2	5%	2	13%
	To avoid callbacks	4	7%	0	0%	1	3%	2	22%	1	17%	2	5%	2	13%
	It's the factory setting	2	3%	1	8%	1	3%	0	0%	0	0%	1	2%	1	6%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	Depends on customer needs	4	7%	1	8%	3	10%	0	0%	0	0%	3	7%	1	6%
	Depends on temperature	2	3%	1	8%	1	3%	0	0%	0	0%	2	5%	0	0%
	Don't know	2	3%	0	0%	1	3%	0	0%	1	17%	1	2%	1	6%
24 (n=93) How many residential electric storage water heaters did your company install in 2022? Your best estimate is fine.	1 to 25	29	31%	13	48%	10	23%	4	31%	2	22%	22	30%	7	35%
	26 to 50	22	24%	7	26%	11	25%	1	8%	3	33%	20	27%	2	10%
	51 to 100	11	12%	2	7%	4	9%	3	23%	2	22%	7	10%	4	20%
	101 to 200	14	15%	3	11%	7	16%	2	15%	2	22%	8	11%	6	30%
	201 to 500	11	12%	1	4%	7	16%	3	23%	0	0%	10	14%	1	5%
	501 to 1,000	2	2%	0	0%	2	5%	0	0%	0	0%	2	3%	0	0%
	More than 1,000	4	4%	1	4%	3	7%	0	0%	0	0%	4	5%	0	0%
25 (n=93) Of the approximately [PIPE NUMBER FROM Q24]	Zero	31	33%	10	37%	8	18%	8	62%	5	56%	21	29%	10	50%
	1 to 25%	41	44%	12	44%	21	48%	4	31%	4	44%	32	44%	9	45%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
residential electric storage water heaters your company installed in 2022, about what percent were heat pump water heaters? Your best estimate is fine.	26 to 50%	7	8%	2	7%	5	11%	0	0%	0	0%	7	10%	0	0%
	51 to 75%	5	5%	1	4%	3	7%	1	8%	0	0%	4	5%	1	5%
	76 to 100%	9	10%	2	7%	7	16%	0	0%	0	0%	9	12%	0	0%
26a (n=62) Of the heat pump water heaters your company installed in 2022, about what percent of units were 55 gallons or greater?	Zero	5	8%	2	12%	2	6%	1	20%	0	0%	4	8%	1	10%
	1 to 25%	19	31%	7	41%	11	31%	0	0%	1	25%	15	29%	4	40%
	26 to 50%	10	16%	1	6%	9	25%	0	0%	0	0%	9	17%	1	10%
	51 to 75%	5	8%	0	0%	5	14%	0	0%	0	0%	5	10%	0	0%
	76 to 100%	23	37%	7	41%	9	25%	4	80%	3	75%	19	37%	4	40%
26b (n=62) Of the heat pump water heaters	Zero	21	34%	7	41%	7	19%	4	80%	3	75%	17	33%	4	40%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
your company installed in 2022, about what percent of units were less than 55 gallons?	1 to 25%	6	10%	0	0%	6	17%	0	0%	0	0%	6	12%	0	0%
	26 to 50%	8	13%	1	6%	7	19%	0	0%	0	0%	8	15%	0	0%
	51 to 75%	7	11%	3	18%	4	11%	0	0%	0	0%	6	12%	1	10%
	76 to 100%	20	32%	6	35%	12	33%	1	20%	1	25%	15	29%	5	50%
27a (n=62) Thinking about all the heat pump water heaters your company installed in 2022, about what percent of units were to customers who were replacing	Zero	10	16%	4	24%	5	14%	1	20%	0	0%	9	17%	1	10%
	1 to 25%	16	26%	4	24%	12	33%	0	0%	0	0%	15	29%	1	10%
	26 to 50%	10	16%	4	24%	4	11%	1	20%	1	25%	8	15%	2	20%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
a failed water heater?	51 to 75%	5	8%	2	12%	2	6%	0	0%	1	25%	3	6%	2	20%
	76 to 100%	21	34%	3	18%	13	36%	3	60%	2	50%	17	33%	4	40%
27b (n=62) Thinking about all the heat pump water heaters your company installed in 2022, about what percent of units were to customers who were replacing an old/near-failure water heater?	Zero	18	29%	6	35%	8	22%	3	60%	1	25%	16	31%	2	20%
	1 to 25%	34	55%	8	47%	23	64%	0	0%	3	75%	27	52%	7	70%
	26 to 50%	6	10%	1	6%	3	8%	2	40%	0	0%	5	10%	1	10%
	51 to 75%	1	2%	0	0%	1	3%	0	0%	0	0%	1	2%	0	0%
	76 to 100%	3	5%	2	12%	1	3%	0	0%	0	0%	3	6%	0	0%
27c (n=62) Thinking about all the heat pump water heaters your company installed in	Zero	26	42%	6	35%	14	39%	4	80%	2	50%	21	40%	5	50%
	1 to 25%	14	23%	7	41%	6	17%	0	0%	1	25%	11	21%	3	30%
	26 to 50%	6	10%	1	6%	4	11%	0	0%	1	25%	6	12%	0	0%
	51 to 75%	2	3%	0	0%	1	3%	1	20%	0	0%	2	4%	0	0%
	76 to 100%	14	23%	3	18%	11	31%	0	0%	0	0%	12	23%	2	20%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
2022, about what percent of units were to customers who were replacing a fully functioning water heater?															
28 (n=101) Thinking about your company's overall business revenues in 2022, about what percent was from water heater sales and installations?	1 to 25%	80	79%	26	84%	36	77%	10	71%	8	89%	61	77%	19	86%
	26 to 50%	15	15%	5	16%	8	17%	2	14%	0	0%	12	15%	3	14%
	51 to 75%	1	1%	0	0%	0	0%	1	7%	0	0%	1	1%	0	0%
	76 to 100%	1	1%	0	0%	1	2%	0	0%	0	0%	1	1%	0	0%
	Don't know	4	4%	0	0%	2	4%	1	7%	1	11%	4	5%	0	0%
29 (n=64) Thinking about your company's revenues just from sales and installations of water heaters in 2022, about what percent was from heat	Zero	1	2%	1	6%	0	0%	0	0%	0	0%	1	2%	0	0%
	1 to 25%	53	83%	15	88%	30	81%	4	80%	4	80%	43	80%	10	100 %
	26 to 50%	1	2%	0	0%	1	3%	0	0%	0	0%	1	2%	0	0%
	51 to 75%	2	3%	0	0%	2	5%	0	0%	0	0%	2	4%	0	0%
	76 to 100%	3	5%	1	6%	2	5%	0	0%	0	0%	3	6%	0	0%
	Don't know	4	6%	0	0%	2	5%	1	20%	1	20%	4	7%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
pump water heaters?															
30 (n=101) When you replace a large capacity (≥55 gallons) electric resistance storage water heater for a residential customer, what is your typical replacement strategy?	Replace with a heat pump water heater	17	17%	5	16%	10	21%	1	7%	1	11%	16	20%	1	5%
	Replace with a single, smaller residential electric resistance storage water heater	14	14%	5	16%	5	11%	1	7%	3	33%	11	14%	3	14%
	Replace with two smaller residential electric resistance storage water heaters	4	4%	1	3%	2	4%	1	7%	0	0%	2	3%	2	9%
	Replace with a single commercial electric resistance storage water heater	33	33%	8	26%	15	32%	8	57%	2	22%	23	29%	10	45%
	Replace with an electric tankless water heater	1	1%	1	3%	0	0%	0	0%	0	0%	1	1%	0	0%
	Replace with a gas storage water heater	3	3%	2	6%	0	0%	1	7%	0	0%	3	4%	0	0%
	Replace with a gas tankless water heater	11	11%	3	10%	6	13%	1	7%	1	11%	8	10%	3	14%
	Same size electric storage	8	8%	3	10%	4	9%	0	0%	1	11%	7	9%	1	5%
	It depends on the situation	3	3%	1	3%	2	4%	0	0%	0	0%	3	4%	0	0%
	Smaller electric storage with mixing value or tank booster	2	2%	0	0%	2	4%	0	0%	0	0%	2	3%	0	0%
	Other	1	1%	0	0%	0	0%	0	0%	1	11%	0	0%	1	5%
	I'm not sure	4	4%	2	6%	1	2%	1	7%	0	0%	3	4%	1	5%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
31 (n=89) When installing smaller electric resistance storage tank water heaters (<55 gallons), how often do you install mixing valves in order to increase the amount of hot water produced by the smaller tank?	Never	19	21%	9	33%	8	19%	2	17%	0	0%	14	20%	5	26%
	Rarely	28	31%	9	33%	12	29%	4	33%	3	38%	24	34%	4	21%
	Sometimes	33	37%	6	22%	18	43%	6	50%	3	38%	25	36%	8	42%
	Always	6	7%	1	4%	3	7%	0	0%	2	25%	4	6%	2	11%
	I'm not sure	3	3%	2	7%	1	2%	0	0%	0	0%	3	4%	0	0%
32 (n=39) Do you install mixing valves on these smaller tanks to avoid installing a heat pump water heater?	Yes	9	23%	0	0%	6	29%	3	50%	0	0%	7	24%	2	20%
	No	30	77%	7	100%	15	71%	3	50%	5	100%	22	76%	8	80%
33 (n=101) What types of water heating equipment does	Electric resistance storage	47	47%	12	39%	20	43%	9	64%	6	67%	36	46%	11	50%
	Gas storage	48	48%	12	39%	19	40%	11	79%	6	67%	36	46%	12	55%
	On-demand/tankless	26	26%	7	23%	14	30%	2	14%	3	33%	21	27%	5	23%
	Heat pump water heater	14	14%	5	16%	9	19%	0	0%	0	0%	13	16%	1	5%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
your company typically keep on hand for emergency replacements? Select all that apply.	None of the above	39	39%	12	39%	22	47%	2	14%	3	33%	30	38%	9	41%
34 (n=97) In what percent of the homes that you visit could you install a heat pump water heater without making more changes to the installation area than is typical for a storage water heater? Think only of existing homes, not newly built homes. Your best guess is fine.	Zero	14	14%	5	18%	8	17%	1	7%	0	0%	11	14%	3	15%
	1 to 25%	40	41%	11	39%	19	40%	7	50%	3	38%	31	40%	9	45%
	26 to 50%	23	24%	7	25%	11	23%	3	21%	2	25%	17	22%	6	30%
	51 to 75%	10	10%	3	11%	4	9%	2	14%	1	13%	9	12%	1	5%
	76 to 100%	5	5%	2	7%	2	4%	0	0%	1	13%	4	5%	1	5%
	Don't know	5	5%	0	0%	3	6%	1	7%	1	13%	5	6%	0	0%
	Zero	49	51%	14	50%	22	47%	8	57%	5	63%	39	51%	10	50%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
35a (n=97) In each of the following scenarios, what percent of the time would you recommend heat pump water heaters to a customer? To replace a fully functioning water heater	1 to 25%	27	28%	9	32%	12	26%	3	21%	3	38%	18	23%	9	45%
	26 to 50%	11	11%	3	11%	6	13%	2	14%	0	0%	10	13%	1	5%
	51 to 75%	2	2%	0	0%	2	4%	0	0%	0	0%	2	3%	0	0%
	76 to 100%	7	7%	2	7%	4	9%	1	7%	0	0%	7	9%	0	0%
	Don't know	1	1%	0	0%	1	2%	0	0%	0	0%	1	1%	0	0%
35b (n=97) In each of the following scenarios, what percent of the time would you recommend heat pump water heaters to a customer? To replace an old/near-failure water heater	Zero	38	39%	11	39%	18	38%	6	43%	3	38%	31	40%	7	35%
	1 to 25%	25	26%	7	25%	12	26%	3	21%	3	38%	19	25%	6	30%
	26 to 50%	13	13%	6	21%	4	9%	2	14%	1	13%	9	12%	4	20%
	51 to 75%	7	7%	0	0%	4	9%	2	14%	1	13%	5	6%	2	10%
	76 to 100%	14	14%	4	14%	9	19%	1	7%	0	0%	13	17%	1	5%
35c (n=97) In each of the	Zero	37	38%	11	39%	17	36%	6	43%	3	38%	31	40%	6	30%
	1 to 25%	22	23%	7	25%	10	21%	3	21%	2	25%	16	21%	6	30%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
following scenarios, what percent of the time would you recommend heat pump water heaters to a customer? To replace a failed water heater	26 to 50%	13	13%	4	14%	4	9%	3	21%	2	25%	9	12%	4	20%
	51 to 75%	5	5%	2	7%	2	4%	1	7%	0	0%	5	6%	0	0%
	76 to 100%	19	20%	4	14%	13	28%	1	7%	1	13%	15	19%	4	20%
	Don't know	1	1%	0	0%	1	2%	0	0%	0	0%	1	1%	0	0%
35d (n=97) In each of the following scenarios, what percent of the time would you recommend heat pump water heaters to a customer? For new construction (new homes that are not yet occupied, where the customer is the	Zero	41	42%	13	46%	18	38%	6	43%	4	50%	30	39%	11	55%
	1 to 25%	15	15%	5	18%	5	11%	2	14%	3	38%	12	16%	3	15%
	26 to 50%	8	8%	3	11%	2	4%	3	21%	0	0%	5	6%	3	15%
	51 to 75%	6	6%	2	7%	2	4%	1	7%	1	13%	5	6%	1	5%
	76 to 100%	26	27%	5	18%	20	43%	1	7%	0	0%	24	31%	2	10%
	Don't know	1	1%	0	0%	0	0%	1	7%	0	0%	1	1%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
builder/developer)															
36 (n=49) When you have recommended heat pump water heaters to a customer who is replacing a fully functioning water heater, what percentage of the time have they agreed to install one?	Zero	5	10%	0	0%	2	8%	2	33%	1	33%	4	10%	1	10%
	1 to 25%	16	33%	6	40%	9	36%	1	17%	0	0%	13	33%	3	30%
	26 to 50%	10	20%	3	20%	6	24%	1	17%	0	0%	8	21%	2	20%
	51 to 75%	3	6%	1	7%	1	4%	0	0%	1	33%	2	5%	1	10%
	76 to 100%	7	14%	2	13%	3	12%	1	17%	1	33%	5	13%	2	20%
	I have never recommended a heat pump water heater to a customer replacing a fully functioning water heater	8	16%	3	20%	4	16%	1	17%	0	0%	7	18%	1	10%
37 (n= 60) When you have recommended heat pump water heaters to a customer who is replacing an old water heater that still works but is near the point	Zero	9	15%	1	6%	3	10%	3	38%	2	40%	5	11%	4	31%
	1 to 25%	19	32%	8	44%	9	31%	1	13%	1	20%	15	32%	4	31%
	26 to 50%	9	15%	1	6%	6	21%	1	13%	1	20%	7	15%	2	15%
	51 to 75%	7	12%	4	22%	3	10%	0	0%	0	0%	7	15%	0	0%
	76 to 100%	5	8%	1	6%	3	10%	1	13%	0	0%	4	9%	1	8%
	I have never recommended a heat pump water heater to a customer replacing a near-failure water heater	11	18%	3	17%	5	17%	2	25%	1	20%	9	19%	2	15%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
of failure, what percentage of the time have they agreed to install one?															
38 (n=60) When you have recommended a heat pump water heater to a customer who is replacing a failed water heater, what percentage of the time have they agreed to install one?	Zero	7	12%	1	6%	3	10%	2	25%	1	20%	4	9%	3	21%
	1 to 25%	19	32%	7	41%	7	23%	3	38%	2	40%	13	28%	6	43%
	26 to 50%	11	18%	2	12%	7	23%	1	13%	1	20%	9	20%	2	14%
	51 to 75%	7	12%	4	24%	3	10%	0	0%	0	0%	7	15%	0	0%
	76 to 100%	7	12%	1	6%	5	17%	1	13%	0	0%	6	13%	1	7%
	I have never recommended a heat pump water heater to a customer replacing a failed water heater	9	15%	2	12%	5	17%	1	13%	1	20%	7	15%	2	14%
39 (n=65) You said you recommend heat pump water heaters to customers who need to replace a failed water heater	Too expensive	20	31%	5	25%	9	31%	3	27%	3	60%	15	29%	5	36%
	Unreliable	9	14%	3	15%	5	17%	1	9%	0	0%	6	12%	3	21%
	Not enough space	7	11%	1	5%	6	21%	0	0%	0	0%	6	12%	1	7%
	Not familiar enough with them	6	9%	0	0%	1	3%	4	36%	1	20%	6	12%	0	0%
	Other water heaters are better	5	8%	1	5%	4	14%	0	0%	0	0%	4	8%	1	7%
	Installation complications	4	6%	3	15%	1	3%	0	0%	0	0%	3	6%	1	7%
	Customers aren't interested in them	3	5%	1	5%	0	0%	1	9%	1	20%	1	2%	2	14%
	Don't want to service them	3	5%	3	15%	0	0%	0	0%	0	0%	3	6%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
about [PIPE Q35C PERCENTAGE]% of the time. Why don't you recommend heat pump water heaters more often in this situation?	Difficulty obtaining them/replacement parts	3	5%	0	0%	1	3%	2	18%	0	0%	3	6%	0	0%
	Don't work well in cold temperatures	2	3%	2	10%	0	0	0	0%	0	0%	2	4%	0	0%
	Other	3	5%	1	5%	2	7%	0	0%	0	0%	2	4%	1	7%
40 (n=56) When you have recommended a heat pump water heater to a builder/contractor or working on building a new home, what percentage of the time have they agreed to install one?	Zero	9	16%	1	7%	2	7%	3	38%	3	75%	4	9%	5	56%
	1 to 25%	9	16%	2	13%	5	17%	2	25%	0	0%	8	17%	1	11%
	26 to 50%	5	9%	1	7%	2	7%	1	13%	1	25%	4	9%	1	11%
	51 to 75%	7	13%	5	33%	2	7%	0	0%	0	0%	7	15%	0	0%
	76 to 100%	16	29%	4	27%	12	41%	0	0%	0	0%	14	30%	2	22%
	I have never recommended a heat pump water heater to a builder/contractor for a new home	10	18%	2	13%	6	21%	2	25%	0	0%	10	21%	0	0%
41 (n=97) In the next year or two, how often do you expect	Much more often than you do now	12	12%	1	4%	8	17%	2	14%	1	13%	11	14%	1	5%
	Somewhat more often than you do now	17	18%	4	14%	10	21%	2	14%	1	13%	15	19%	2	10%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
you will you recommend heat pump water heaters to your customers?	At the same rate as you do now	67	69%	23	82%	28	60%	10	71%	6	75%	50	65%	17	85%
	I'm not sure	1	1%	0	0%	1	2%	0	0%	0	0%	1	1%	0	0%
42 (n=95) Why do you say that you will recommend heat pump water heaters to your customers [PIPE Q41 RESPONSE]?	Too expensive/not cost-effective	20	21%	5	18%	6	13%	6	43%	3	43%	15	20%	5	26%
	Building codes will require them	22	23%	7	25%	15	33%	0	0%	0	0%	17	22%	5	26%
	Already recommend most/all the time	8	8%	4	14%	4	9%	0	0%	0	0%	8	11%	0	0%
	Rebates/tax credits	6	6%	0	0%	5	11%	1	7%	0	0%	6	8%	0	0%
	Increased contractor familiarity	6	6%	0	0%	4	9%	1	7%	1	14%	6	8%	0	0%
	Other water heaters are better	6	6%	2	7%	3	7%	0	0%	1	14%	5	7%	1	5%
	Installation challenges	5	5%	4	14%	1	2%	0	0%	0	0%	3	4%	2	11%
	Improvements in product performance	4	4%	0	0%	2	4%	1	7%	1	14%	3	4%	1	5%
	Customer preference for efficiency	3	3%	2	7%	1	2%	0	0%	0	0%	2	3%	1	5%
	Increased product availability	1	1%	0	0%	0	0%	1	7%	0	0%	1	1%	0	0%
	Difficulty obtaining HPWH &/or replacement parts	1	1%	0	0%	0	0%	1	7%	0	0%	1	1%	0	0%
	Lack of product availability	1	1%	1	4%	0	0%	0	0%	0	0%	0	0%	1	5%
	Not familiar enough with them	1	1%	0	0%	0	0%	1	7%	0	0%	1	1%	0	0%
	Other	8	8%	3	11%	2	4%	2	14%	1	14%	5	7%	3	16%
	Don't know	3	3%	0	0%	3	7%	0	0%	0	0%	3	4%	0	0%
43 (n=52)	Yes	34	65%	0	0%	32	68%	2	67%	n/a	n/a	28	67%	6	60%
	No	16	31%	2	100%	13	28%	1	33%	n/a	n/a	12	29%	4	40%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
[IF Q1 = WASHINGTON] Have you heard of the new standard, ANSI/CTA-2045, which requires all new electric storage water heaters manufactured after January 1, 2023, to have a communications port?	I'm not sure	2	4%	0	0%	2	4%	0	0%	n/a	n/a	2	5%	0	0%
44 (n=34) Do you think the new standard is a positive or negative development?	Positive	4	12%	n/a	n/a	4	13%	0	0%	n/a	n/a	4	14%	0	0%
	Negative	18	53%	n/a	n/a	16	50%	2	100%	n/a	n/a	14	50%	4	67%
	Neither positive or negative	9	26%	n/a	n/a	9	28%	0	0%	n/a	n/a	8	29%	1	17%
	I'm not sure	3	9%	n/a	n/a	3	9%	0	0%	n/a	n/a	2	7%	1	17%
45 (n=27) Why do you say that?	Increases cost of water heater	7	26%	n/a	n/a	6	24%	1	50%	n/a	n/a	6	27%	1	20%
	Gives utilities/government control over water heater	5	19%	n/a	n/a	4	16%	1	50%	n/a	n/a	4	18%	1	20%
	No tangible benefit to customer	4	15%	n/a	n/a	4	16%	0	0%	n/a	n/a	3	14%	1	20%
	Privacy concerns	4	15%	n/a	n/a	4	16%	0	0%	n/a	n/a	4	18%	0	0%
	Another component that can malfunction	2	7%	n/a	n/a	2	8%	0	0%	n/a	n/a	1	5%	1	20%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	Other	5	19%	n/a	n/a	5	20%	0	0%	n/a	n/a	4	18%	1	20%
50 (n=101) Have you, or has someone else at your company, ever participated in a Hot Water Solutions training or orientation session about heat pump water heaters sponsored by the Northwest Energy Efficiency Alliance? (Hot Water Solutions trainings have been offered in-person and via webinar, so you may have attended in person or online).	Yes	23	23%	6	19%	14	30%	2	14%	1	11%	18	23%	5	23%
	No	70	69%	23	74%	28	60%	11	79%	8	89%	54	68%	16	73%
	I'm not sure	8	8%	2	6%	5	11%	1	7%	0	0%	7	9%	1	5%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
51 (n=101) Before today, have you heard of Hot Water Solutions?	Yes	28	28%	9	29%	18	38%	0	0%	1	11%	23	29%	5	23%
	No	68	67%	20	65%	26	55%	14	100 %	8	8	51	65%	17	77%
	I'm not sure	5	5%	2	6%	3	6%	0	0%	0	89%	5	6%	0	0%
52 (n=97) In closing, how likely are you to recommend heat pump water heaters to a friend or colleague? Please use a score of 0 to 10 where 0 is not at all likely and 10 is extremely likely.	0 NOT AT ALL LIKELY	28	29%	8	29%	13	28%	4	29%	3	38%	22	29%	6	30%
	1	5	5%	1	4%	1	2%	2	14%	1	13%	3	4%	2	10%
	2	11	11%	4	14%	5	11%	1	7%	1	13%	8	10%	3	15%
	3	4	4%	0	0%	2	4%	1	7%	1	13%	3	4%	1	5%
	4	2	2%	2	7%	0	0%	0	0%	0	0%	1	1%	1	5%
	5	13	13%	4	14%	3	6%	4	29%	2	25%	8	10%	5	25%
	6	5	5%	0	0%	5	11%	0	0%	0	0%	5	6%	0	0%
	7	5	5%	1	4%	3	6%	1	7%	0	0%	5	6%	0	0%
	8	8	8%	4	14%	4	9%	0	0%	0	0%	7	9%	1	5%
	9	2	2%	0	0%	2	4%	0	0%	0	0%	2	3%	0	0%
	10 EXTREMELY LIKELY	14	14%	4	14%	9	19%	1	7%	0	0%	13	17%	1	5%

Appendix C Retailer Interviews

The following section describes the results of the two interviews conducted with corporate-level HPWH retailers interviewed for this MPER. The takeaways highlighted below are not necessarily the recommendations or opinions of the research team, but of the respondents themselves.

Methodology

NMR conducted interviews with corporate-level managers at two national retail chains; these respondents had experience working with utility programs that incentivize water heaters sold via retail channels. The team gathered additional information via email from other key, corporate-level staff at these retailers. Company policy limited how much information respondents were willing to share or have made public about their sales and stocking practices. The following describes specific findings based on the retailer interviews, with additional context added from other MPER #7 research activities.

Company Profile and Product Offering

Retailer feedback: manufacturers are responsible for increasing product awareness among retail staff. Both retailers indicated that water heater manufacturers serve as the primary sources of information about heat pump water heaters for retail staff. The retailers rely on this information from manufacturers, but also receive supplemental product information from key industry stakeholders or other industry representatives.

Stocking, Sales, and Recommendation

Retailer feedback: utility incentives and availability of natural gas are primary drivers of HPWH stocking. Retailers reported stocking HPWH in areas where high rebates are available. This statement aligns with the inconsistent HPWH stocking practices seen via the team's web-scraping of two major home improvement retailers' websites, which showed that some stores kept quite a few HPWHs in stock and others did not keep any in stock at all, even if they could be delivered quickly (Appendix E). Strong online sales for HPWH also drive stocking in area stores. If a branch is in an area served by a gas utility, the retailer will stock more gas units and fewer HPWHs. Retailers confirmed the team and NEEA's experience that customers experiencing a water heater failure are unlikely to switch fuels. Even in areas with high utility incentives, the respondents reported that rebates may not cover the incremental cost of fuel switching.

One retailer indicated that stores stock one to five HPWH units, depending on sales volume. The other retailer declined to specify stocking practices but indicated that HPWHs are available at all distribution centers across the country and can support same-day installation if they are not available in-store.

Retailer feedback: federal tax credits drive HPWH sales by offering consumers additional financial relief. One retailer estimated that higher federal tax credits increased demand for HPWHs via the Inflation Reduction Act (IRA), which increased the tax credits for HPWHs from $300 to up to $2,000 (or

up to 30% of the project cost) as of January 1, 2023. The other retail representative thought it was too soon to see an impact; they had not observed any customers making purchasing decisions based on the availability of the tax credit.

Retailer feedback: there are opportunities to increase in-store recommendations of HPWHs. Retail respondents indicated that their store associates are more likely to recommend HPWH to customers if they are knowledgeable about the technology and are in an area with an available utility incentive.

Retailer feedback: downstream programs are more accessible for retail customers. One retail representative observed that downstream programs for HPWH are decreasing nationwide because they are more expensive than other program models, such as midstream. This representative observed that do-it-yourself (DIY) customers are extremely price sensitive and are unlikely to select a HPWH without an incentive.

Marketing

Retailer feedback: customer education as a key to increasing HPWH sales. One of the retailers identified customer awareness as the most important way NEEA and/or the utilities could support their store in selling HPWHs.

One of the representatives suggested advertising the annual electric savings or calculating the ROI to help the customer make the decision to spend more upfront on the HPWH.

Retailer feedback: manufacturers and utility program implementers are primarily responsible for in-store HPWH marketing. Manufacturers provide marketing materials and craft messaging to engage target customers. According to one of the retail representatives, the program field staff are responsible for engaging the sales teams and providing training about HPWHs and the availability of utility incentives. One of the representatives observed that manufacturers can successfully support utility programs by promoting local utility incentives in advertisements.

Barriers and Challenges

Retailer feedback: cost is a significant barrier to purchasing HPWH. Retailers reported that rebates drive sales at their stores because HPWHs are expensive items. One retailer indicated that HPWHs are stocked at higher rates in areas that are more affluent.

One retailer estimated that sales of HPWH in 2022 increased due to an increase in utility programs offering rebates.

Utility incentives are the primary avenue for decreasing the up-front cost of a HPWH. Retailers do not typically offer sales on water heaters because purchasing decisions are driven by need – if a customer's water heater fails, they are not waiting for it to go on sale.

Retailer feedback: supply chain costs are passed along to customers. One of the representatives observed that increases in costs to produce HPWHs, including raw material costs, manufacturing, and transportation, have been passed along to the consumer. This representative expects costs for HPWH to increase over the next year.

Retailer feedback: challenges with HPWH installations should be communicated to customers. One retailer identified the importance of educating customers on the less positive aspects of the HPWH technology (the respondent cited complaints about noise levels and recovery periods) so they can make informed decisions about where and how to install it and increase satisfaction with their purchase. They indicated that HPWHs are efficient but not suitable for every customer.

According to one of the retailers, returns of HPWH to the store are "higher than you would expect." DIY customers may have bought the wrong thing for their application or have difficulty finding a contractor to install the HPWH they purchased.

New Water Heater Standards

Retailer feedback: The impact of ANSI/CTA-2045 standard has been limited. One retail representative had not heard of the new standard in Washington state requiring all new electric storage water heaters manufactured after January 1, 2023, to have a communications port. The other retail representative did not expect it to have a dramatic impact on their sales because the incremental cost of a HPWH was more than the additional cost of the communications port.

Appendix D Consumer Survey

NMR conducted a survey of residents in the Northwest to assess the impact of the "Boring but Efficient" marketing campaign, limiting the respondent pool to residents who live in the ZIP codes targeted by the campaign. The survey was deployed in two waves: the first in August 2022 before the campaign and the second in November 2022 after the campaign. The survey gauged consumer awareness and perceptions of HPWHs before and after the campaign. In addition, it gathered information on the factors that affect water heater purchase decisions. Anyone who participated in the pre-campaign survey was excluded from participating in the post-survey campaign. This appendix describes the detailed methodology and findings from that effort.

Survey topics included the following:

- Awareness (MPI 9), interest, and perceptions of HPWHs, including customer satisfaction (MPI 4a and 4b)
- Common reasons for purchasing water heaters
- Awareness of HWS brand
- Attitudes about technology and the environment
- Household characteristics and demographics

METHODOLOGY

NMR conducted two consumer awareness surveys in 2022. The first survey of 416 respondents was conducted August 26 to 29, 2022. The second survey with 411 respondents was conducted November 7 to 9, 2022, after the "Boring but Efficient" marketing campaign that ran from September 12 to November 6, 2022. Both surveys were fielded by Qualtrics to market research panelists of homeowners and renters of single- and multifamily homes in ZIP codes targeted by NEEA's marketing campaign in Washington, Oregon, Idaho, and Montana. The "Boring but Efficient" campaign directed more resources toward rural zip codes than previous marketing campaigns. Respondents with any type of water heater were eligible to complete the MPER #7 survey.[29] Table 19 shows survey results by region. The targets were the same for both the pre- and post-campaign survey waves to obtain comparable respondent samples. There is no overlap in respondents between the pre- and post-campaign surveys, so sampling

[29] MPER #1 and MPER #2 included homeowners and renters of single- and multi-family homes with electric storage water heaters. MPER #6 included only homeowners of single-family homes with electric storage water heaters, to narrow the respondent pool to those who are more likely to be in the position to purchase an electric or heat pump water heater.

error can contribute to differences in results. The team classified counties as rural or urban based on the 2013 Rural-Urban Continuum Codes.[30]

Table 19: Survey Disposition

State	Strata	Target	Pre-Campaign Responses Achieved	Post-Campaign Responses Achieved
Washington	Urban	160	168	160
	Rural	30	34	32
Oregon	Urban	80	75	82
	Rural	30	33	32
Idaho	Urban	30	33	45
	Rural	30	28	18
Montana	Urban	10	12	19
	Rural	30	33	23
Total		**400**	**416**	**411**

Table 20 and Table 21 show the weights applied to the pre- and post-campaign survey results in order to represent the population of household types in urban and rural counties in each state.

Table 20: Pre-Campaign Survey Weights

Household Type	Washington		Oregon		Idaho		Montana	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Owner-occupied								
1-unit detached	1.319	0.727	1.438	1.021	0.138	1.035	0.701	0.840
All other types	2.084	1.370	1.330	0.501				
Renter-occupied								
1-unit detached	0.929	0.307	1.710	0.362	0.795	0.655	0.511	1.232
All other types	1.110	1.357	0.941	0.665				

Source: Census data from 2021 ACS Survey 5-year estimates (Table B25032)

[30] U.S. Department of Agriculture Economic Research Service. *Rural-Urban Continuum Codes.* December 10, 2020. https://www.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx.

Table 21: Post-Campaign Survey Weights

Household Type	Washington		Oregon		Idaho		Montana	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Owner-occupied								
1-unit detached	1.215	0.552	1.495	0.653	0.219	0.640	0.975	0.851
All other types	1.460	1.386	1.178	1.014				
Renter-occupied								
1-unit detached	0.818	0.700	1.039	0.586	0.804	0.464	1.034	0.416
All other types	1.307	1.030	1.476	0.673				

Source: Census data from 2021 ACS Survey 5-year estimates (Table B25032)

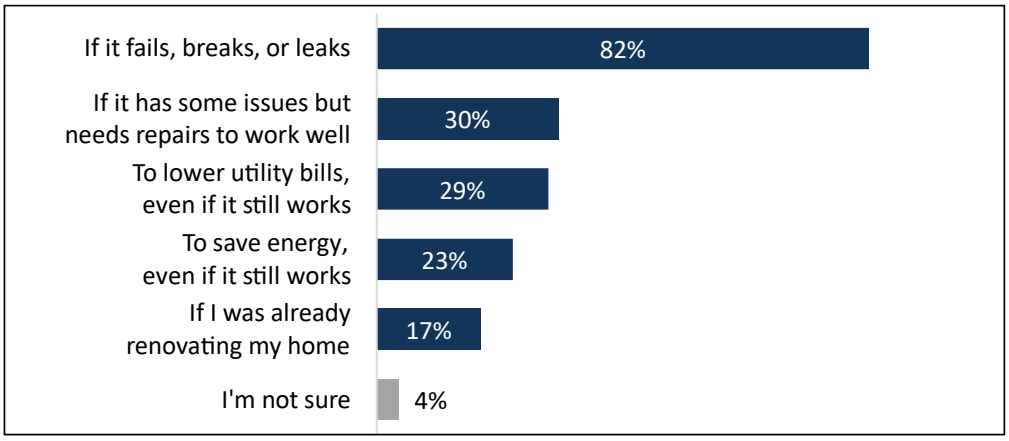
Additionally, readers should note that while the surveys reached people in the geographic areas targeted by the awareness campaign, respondents to the post-campaign survey *did not necessarily see any awareness campaign materials*. The post-campaign survey did record if respondents recalled seeing any such materials, but NEEA has no way of knowing exactly which people saw or were targeted by campaign materials due to the nature of social media and internet advertising campaigns. Accordingly, any differences seen between pre- and post-campaign survey results are not necessarily caused by the campaign.

Unless noted, results below are reported between the two surveys in aggregate if the team does not expect the results to have been affected by the awareness campaign.

Water Heater Purchase Factors

Consumers replace water heaters when they fail, and one-fifth of water heaters are close to failure. Figure 32 displays the reasons respondents selected for what would cause them to purchase a new water heater. The most common reason, cited by more than four-fifths (82%) of the combined respondents from both surveys, was if the current water heater failed, broke, or leaked. Around one-fifth (21%) of respondents reported that they owned a water heater that was more than ten years old and would soon need replacement (n=782). That said, in the team's experience, respondents are often unaware of the specific age of their appliance and mechanical systems, so this should be treated as a qualitative assessment rather than a guarantee of appliance age. Around one-quarter of respondents indicated they would purchase a new water heater to lower utility bills (29%) or to save energy (23%), even if their current water heater still worked.

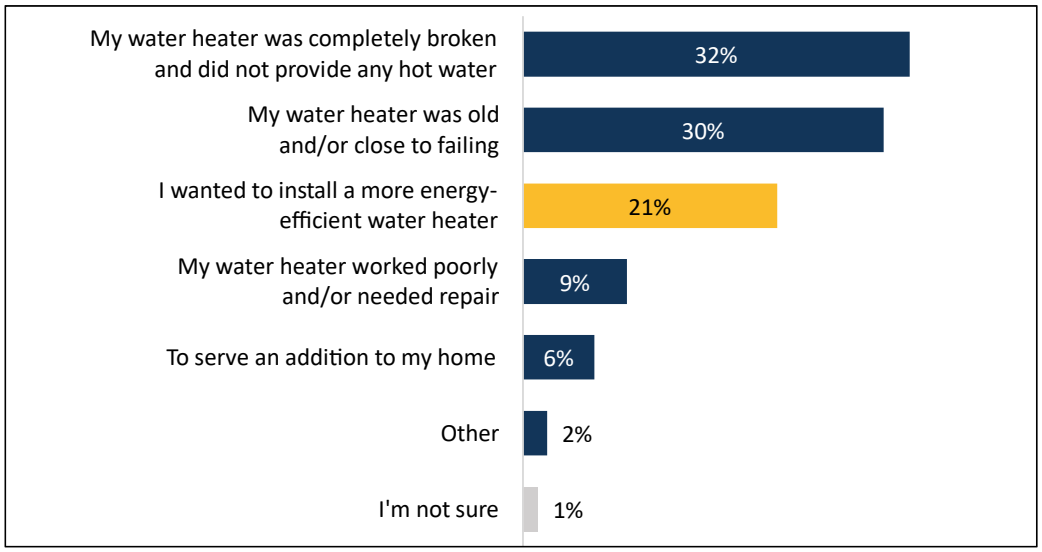
Figure 32: Why Respondents Would Purchase a New Water Heater (n=827)



Notes: Includes responses from both the pre- and post-campaign surveys.
A15. What would cause you to purchase a new water heater (of any type)?

A substantial minority of consumers is amenable to replacing a working water heater to save energy. Around one-fifth (19%) of respondents reported having purchased a new water heater in the past three years (n=827). Figure 33 displays the reasons respondents gave for purchasing a new water heater. The most common reason was because their water heater broke (32%). However, one-fifth (21%) of respondents said they wanted to install a more energy-efficient water heater, echoing the 23% to 29% of respondents in Figure 32 who said they would replace a working water heater to save money or energy.

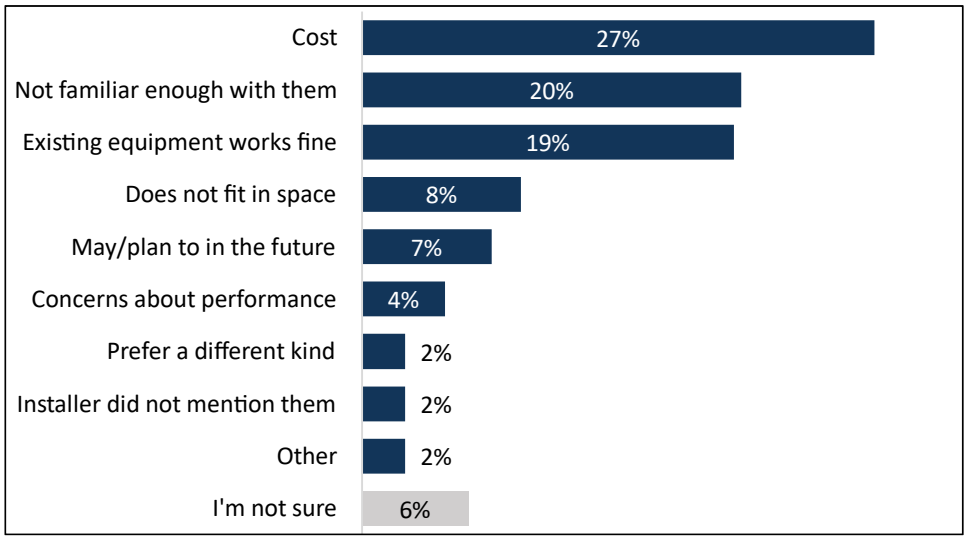
Figure 33: Why Respondents purchased a new Water Heater (n=152)



Notes: Includes responses from both the pre- and post-campaign surveys.
A15. What would cause you to purchase a new water heater (of any type)?

Upfront cost is the largest barrier to HPWH adoption. Just over one-half (52%) of respondents who purchased a water heater in the past three years said they had considered installing a HPWH, and around one-fifth (22%) of respondents who recently purchased a water heater purchased a HPWH. Those who had never considered installing a HPWH (including both those who had and had not recently purchased a water heater) provided the reasons in Figure 34. The top reasons for not considering a HPWH were cost (27%), followed by not being familiar enough with them (20%), and the existing equipment working fine (19%) – the latter two being strong indications of consumers being comfortable with the types of systems to which they are accustomed.

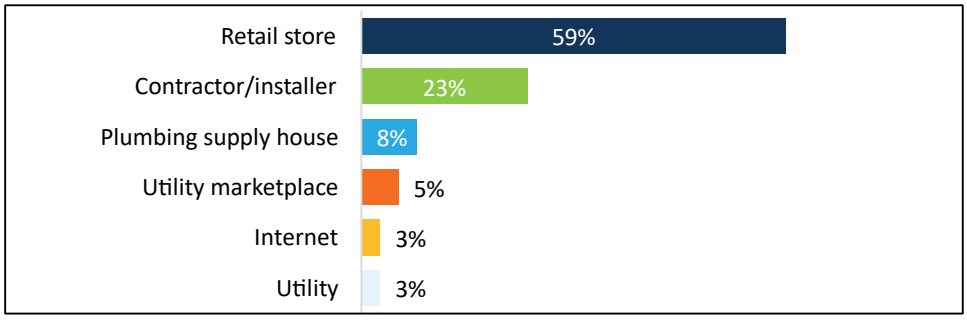
Figure 34: Reasons for Not Considering a HPWH (n=102)



Notes: Includes responses from both the pre- and post-campaign surveys. Only respondents who purchased a water heater in the past three years (A11) responded to this question.
A12. Why did you purchase a new water heater?

Consumers purchase electric water heaters from retail stores. Nearly three out of five (59%) respondents who recently purchased an electric water heater obtained it from a retail store (Figure 35). Over one-third (36%) of respondents who recently purchased a water heater installed it themselves. Respondents who installed their water heaters themselves were more likely to purchase from a retail store (71%, n=15) than those who used a professional installer (52%, n=26).

Figure 35: Where Respondents Purchased Electric Water Heaters (n=41)



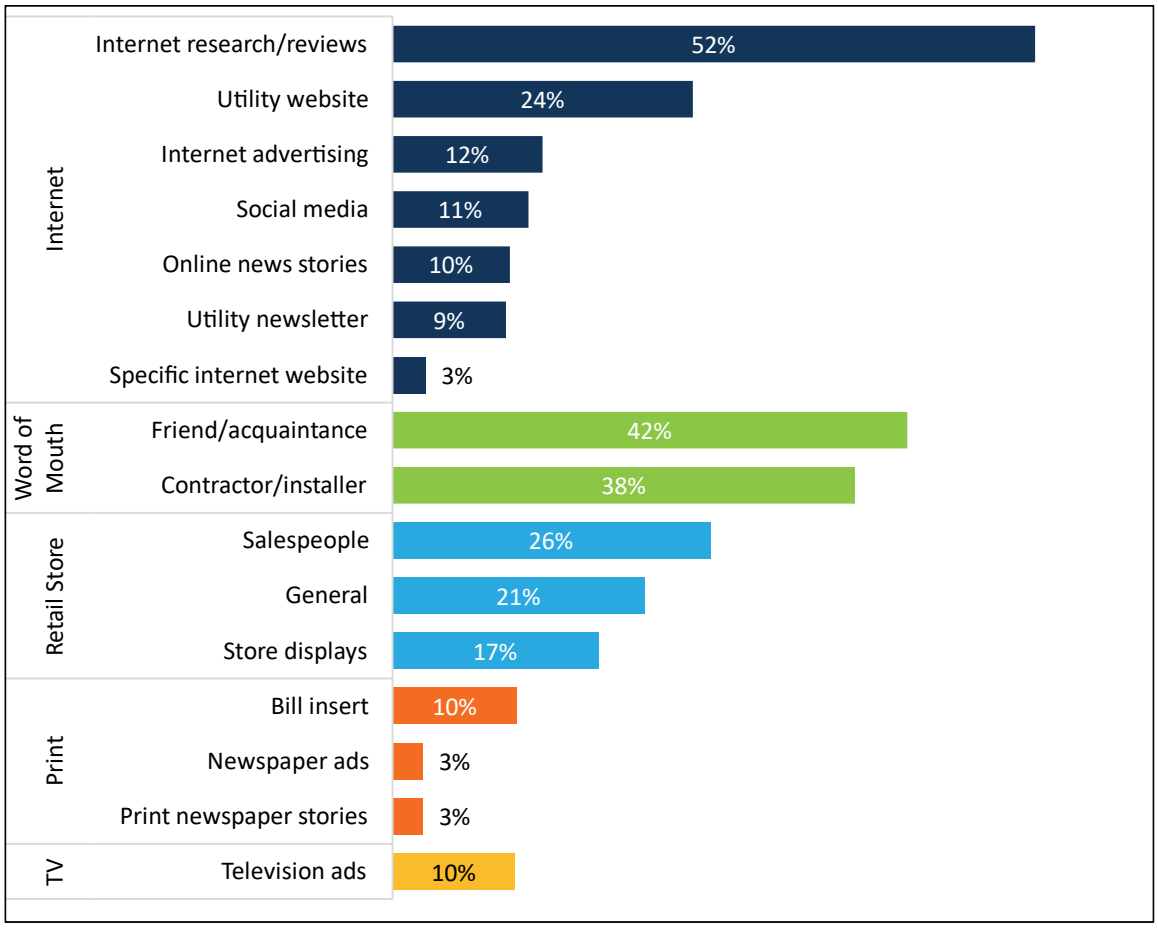
Notes: Includes responses from the post-campaign survey only; question not asked in pre-campaign survey. Only respondents who purchased an electric water heater (S_WHFuel) in the past three years (A11) responded to this question.
Q48. Where did you purchase your electric water heater?

Contractors are recommending HPWHs to customers. Around one-fifth (19%) of respondents reported having purchased a new water heater in the past three years (n=827). The survey asked respondents who recently purchased a water heater and who were aware of HPWHs if their installer or contractor had recommended a HPWH to them. Half of these respondents (51%) said their installer or contractor recommended a HPWH (n=101). The HPWH recommendation rate is lower than observed in MPER #6, where 64% of recent water heater purchasers said their installer or contractor recommended a HPWH. These results are not comparable due to differences in sample frame (unlike MPER #6, the MPER #7 consumer survey was not limited to single-family homeowners with electric resistance water heaters). DIY installers may not have consulted a contractor. One-third of the respondents in the MPER #7 post-campaign survey reported installing their water heater themselves.[31]

[31] The question about whether the recently purchased water heater was self-installed or installed by a professional contractor or installer was not asked in the MPER #6 consumer survey or the MPER #7 pre-campaign survey.

Internet research and word of mouth are primary sources of information for major purchases. Figure 36 displays sources of information respondents consult when making decisions about purchasing mechanical equipment for the home, including water heaters. The top three sources were internet research or reviews (52%), friends and acquaintances (42%), and contractors and installers (38%). One-half (50%) of respondents who purchased a water heater in the past three years said their contractor recommended a HPWH (n=96).

Figure 36: Sources of Information for Purchasing Mechanical Equipment (n=827)



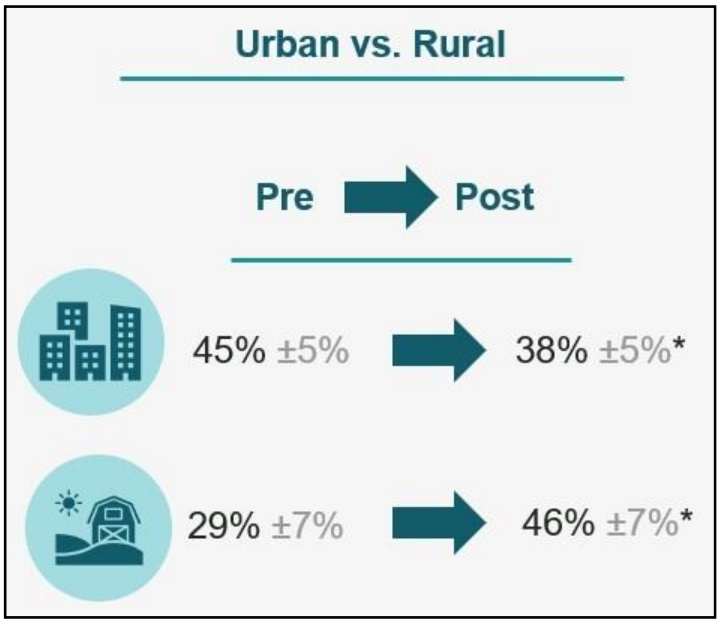
Notes: Includes responses from both the pre- and post-campaign surveys.
A10. When making a decision about purchasing mechanical equipment for your home, such as a furnace or water heater, what are your typical sources of information regarding which product to purchase? Please select all that apply.

Awareness and Perceptions of HPWHs

Around two-fifths of respondents were aware of HPWHs. Awareness of HPWHs overall was similar (i.e., not statistically different) between the pre- and post-campaign samples. Forty-two percent of pre-campaign respondents (n=411) were aware of HPWHs compared to 39% of post-campaign respondents (n=416), or 41% of all consumers surveyed across both surveys (n=827, MPI 9). HPWH awareness is not comparable to past MPERs due to differences in sample frames.

HPWH awareness among rural residents, a key target of the awareness campaign. Figure 37 displays pre- and post-campaign HPWH awareness among urban and rural residents. Post-campaign awareness was significantly lower in urban areas than pre-campaign awareness (38%, down from 45%) but significantly higher in rural areas (46%, up from 29%). The "Boring but Efficient" campaign invested proportionately more resources in rural markets than urban areas.

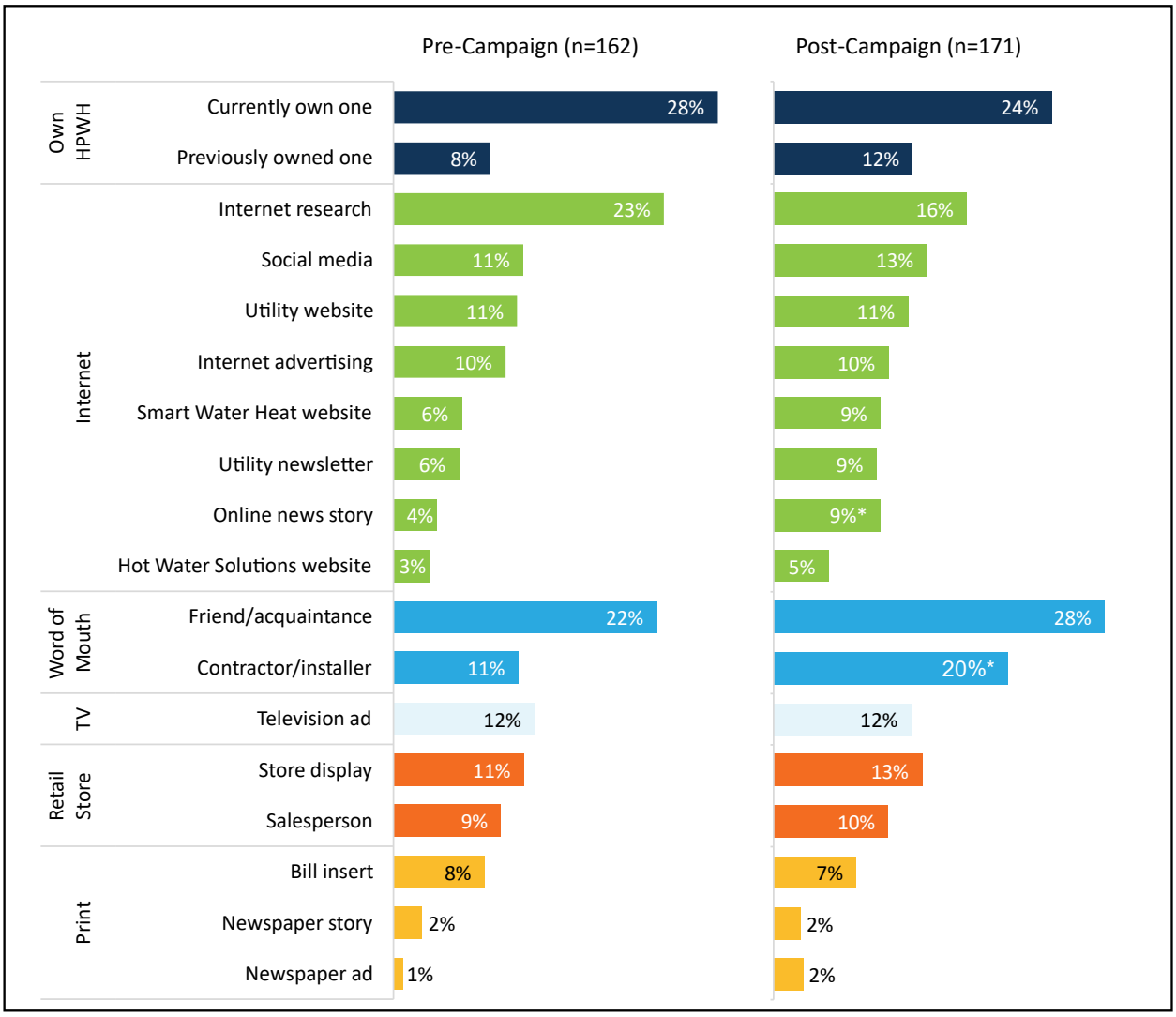
Figure 37: HPWH Awareness by Region



** Denotes that post-campaign finding is statistically different from the pre-campaign at the 90% confidence level.*
A2. [HPWH description shown] Based on this description, have you heard of "heat pump water heaters" or "electric hybrid water heaters"?

Word of mouth and online sources are primary drivers of HPWH awareness. Figure 38 shows that the top ways respondents heard of HPWHs were friends and acquaintances, currently owning one, and internet research. The only sources of awareness to change significantly after the campaign were contractors/installers (from 11% to 20%) and online news stories (from 4% to 9%).

Figure 38: Sources of HPWH Awareness

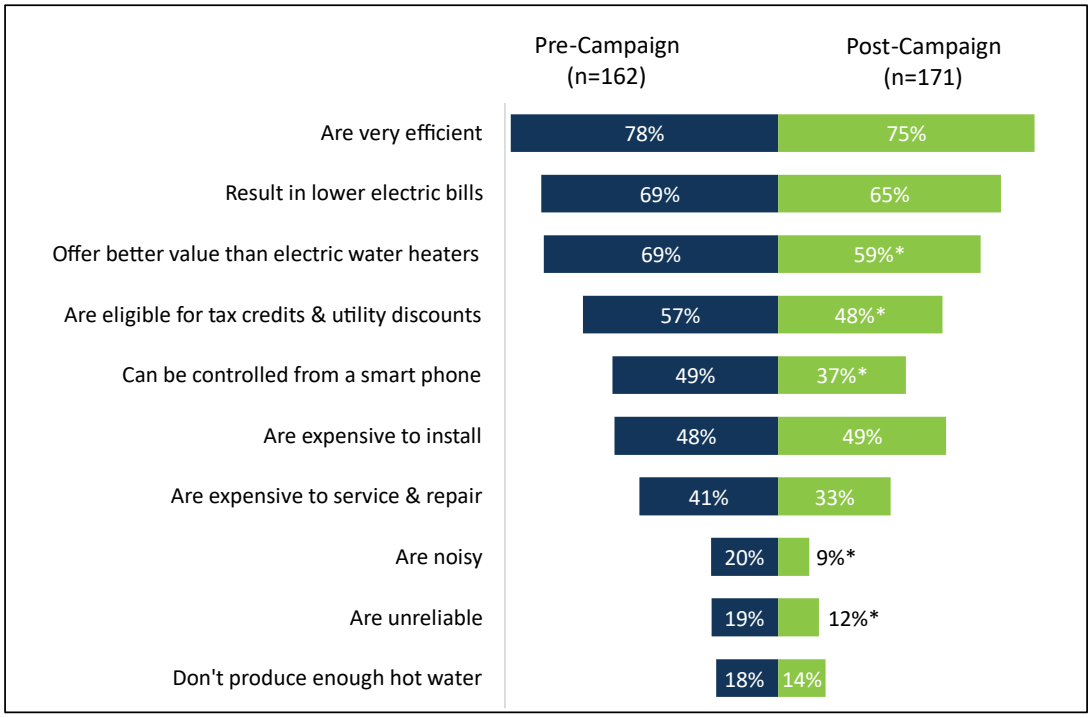


Notes: Includes responses from both the pre- and post-campaign surveys. Respondents who were aware of HPWH (A2) responded to this question.
** denotes that findings are statistically different from pre-campaign values at the 90% confidence level.*
A10. Where or how have you heard about heat pump water heaters? Please select all that apply.

Around one-quarter of respondents were aware of HPWH brands. Twenty-six percent of respondents said they had heard of one or more brands that make HPWHs (n=333). Respondents who saw ads were significantly more likely to have heard of a HPWH brand (56%) than those who did not see any ads (16%, n=171). The top three HPWH brands respondents had heard of were Whirlpool (46%), Kenmore (44%), and General Electric (37%).

Consumers understand that HPWHs are efficient and result in lower electric bills. Figure 39 displays the percentage of respondents who agreed with various statements about HPWHs before and after the campaign. Both pre- and post-campaign, around three-quarters of respondents (78% and 75%, respectively) agreed that HPWHs are very efficient, while around two-thirds agreed that they result in lower electric bills (69% and 65%, respectively). The percentage of respondents who agreed with certain benefits of HPWHs (e.g., offer better value, are eligible for credits/discounts, can be controlled from a phone) decreased after the campaign. However, the percentage of respondents who agreed with certain drawbacks of HPWHs (e.g., are noisy or unreliable) also decreased after the campaign.

Figure 39: Perceptions of HPWHs Pre- and Post-Campaign

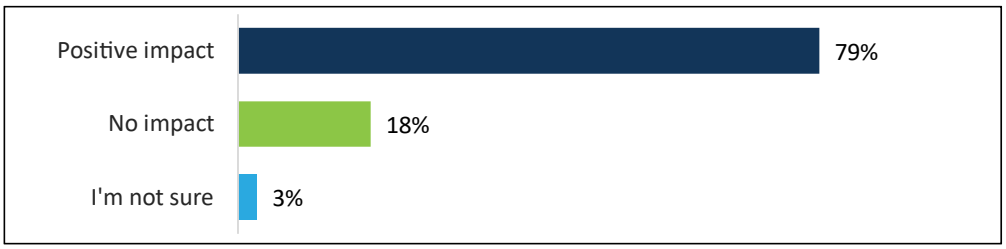


Notes: Includes responses from both the pre- and post-campaign surveys. Respondents who were aware of HPWH (A2) responded to this question.
** denotes that findings are statistically different from pre-campaign values at the 90% confidence level.*
A9. Please assess how much you agree or disagree with the following statements.

Around one-fifth of post-campaign respondents recalled seeing a campaign ad. Nineteen percent of post-campaign respondents recalled seeing at least one campaign ad. Ad recall was similar across states and regions, indicating that targeting was effective. Male respondents (26%) and early adopters of technology (66%) were significantly more likely to recall seeing an ad than females (15%) and late adopters of technology (11%). Nearly three-quarters (73%) of respondents who recalled an ad were aware of HPWHs. Respondents who saw an ad were significantly more likely to have heard of HPWHs from social media (30%) or internet advertising (20%) than those who did not (4% and 5%, respectively), suggesting the campaign drove HPWH awareness among those who recalled seeing ads.

Around four-fifths (79%) of respondents who saw an ad said it had a positive impact on their opinion of HPWHs, while around one-fifth (18%) said it at no impact (Figure 40).

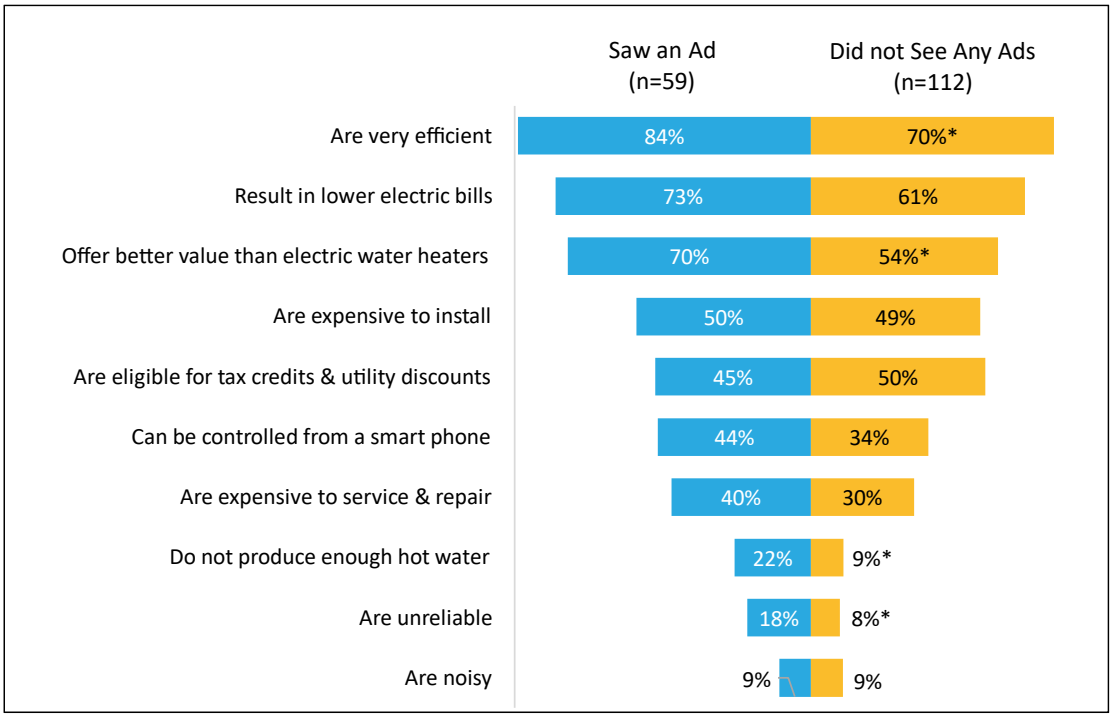
Figure 40: Impact of Campaign Ad (n=79)



Notes: Includes responses from the post-campaign survey only. Respondents who recalled seeing a campaign ad (Q35) responded to this question.
Q36. Did the ad(s) you saw have a positive, negative, or no impact on your opinion of heat pump water heaters?

Consumers that saw campaign ads think HPWHs are efficient and a good value at higher rates than those that did not see ads. Figure 41 displays the percentage of respondents who agreed with various statements about HPWHs after the campaign, broken out by those who saw campaign ads and those who did not. Respondents who saw an ad were significantly more likely to agree that HPWHs are very efficient (84%) and offer better value than electric resistance water heaters (70%) than those who did not see an ad (70% and 54%, respectively). However, respondents who saw an ad were also significantly more likely to agree that HPWHs do not produce enough hot water (22%) and are noisy (18%) than those who did not see an ad (9% and 8%, respectively).

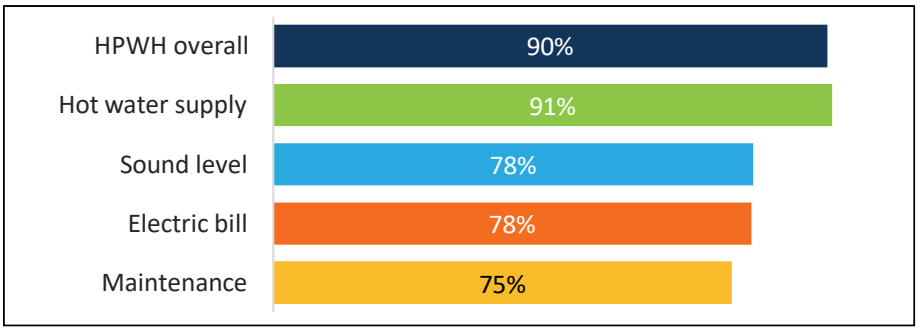
Figure 41: Perceptions of HPWHs by Saw an Ad



Notes: Includes responses from the post-campaign survey only. Respondents who were aware of HPWH (A2) and recalled seeing a campaign ad (Q35) responded to this question.
** denotes that findings are statistically different from respondents who did not recall seeing an ad at the 90% confidence level.*
A9. Please assess how much you agree or disagree with the following statements.

HPWH owners are highly satisfied. Nine out of ten (90%) respondents that owned a HPWH were satisfied with it overall (MPI 4a, Figure 42). Most HPWH owners (91%) were satisfied with their hot water supply. Around three-quarters of HPWH owners were satisfied with the sound level of the HPWH (78%), the change in their electric bill since installing the HPWH (78%), and the maintenance requirements of the HPWH (75%). Almost nine out of ten (87%) HPWH owners have or would recommend a HPWH to a friend, colleague, or family member (MPI 4b).

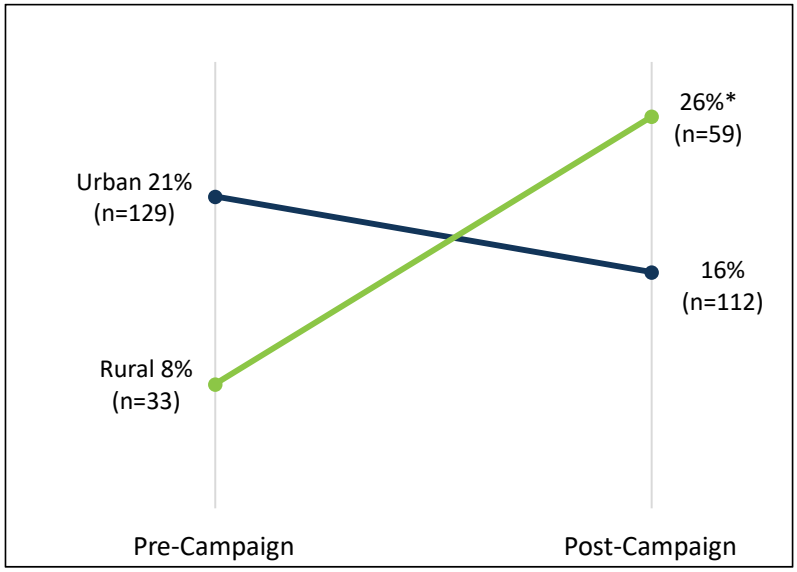
Figure 42: Satisfaction with HPWH (n=80)



Notes: Includes responses from both the pre- and post-campaign surveys. Respondents who currently use or own a HPWH (A4) responded to this question.
A6. Please rate your satisfaction with the following aspects of your heat pump water heater.

One-fifth of respondents were aware of the cooling effect of HPWHs. Around one-fifth (19%) of respondents (n=333) were aware that HPWHs cool the air around the water heater. More rural respondents had heard that HPWHs cool air around the water heater in the post-campaign survey (26%) than in the pre-campaign survey (8%), likely reflecting the increase in awareness of HPWHs. When asked where they heard that HPWHs cool the air around the water heater, respondents cited friends and family (44%), online research (33%), contractors (29%), and social media (28%).

Figure 43: Awareness of HPWH Cooling Effect



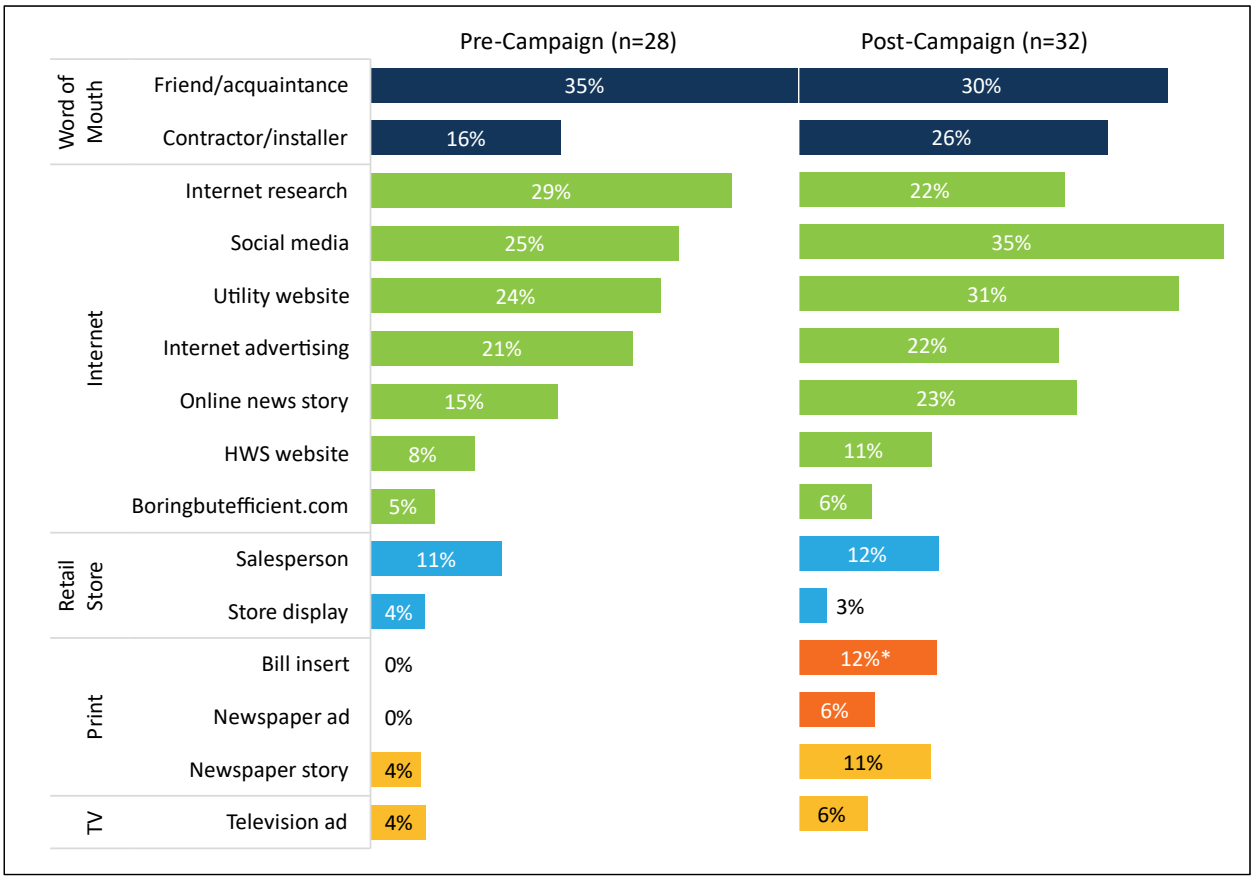
Notes: Includes responses from both the pre- and post-campaign surveys. Respondents who were aware of HPWH (A2) responded to this question.
** denotes that findings are statistically different from pre-campaign values at the 90% confidence level.*
Q37. Have you heard anyone say that heat pump water heaters cool the air around the water heater?

HWS Awareness

Eight percent of consumers were aware of the Hot Water Solutions program. Fewer than one in ten (8%) consumers were aware of the HWS program. There was no difference in awareness of HWS between the pre- and post-campaign samples; in both cases only 8% of consumers were aware. However, among post-campaign respondents, those who recalled seeing an ad were significantly more likely to be aware of HWS (26%) than those who did not recall seeing an ad (3%, n=416).

Figure 44 shows that the top ways respondents heard of the HWS program were friends and acquaintances, social media, utility websites, and internet research. Only bill inserts as a source of HWS awareness changed significantly after the campaign (from 0% to 12%).

Figure 44: Sources of HWS Awareness

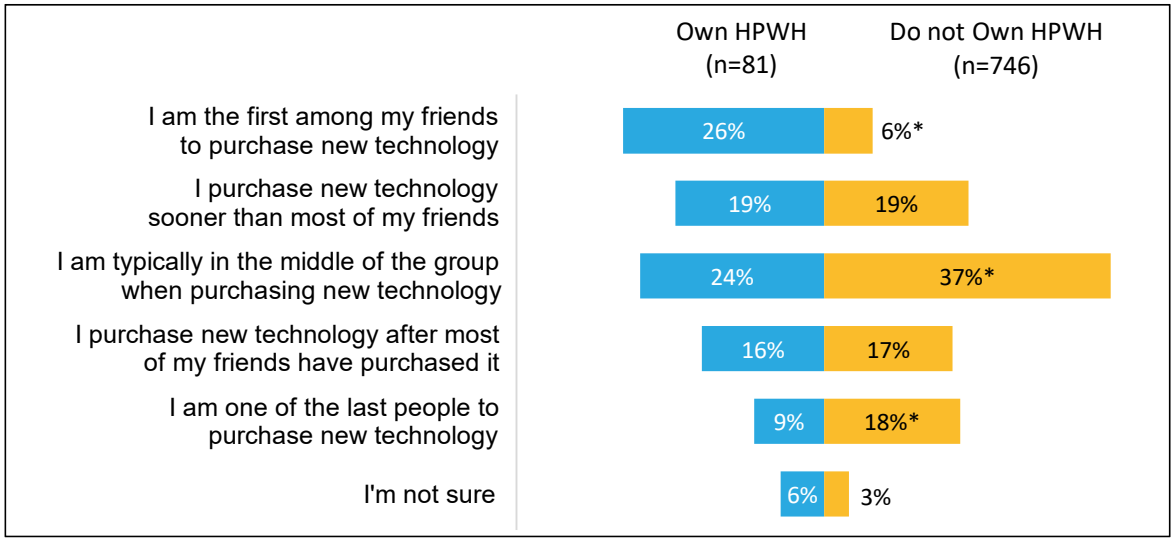


Notes: Includes responses from both the pre- and post-campaign surveys. Respondents who were aware of Hot Water Solutions program (Q31) responded to this question.
** denotes that findings are statistically different from pre-campaign values at the 90% confidence level.*
Q32. How did you first hear of the "Hot Water Solutions" program?

Attitudes About Technology and the Environment

HPWH owners are more likely to be early adopters of technology. Figure 45 displays respondents' tendency to accept new technology by whether they own a HPWH. HPWH owners were four times as likely to be early adopters of technology (26%) than those who did not own a HPWH (6%).

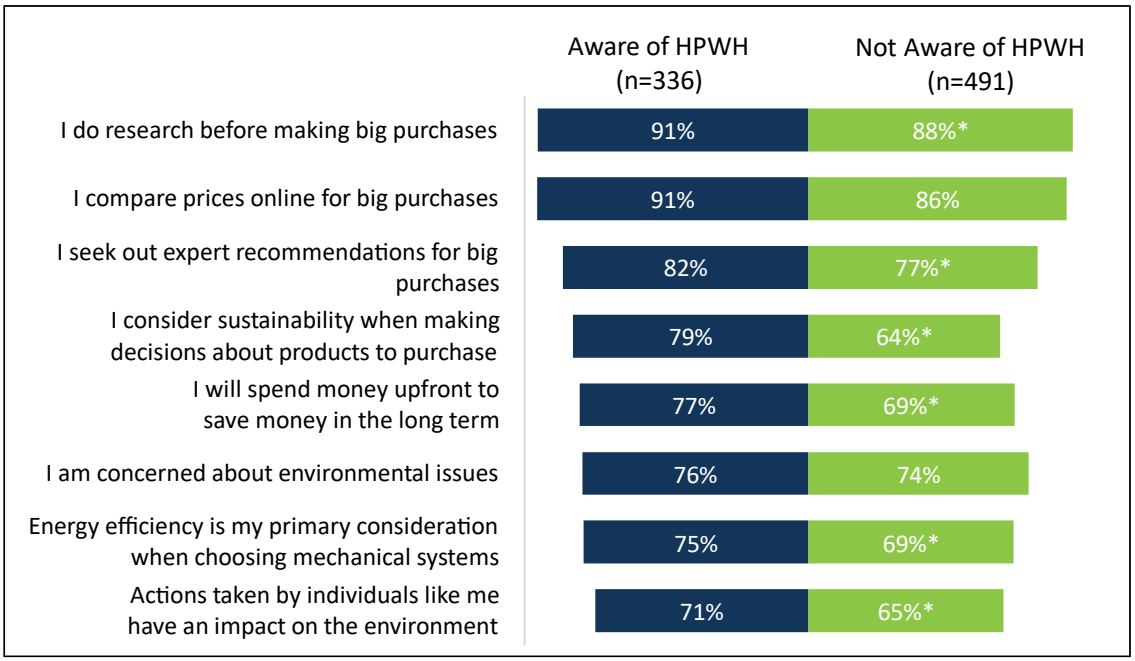
Figure 45: New Technology Adoption



Notes: Includes responses from both the pre- and post-campaign surveys. Respondents who were aware of HPWH (A2) responded to this question.
** denotes that findings are statistically different from respondents who currently own or use a HPWH (A4) at the 90% confidence level.*
D1. Which of the following statements best describes you?

Consumers aware of HPWHs are more likely to consider sustainability for major purchases. Figure 46 displays the percentage of respondents who agreed with various statements about the process of making big purchases by whether they were aware of HPWHs. Nearly all respondents reported doing research and comparing prices online before making big purchases. Respondents who were aware of HPWHs were more likely to agree with all of the statements than those who were not aware of HPWHs. In particular, those who were aware of HPWHs were significantly more likely to consider sustainability when making decisions about which products to purchase (79% compared to 64%, respectively), and to spend money upfront to save money in the long term (77% compared to 69%, respectively).

Figure 46: Purchase Process and Environmental Considerations



Notes: Includes responses from both the pre- and post-campaign surveys. Respondents who were aware of HPWH (A2) responded to this question. Figure shows respondents who "strongly agree" or "somewhat agree."
** denotes that findings are statistically different from respondents who currently own or use a HPWH (A4) at the 90% confidence level.*
D1. Please rate your agreement with the following statements.

Demographic Characteristics

This section presents demographic characteristics of the consumer survey respondents. By most metrics, the households in the pre- and post-campaign samples are reasonably comparable.

Nearly two-thirds of respondents in both surveys reported owning their home (Table 22).

Table 22: Tenure

Tenure	Pre-Campaign	Post-Campaign
n	*411*	*416*
Own	63%	63%
Rent	37%	37%

S_OwnRent. Do you own or rent your home?

More than three-quarters of respondents in both surveys lived in a free-standing or attached single-family home (Table 23). Unlike MPER #6, the MPER #7 consumer survey included respondents in apartments or condominiums.

Table 23: Home Type

Home Type	Pre-Campaign	Post-Campaign
n	*411*	*416*
A free-standing, single-family home	67%	67%
Townhouse or rowhome	8%	9%
Mobile home	5%	5%
Apartment or condominium with 2-4 units	4%	4%
Apartment or condominium with 5 or more units	16%	14%

S_HomeType. What type of home do you live in?

The pre-campaign sample had more people aged 45 to 64 and fewer people aged 18 to 24 than the post-campaign sample (Table 24).

Table 24: Age

Age	Pre-Campaign	Post-Campaign
n	*411*	*416*
Under 18	0%	0%
18 to 24	4%	7%*
25 to 34	18%	17%
35 to 44	22%	24%
45 to 54	18%	14%*
55 to 64	18%	14%*
65 and older	20%	24%
I'd rather not say	0%	0%

D4: Which of the following categories includes your age?
** denotes that the post-campaign value is statistically difference from pre-campaign at the 90% confidence level.*

Over two-thirds of respondents in both surveys had at least some college education (Table 25). The pre-campaign sample had slightly more people who graduated from trade or technical school than the post-campaign sample.

Table 25: Education

Education	Pre-Campaign	Post-Campaign
n	*411*	*416*
Some high school	1%	1%
High school or GED	19%	16%
Trade or technical school	7%	3%*
Some college	25%	28%
College graduate	30%	31%
Some graduate school	5%	4%
Graduate degree	14%	16%
I'd rather not say	0%	0%

D6: Which of the following categories best describes the highest level of education you have completed?
** denotes that the post-campaign value is statistically difference from pre-campaign at the 90% confidence level.*

Table 26 displays level of income. The post-campaign sample had slightly more respondents earning incomes between $80,000 and $120,000 per year, and fewer respondents earning incomes less than $40,000 per year, than the pre-campaign sample.

Table 26: Income

Income	Pre-Campaign	Post-Campaign
n	*411*	*416*
Less than $40,000	34%	26%*
Between $40,001 and $60,000	21%	22%
Between $60,001 and $80,000	17%	15%
Between $80,001 and $120,000	12%	17%*
Between $120,001 and $250,000	12%	15%
Over $250,000	1%	2%
I'm not sure	1%	1%
I'd rather not say	2%	2%

D7: Which of the following categories best describes your approximate annual household income from all sources in 2021, before taxes?
** denotes that the post-campaign value is statistically difference from pre-campaign at the 90% confidence level.*

Table 27 displays respondents' reported race. Most respondents identified as white, though nearly one-fifth of respondents indicated a race other than white. Eight percent of pre-campaign respondents and six percent of post-campaign respondents identified as Hispanic.

Table 27: Race

Race	Pre-Campaign	Post-Campaign
n	*411*	*416*
White	85%	88%
Black or African American	4%	3%
American Indian or Alaska Native	3%	5%
Asian	7%	5%
Native Hawaiian or Pacific Islander	1%	1%
Other	2%	1%
I'd rather not say	2%	1%

D9: How would you describe yourself? Please select all that apply.

Table 28 displays respondents' self-reported gender. Most respondents identified as female. There were significantly more respondents who identified as male in the pre-campaign sample (39%) than the post-campaign sample (33%), though that represents only a six-point difference.

Table 28: Gender

Gender	Pre-Campaign	Post-Campaign
n	*411*	*416*
Male	39%	33%*
Female	61%	66%
Non-binary	1%	1%
I'd rather not say	0%	0%

D10: How would you describe yourself?
** denotes that the post-campaign value is statistically difference from pre-campaign at the 90% confidence level.*

Nearly all respondents primarily spoke English in their home for both pre- and post-campaign samples (Table 29).

Table 29: Primary Language Spoken at Home

Primary Language	Pre-Campaign	Post-Campaign
n	*411*	*416*
English	97%	99%*
Spanish	2%	0%*
Other	2%	1%

D11: What language is primarily spoken in your home?

DETAILED RESULTS

This section contains full results for all consumer survey questions. Note that sample sizes (n's) are unweighted and percentages are weighted.

Table 30: Detailed Pre-Campaign Consumer Survey Results

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
S_OwnRent (n=411) Do you own or rent your home?	Own	246	63%	246	63%	63	63%	110	64%	44	53%	29	70%	179	61%
	Rent	165	37%	165	37%	51	37%	82	36%	19	47%	13	30%	127	39%
S_HomeType (n=411) What type of home do you live in?	Single-family home	275	66%	64	63%	128	64%	51	71%	32	79%	194	63%	81	75%
	Townhouse/rowhouse	33	9%	11	7%	20	12%	2	3%	0	0%	25	9%	8	8%
	Mobile home	21	5%	8	6%	5	4%	5	13%	3	6%	10	4%	11	11%
	Apartment/condo (2-4 units)	17	4%	7	6%	9	5%	1	3%	0	0%	15	5%	2	2%
	Apartment/condo (5+ units)	65	16%	24	18%	30	16%	4	10%	7	15%	62	19%	3	4%
WH_Age (n=390) Approximately how old is your water heater?	Less than 1 year old	21	6%	4	3%	12	7%	4	7%	1	3%	15	5%	6	5%
	1 to 5 years old	159	41%	41	38%	78	43%	27	43%	13	33%	122	42%	37	35%
	6 to 10 years old	104	26%	33	30%	44	25%	14	17%	13	33%	77	27%	27	26%
	More than 10 years old	70	18%	20	20%	31	16%	10	13%	9	23%	48	17%	22	23%
	I'm not sure	36	9%	9	8%	17	9%	8	20%	2	7%	25	9%	11	11%
A1 (n=411) Before today, had you heard the terms "heat pump	Yes	152	39%	37	33%	83	44%	20	34%	12	29%	116	40%	36	34%
	No	216	50%	68	60%	84	43%	37	52%	27	62%	157	49%	59	56%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
water heater" or "hybrid water heater"?	I'm not sure	43	11%	9	7%	25	13%	6	14%	3	9%	33	11%	10	10%
A2 (n=411) Based on that description, have you heard of "heat pump water heaters" or "hybrid water heaters"?	Yes	162	42%	46	41%	88	47%	19	31%	9	18%	149	45%	24	29%
	No	219	51%	61	53%	89	45%	39	66%	30	73%	155	47%	55	67%
	I'm not sure	30	7%	7	6%	15	8%	5	3%	3	9%	26	8%	3	4%
A4 (n=162) Where or how have you heard about heat pump water heaters?	I currently own or use one	44	28%	10	21%	27	30%	4	30%	3	29%	32	25%	12	41%
	I previously owned or use one	12	8%	4	11%	7	8%	0	0%	1	13%	11	9%	1	4%
	From a friend or acquaintance	39	22%	6	11%	26	29%	5	14%	2	24%	33	24%	6	14%
	Utility print advertising or bill insert	13	8%	5	13%	6	6%	2	3%	0	0%	12	8%	1	3%
	Utility website	18	11%	5	12%	10	11%	2	3%	1	11%	15	11%	3	8%
	Smart Water Heat website	8	6%	1	3%	6	7%	1	11%	0	0%	7	6%	1	4%
	Hot Water Solutions website	4	3%	3	8%	1	1%	0	0%	0	0%	4	4%	0	0%
	Retail store display	20	11%	5	10%	10	11%	3	4%	2	22%	16	10%	4	15%
	Retail store salesperson	16	9%	3	8%	8	8%	3	17%	2	24%	12	9%	4	11%
	Printed newspaper ad	1	1%	1	3%	0	0%	0	0%	0	0%	1	1%	0	0%
	Print newspaper story	4	2%	1	3%	3	3%	0	0%	0	0%	3	3%	1	1%
	Online news story	6	4%	1	2%	5	5%	0	0%	0	0%	5	4%	1	1%
	Television ad	19	12%	3	9%	13	13%	3	23%	0	0%	15	12%	4	13%
	Social media, such as Facebook, Instagram, or YouTube	16	11%	4	10%	11	13%	1	1%	0	0%	15	12%	1	3%
	Contractor or installer	18	11%	2	5%	11	13%	3	14%	2	22%	15	11%	3	9%
	While researching on the Internet	35	23%	7	16%	22	26%	4	25%	2	24%	29	23%	6	22%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	Internet advertising	15	10%	6	16%	7	8%	2	3%	0	0%	14	11%	1	1%
	Utility newsletter	8	6%	1	3%	6	7%	1	8%	0	0%	8	6%	0	0%
	Other	3	1%	0	0%	2	2%	0	0%	1	8%	2	1%	1	1%
A6a (n=43) Please rate your satisfaction with the following aspects of your heat pump water heater. - The sound level of the heat pump water heater	Very dissatisfied	2	6%	1	9%	1	6%	0	0%	0	0%	2	8%	0	0%
	Somewhat dissatisfied	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Neither satisfied nor dissatisfied	12	25%	1	9%	9	31%	1	0%	1	50%	10	29%	2	11%
	Somewhat satisfied	8	20%	0	0%	8	31%	0	0%	0	0%	7	24%	1	11%
	Very satisfied	21	48%	8	82%	8	31%	3	100%	2	50%	13	39%	8	78%
A6b (n=42) Please rate your satisfaction with the following aspects of your heat pump water heater. - The change in your electricity bill since installing the heat pump water heater	Very dissatisfied	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Somewhat dissatisfied	5	12%	1	9%	4	16%	0	0%	0	0%	4	13%	1	10%
	Neither satisfied nor dissatisfied	6	12%	2	18%	2	6%	1	0%	1	50%	4	11%	2	20%
	Somewhat satisfied	18	47%	2	27%	15	56%	1	50%	0	0%	14	50%	4	30%
	Very satisfied	13	29%	5	45%	6	22%	1	50%	1	50%	9	26%	4	40%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
A6c (n=43) Please rate your satisfaction with the following aspects of your heat pump water heater. - Your hot water supply	Very dissatisfied	1	3%	0	0%	1	3%	0	0%	0	0%	1	3%	0	0%
	Somewhat dissatisfied	3	7%	2	18%	1	3%	0	0%	0	0%	2	6%	1	10%
	Neither satisfied nor dissatisfied	3	5%	1	9%	1	3%	1	0%	0	0%	3	6%	0	0%
	Somewhat satisfied	11	28%	0	0%	11	41%	0	0%	0	0%	8	31%	3	20%
	Very satisfied	25	58%	7	73%	13	50%	3	100%	2	100%	17	56%	8	70%
A6d (n=43) Please rate your satisfaction with the following aspects of your heat pump water heater. - The maintenance requirements of the heat pump water heater	Very dissatisfied	2	5%	1	10%	1	3%	0	0%	0	0%	2	5%	0	0%
	Somewhat dissatisfied	2	4%	0	0%	2	6%	0	0%	0	0%	1	3%	1	10%
	Neither satisfied nor dissatisfied	8	17%	1	10%	6	19%	1	33%	0	0%	5	16%	3	20%
	Somewhat satisfied	11	28%	2	20%	7	31%	1	0%	1	50%	11	35%	0	0%
	Very satisfied	20	46%	6	60%	11	41%	2	67%	1	50%	12	41%	8	70%
A6e (n=43) Please rate your satisfaction with the following aspects of your heat pump water heater. - The heat pump water heater overall	Very dissatisfied	1	2%	1	9%	0	0%	0	0%	0	0%	1	3%	0	0%
	Somewhat dissatisfied	2	4%	0	0%	2	6%	0	0%	0	0%	1	3%	1	10%
	Neither satisfied nor dissatisfied	4	9%	1	9%	2	6%	0	0%	1	50%	4	11%	0	0%
	Somewhat satisfied	14	29%	0	0%	13	44%	1	0%	0	0%	10	31%	4	20%
	Very satisfied	22	55%	8	82%	10	44%	3	100%	1	50%	15	53%	7	70%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	Yes, I have	19	47%	5	55%	11	45%	3	67%	0	0%	14	47%	5	40%
A7 (n=44) Have you, or would you, recommend a heat pump water heater to a friend, colleague, or family member?	Yes, I would	16	36%	3	27%	10	39%	1	33%	2	50%	12	34%	4	40%
	No	4	9%	2	18%	2	6%	0	0%	0	0%	3	11%	1	10%
	I'm not sure	5	8%	0	0%	4	10%	0	0%	1	50%	3	8%	2	10%
A9a (n=162) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters are very efficient.	Strongly disagree	2	2%	1	4%	1	1%	0	0%	0	0%	2	2%	0	0%
	Somewhat disagree	6	3%	3	8%	2	2%	0	0%	1	14%	5	4%	1	0%
	Neither agree nor disagree	30	17%	7	11%	17	18%	3	11%	3	29%	19	15%	11	30%
	Somewhat agree	73	43%	19	42%	39	43%	12	67%	3	29%	61	44%	12	35%
	Strongly agree	51	35%	16	36%	29	36%	4	22%	2	29%	42	35%	9	35%
A9b (n=162) Please assess how much you agree or disagree with the following statements. - Heat	Strongly disagree	6	3%	0	0%	4	4%	0	0%	2	14%	5	3%	1	4%
	Somewhat disagree	11	7%	2	4%	8	8%	0	0%	1	14%	8	7%	3	4%
	Neither agree nor disagree	35	21%	14	27%	16	18%	4	11%	1	14%	25	19%	10	29%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
pump water heaters result in lower electric bills than a typical water heater.	Somewhat agree	77	47%	21	48%	39	45%	12	67%	5	57%	63	48%	14	46%
	Strongly agree	33	22%	9	21%	21	25%	3	22%	0	0%	28	23%	5	17%
A9c (n=162) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters are eligible for tax credits and/or discounts from utility companies.	Strongly disagree	3	2%	2	6%	1	1%	0	0%	0	0%	5	3%	1	4%
	Somewhat disagree	9	6%	4	11%	3	3%	0	0%	2	29%	8	7%	3	4%
	Neither agree nor disagree	57	35%	13	28%	33	37%	6	33%	5	43%	25	19%	10	29%
	Somewhat agree	60	36%	15	28%	34	39%	10	56%	1	14%	63	48%	14	46%
	Strongly agree	33	22%	12	28%	17	20%	3	11%	1	14%	28	23%	5	17%
A9d (n=162) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters offer	Strongly disagree	5	3%	1	4%	3	3%	0	0%	1	14%	4	3%	1	0%
	Somewhat disagree	7	5%	4	8%	3	5%	0	0%	0	0%	5	5%	2	4%
	Neither agree nor disagree	39	24%	13	25%	20	24%	4	11%	2	14%	32	24%	7	17%
	Somewhat agree	66	39%	16	36%	37	40%	9	44%	4	43%	54	40%	12	39%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
better value than typical electric water heaters.	Strongly agree	45	29%	12	28%	25	29%	6	44%	2	29%	34	28%	11	39%
A9e (n=162) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters can be controlled from a smart phone.	Strongly disagree	4	2%	1	2%	2	2%	0	0%	1	14%	4	2%	0	0%
	Somewhat disagree	9	6%	5	13%	3	3%	0	0%	1	14%	8	7%	1	0%
	Neither agree nor disagree	73	43%	17	33%	43	48%	9	44%	4	43%	55	42%	18	46%
	Somewhat agree	47	29%	14	31%	22	26%	8	44%	3	29%	38	28%	9	33%
	Strongly agree	29	20%	9	21%	18	21%	2	11%	0	0%	24	20%	5	21%
A9f (n=162) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters are noisy.	Strongly disagree	34	21%	11	22%	17	20%	4	20%	2	29%	25	19%	28	32%
	Somewhat disagree	46	28%	13	31%	22	24%	7	30%	4	43%	39	29%	43	20%
	Neither agree nor disagree	54	32%	16	33%	30	32%	6	40%	2	14%	39	30%	45	40%
	Somewhat agree	17	12%	3	6%	11	14%	2	10%	1	14%	16	13%	19	4%
	Strongly agree	11	8%	3	8%	8	10%	0	0%	0	0%	10	9%	13	4%
A9g (n=162) Please assess how much you agree or disagree with the following statements. - Heat pump water	Strongly disagree	28	19%	12	28%	14	16%	1	0%	1	14%	25	20%	3	13%
	Somewhat disagree	51	31%	12	26%	28	31%	7	30%	4	43%	42	32%	9	29%
	Neither agree nor disagree	52	31%	13	25%	29	33%	7	40%	3	29%	39	30%	13	38%
	Somewhat agree	20	12%	5	11%	11	12%	3	20%	1	14%	15	11%	5	13%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
heaters are unreliable.	Strongly agree	11	7%	4	9%	6	7%	1	10%	0	0%	8	7%	3	8%
A9h (n=162) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters are expensive to install.	Strongly disagree	9	6%	2	6%	5	6%	2	11%	0	0%	8	7%	1	4%
	Somewhat disagree	23	13%	7	15%	11	12%	2	0%	3	33%	19	14%	4	13%
	Neither agree nor disagree	54	33%	21	42%	27	30%	5	33%	1	17%	38	30%	16	46%
	Somewhat agree	54	33%	13	31%	29	34%	9	44%	3	33%	46	34%	8	25%
	Strongly agree	22	14%	3	6%	16	18%	1	11%	2	17%	18	15%	4	13%
A9i (n=162) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters are expensive to service or repair.	Strongly disagree	10	6%	2	4%	7	9%	1	11%	0	0%	9	7%	1	4%
	Somewhat disagree	22	14%	7	17%	13	14%	1	0%	1	14%	17	15%	5	13%
	Neither agree nor disagree	63	38%	21	40%	32	37%	7	44%	3	29%	49	38%	14	43%
	Somewhat agree	52	33%	15	37%	25	30%	9	33%	3	29%	46	35%	6	17%
	Strongly agree	15	8%	1	2%	11	10%	1	11%	2	29%	8	6%	7	22%
A9j (n=162) Please assess how much you agree or disagree with the following statements. - Heat	Strongly disagree	32	22%	12	31%	16	18%	2	11%	2	25%	23	21%	6	25%
	Somewhat disagree	43	25%	12	23%	23	26%	7	22%	1	13%	35	25%	8	21%
	Neither agree nor disagree	60	35%	15	31%	33	36%	8	56%	4	38%	45	35%	15	42%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
pump water heaters do not produce enough hot water.	Somewhat agree	17	12%	4	8%	11	14%	1	0%	1	13%	15	13%	2	4%
	Strongly agree	10	7%	3	8%	5	6%	1	11%	1	13%	8	7%	2	8%
A10 (n=410) When making a decision about purchasing mechanical equipment for your home, such as a furnace or water heater, what are your typical sources of information regarding which product to purchase?	Friends or acquaintances	148	37%	48	46%	63	32%	23	36%	14	35%	111	37%	37	36%
	Utility print advertising or bill inserts	39	10%	9	8%	23	12%	4	4%	3	7%	32	11%	7	6%
	Utility website	93	22%	29	25%	46	23%	13	16%	5	12%	74	23%	19	17%
	Retail store – general	91	22%	34	28%	39	21%	11	20%	7	18%	66	22%	25	24%
	Retail store – displays	72	18%	17	15%	33	18%	11	23%	11	27%	51	17%	21	21%
	Retail store salespeople	110	26%	35	32%	41	21%	19	31%	15	38%	80	26%	30	29%
	Newspaper ads	9	2%	3	3%	5	2%	0	0%	1	2%	7	3%	2	2%
	Print newspaper stories	7	2%	2	2%	5	2%	0	0%	0	0%	5	2%	2	2%
	Online news stories	33	9%	6	7%	20	11%	6	11%	1	2%	27	9%	6	8%
	Television ads	39	10%	10	9%	21	10%	5	12%	3	6%	25	9%	14	13%
	Social media, such as Facebook, Instagram or YouTube	36	9%	8	7%	21	10%	6	12%	1	2%	26	9%	10	8%
	From a contractor or installer	151	36%	44	39%	64	32%	21	29%	22	53%	106	34%	45	45%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	Internet research or internet reviews	184	45%	50	46%	90	47%	24	28%	20	50%	141	46%	43	41%
	Internet advertising	35	10%	9	9%	21	11%	5	10%	0	0%	29	11%	6	5%
	Specific internet website	7	2%	1	1%	5	3%	1	3%	0	0%	4	1%	3	3%
	Utility newsletter	32	8%	10	9%	21	11%	1	0%	0	0%	26	10%	6	4%
	Other	7	2%	3	3%	2	1%	2	3%	0	0%	4	1%	3	3%
	Not applicable	8	2%	1	1%	3	1%	2	5%	2	8%	4	1%	4	5%
	I'm not sure	27	7%	3	1%	19	10%	3	9%	2	3%	23	8%	4	4%
A10_site (n=6) Specific internet website	Consumer Reports	1	20%	0	0%	1	25%	0	0%	0	0%	1	33%	0	0%
	Google	1	17%	0	0%	1	25%	0	0%	0	0%	1	33%	0	0%
	Home Depot	1	16%	0	0%	0	0%	1	100%	0	0%	0	0%	1	33%
	Hometalk	1	16%	1	100%	0	0%	0	0%	0	0%	0	0%	1	33%
	Pinterest	1	20%	0	0%	1	25%	0	0%	0	0%	1	33%	0	0%
	Manufacturer's website	1	11%	0	0%	1	25%	0	0%	0	0%	0	0%	1	33%
A11 (n=411) Have you purchased a new water heater in the past three years?	Yes	79	20%	23	21%	34	18%	11	20%	11	24%	60	20%	19	18%
	No	327	79%	91	79%	156	81%	50	77%	30	74%	242	79%	85	80%
	I'm not sure	5	1%	0	0%	2	1%	2	3%	1	3%	4	1%	1	1%
A12 (n=79)	My water heater was completely broken and did not provide any hot water	29	33%	7	30%	10	27%	7	67%	5	44%	21	30%	8	43%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
Why did you purchase a new water heater?	My water heater worked poorly and/or needed repair	7	7%	0	0%	4	10%	1	0%	2	11%	6	8%	1	0%
	My water heater was old and/or close to failing	23	35%	9	41%	11	37%	1	17%	2	22%	19	38%	4	21%
	I wanted to install a more energy-efficient water heater	14	18%	6	26%	6	17%	2	17%	0	0%	10	17%	4	21%
	To serve an addition to my home	3	4%	1	4%	2	7%	0	0%	0	0%	2	5%	1	7%
	Other	1	1%	0	0%	0	0%	0	0%	1	11%	0	0%	1	7%
	I'm not sure	2	2%	0	0%	1	2%	0	0%	1	11%	2	3%	0	0%
A13 (n=42) Did your installer or contractor recommend a heat pump water heater to you?	Yes	20	47%	8	61%	8	38%	2	33%	2	50%	16	50%	4	38%
	No	21	51%	7	39%	12	63%	1	33%	1	50%	17	50%	4	50%
	I'm not sure	1	2%	0	0%	0	0%	1	33%	0	0%	0	0%	1	13%
A15 (n=411) What would cause you to purchase a new water heater	If it fails, breaks, or leaks	323	79%	91	79%	147	76%	52	75%	33	78%	234	76%	89	83%
	If it has some issues but needs repairs to work well	121	29%	39	33%	50	25%	17	28%	15	33%	90	28%	31	30%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
(of any type)? Please select all that apply.	To save energy, even if it still works	82	20%	28	26%	37	19%	8	11%	9	19%	63	21%	19	18%
	To lower utility bills, even if it still works	104	25%	36	34%	43	22%	10	14%	15	35%	77	26%	27	27%
	If I was already renovating my home	61	15%	18	14%	28	15%	9	13%	6	14%	43	15%	18	15%
	Not applicable	13	3%	1	1%	7	3%	2	5%	3	11%	9	3%	4	5%
	I'm not sure	16	4%	6	5%	5	3%	4	11%	1	2%	12	4%	4	3%
A16 (n=118) Did/Have you Considered installing a heat pump water heater?	Yes	53	48%	17	52%	28	48%	4	14%	4	60%	46	50%	7	40%
	No	49	37%	14	33%	24	37%	10	71%	1	20%	38	36%	11	47%
	I'm not sure	16	15%	5	14%	9	15%	1	14%	1	20%	13	14%	3	13%
A17 (n=49) What is the primary reason you did not consider installing a heat pump water heater?	Existing equipment works fine	11	15%	2	14%	7	19%	2	0%	0	0%	6	15%	5	29%
	Prefer a different kind	1	2%	0	0%	1	4%	0	0%	0	0%	1	3%	0	0%
	May/plan to in the future	2	7%	0	0%	2	11%	0	0%	0	0%	2	8%	0	0%
	Cost	15	30%	5	36%	5	22%	5	75%	0	0%	11	28%	4	43%
	Not familiar enough with them	12	26%	4	29%	5	26%	3	25%	0	0%	11	28%	1	14%
	Concerns about their performance	3	7%	2	14%	0	0%	0	0%	1	100%	2	5%	1	14%
	Does not fit in my space	1	2%	1	7%	0	0%	0	0%	0	0%	1	3%	0	0%
	The installer/contractor did not mention them	1	2%	0	0%	1	4%	0	0%	0	0%	1	3%	0	0%
	Other	1	2%	0	0%	1	4%	0	0%	0	0%	1	3%	0	0%
	I'm not sure	2	7%	0	0%	2	11%	0	0%	0	0%	2	8%	0	0%
A19 (n=162)	Yes	36	23%	8	19%	21	24%	3	20%	4	43%	35	24%	5	21%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
Have you heard of any brands that make heat pump water heaters?	No	97	58%	29	62%	52	57%	11	50%	5	57%	84	57%	15	63%
	I'm not sure	29	19%	9	19%	15	19%	5	30%	0	0%	29	20%	4	17%
A20 (n=36) Which of the following heat pump water heater brands have you heard of, if any?	General Electric ("GE")	9	29%	2	22%	7	36%	0	0%	0	0%	8	31%	1	14%
	A.O. Smith	4	13%	0	0%	3	19%	0	0%	1	25%	4	15%	0	0%
	American	7	19%	1	14%	4	18%	1	57%	1	19%	5	17%	2	35%
	Kenmore	16	46%	3	40%	9	46%	1	36%	3	75%	13	47%	3	44%
	Reliance	3	8%	0	0%	2	10%	0	0%	1	25%	3	9%	0	0%
	State	6	19%	1	17%	4	21%	0	0%	1	19%	6	21%	0	0%
	Stiebel Eltron	2	7%	2	27%	0	0%	0	0%	0	0%	2	8%	0	0%
	U.S. Craftmaster	3	10%	1	14%	2	10%	0	0%	0	0%	3	12%	0	0%
	Whirlpool	17	46%	4	47%	10	45%	0	0%	3	75%	13	45%	4	52%
	AirGenerate	3	10%	0	0%	3	16%	0	0%	0	0%	3	11%	0	0%
	Electrolux	6	15%	2	28%	2	8%	2	64%	0	0%	4	12%	2	35%
	Rheem	12	38%	4	46%	7	39%	0	0%	1	25%	12	44%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	Bradford White	7	20%	1	9%	5	26%	1	36%	0	0%	6	21%	1	13%
	Hubbell	4	12%	1	9%	3	16%	0	0%	0	0%	4	14%	0	0%
	Jetglas	1	3%	0	0%	1	5%	0	0%	0	0%	1	4%	0	0%
	Lochinvar	3	9%	0	0%	3	15%	0	0%	0	0%	3	11%	0	0%
	Ruud	5	14%	0	0%	3	16%	1	57%	1	25%	4	13%	1	21%
	Richmond	2	5%	0	0%	2	8%	0	0%	0	0%	1	4%	1	14%
	Vaughn	5	14%	2	31%	2	8%	0	0%	1	19%	4	14%	1	14%
	I'm not sure	1	2%	1	9%	0	0%	0	0%	0	0%	1	3%	0	0%
HWS_Aware (n=411) Before today, had you heard of the "Hot Water Solutions" program?	Yes	28	8%	8	9%	17	9%	2	7%	1	3%	21	8%	7	6%
	No	366	88%	101	87%	167	87%	57	87%	41	97%	271	87%	95	90%
	I'm not sure	17	4%	5	5%	8	5%	4	7%	0	0%	14	5%	3	4%
HWS_First (n=28) How did you hear of HWS program?	Hot Water Solutions website	2	8%	1	14%	1	7%	0	0%	0	0%	2	10%	0	0%
	Friend or acquaintance	8	35%	4	59%	4	26%	0	0%	0	0%	8	42%	0	0%
	Utility website	7	24%	2	25%	3	17%	2	100%	0	0%	4	19%	3	46%
	Retail store display	1	4%	1	14%	0	0%	0	0%	0	0%	1	5%	0	0%
	Retail store salesperson	3	11%	1	14%	2	10%	0	0%	0	0%	3	13%	0	0%
	Print newspaper story	1	4%	0	0%	1	7%	0	0%	0	0%	1	5%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	Online news story	4	15%	1	14%	3	18%	0	0%	0	0%	4	18%	0	0%
	Television ad	2	4%	0	0%	2	7%	0	0%	0	0%	0	0%	2	28%
	Social media, such as Facebook, Instagram or YouTube	7	25%	4	45%	3	17%	0	0%	0	0%	5	25%	2	24%
	Contractor or installer	4	16%	0	0%	4	26%	0	0%	0	0%	4	19%	0	0%
	Internet research	8	29%	1	14%	6	38%	0	0%	1	100%	7	32%	1	16%
	Internet advertising	7	21%	0	0%	6	31%	1	61%	0	0%	3	14%	4	62%
	Boring but Efficient website	1	5%	1	16%	0	0%	0	0%	0	0%	1	6%	0	0%
D1 (n=411) Which of the following statements best describes you?	I am the first among my friends to purchase new technology	37	10%	11	10%	22	12%	2	4%	2	3%	39	12%	2	2%
	I purchase new technology sooner than most of my friends	69	18%	17	15%	41	22%	8	11%	3	9%	58	18%	15	18%
	I am typically in the middle of the group when purchasing new technology	147	35%	40	36%	60	32%	26	39%	21	52%	113	34%	32	39%
	I purchase new technology after most of my friends have purchased it	63	16%	20	18%	31	15%	7	11%	5	12%	55	17%	10	12%
	I am one of the last people to purchase new technology	71	16%	20	16%	30	15%	15	25%	6	12%	50	15%	16	20%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	I'm not sure	24	5%	6	4%	8	4%	5	11%	5	12%	14	4%	7	9%
D2a (n=411) Please rate your level of agreement with the following statements. - I do research before making big purchases.	Strongly disagree	12	3%	3	3%	7	3%	1	3%	1	3%	9	3%	3	2%
	Somewhat disagree	10	2%	5	3%	3	1%	1	0%	1	3%	8	2%	2	1%
	Neither agree nor disagree	29	6%	9	7%	12	6%	5	7%	3	6%	20	6%	9	8%
	Somewhat agree	138	36%	40	36%	62	35%	21	40%	15	36%	103	36%	35	35%
	Strongly agree	222	53%	57	51%	108	55%	35	50%	22	52%	166	53%	56	53%
D2b (n=411) Please rate your level of agreement with the following statements. - I compare prices online for big purchases.	Strongly disagree	10	2%	2	2%	7	3%	1	3%	0	0%	6	2%	4	2%
	Somewhat disagree	10	2%	3	3%	5	2%	1	0%	1	3%	8	2%	2	2%
	Neither agree nor disagree	41	9%	9	7%	18	9%	6	10%	8	18%	32	10%	9	7%
	Somewhat agree	155	40%	49	42%	75	41%	20	30%	11	29%	113	40%	42	41%
	Strongly agree	195	46%	51	46%	87	44%	35	57%	22	50%	147	46%	48	46%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
D2c (n=411) Please rate your level of agreement with the following statements. - I seek out expert recommendations for big purchases.	Strongly disagree	11	3%	3	2%	7	4%	1	3%	0	0%	7	3%	4	4%
	Somewhat disagree	20	5%	4	3%	14	7%	2	3%	0	0%	16	6%	4	2%
	Neither agree nor disagree	65	14%	17	12%	25	13%	10	13%	13	30%	44	13%	21	18%
	Somewhat agree	185	46%	49	45%	87	46%	30	53%	19	45%	136	45%	49	50%
	Strongly agree	130	32%	41	38%	59	31%	20	27%	10	24%	103	34%	27	26%
D2d (n=411) Please rate your level of agreement with the following statements. - I will spend money upfront to save money in the long term.	Strongly disagree	11	3%	4	2%	6	3%	1	3%	0	0%	6	2%	5	4%
	Somewhat disagree	25	6%	11	9%	10	6%	4	3%	0	0%	21	7%	4	2%
	Neither agree nor disagree	91	21%	24	19%	40	21%	16	29%	11	24%	70	22%	21	20%
	Somewhat agree	184	45%	46	44%	85	45%	33	52%	20	52%	133	44%	51	49%
	Strongly agree	100	25%	29	26%	51	26%	9	13%	11	24%	76	25%	24	25%
D2e (n=411) Please rate your level of agreement with the following statements. - I am concerned about	Strongly disagree	16	4%	4	3%	7	4%	3	6%	2	3%	12	4%	4	4%
	Somewhat disagree	21	5%	1	1%	14	8%	2	0%	4	9%	16	5%	5	5%
	Neither agree nor disagree	78	18%	22	17%	33	17%	13	23%	10	21%	56	17%	22	21%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
environmental issues.	Somewhat agree	160	39%	52	47%	68	35%	28	48%	12	30%	118	40%	42	39%
	Strongly agree	136	34%	35	33%	70	35%	17	23%	14	36%	104	34%	32	32%
D2f (n=411) Please rate your level of agreement with the following statements. - I consider sustainability when making decisions about which products to purchase.	Strongly disagree	17	4%	5	5%	7	4%	4	7%	1	3%	11	4%	6	6%
	Somewhat disagree	27	6%	5	4%	12	6%	6	7%	4	9%	18	5%	9	9%
	Neither agree nor disagree	97	22%	26	20%	40	21%	18	30%	13	30%	70	21%	27	24%
	Somewhat agree	175	44%	53	48%	81	43%	26	40%	15	36%	135	45%	40	40%
	Strongly agree	95	24%	25	23%	52	26%	9	17%	9	21%	72	25%	23	21%
D2g (n=411) Please rate your level of agreement with the following statements. - Actions taken by individuals like me have an impact on the environment.	Strongly disagree	9	2%	1	1%	3	2%	4	7%	1	3%	5	1%	4	5%
	Somewhat disagree	26	6%	4	2%	15	8%	3	3%	4	9%	19	6%	7	7%
	Neither agree nor disagree	114	26%	28	22%	50	26%	22	34%	14	33%	83	26%	31	28%
	Somewhat agree	144	36%	53	48%	59	31%	20	34%	12	27%	110	37%	34	33%
	Strongly agree	118	29%	28	26%	65	33%	14	21%	11	27%	89	30%	29	28%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
D2h (n=411) Please rate your level of agreement with the following statements. - Energy efficiency is my primary consideration when choosing mechanical systems for my home, like a furnace, air conditioner, or water heater.	Strongly disagree	11	3%	2	2%	6	4%	2	3%	1	3%	7	2%	4	5%
	Somewhat disagree	25	6%	8	6%	13	7%	2	0%	2	6%	17	6%	8	7%
	Neither agree nor disagree	93	22%	22	18%	46	23%	15	20%	10	24%	72	22%	21	20%
	Somewhat agree	179	43%	55	50%	71	38%	33	57%	20	47%	133	43%	46	43%
	Strongly agree	103	26%	27	26%	56	28%	11	20%	9	21%	77	26%	26	26%
COOL_SPACE (n=162) Have you heard anyone say that heat pump water heaters cool the air around the water heater?	Yes	26	19%	7	19%	17	21%	1	11%	1	17%	24	21%	2	8%
	No	109	65%	32	66%	57	63%	14	67%	6	67%	84	64%	25	75%
	I'm not sure	27	16%	7	15%	14	15%	4	22%	2	17%	21	16%	6	17%
38 (n=26) Where did you hear that heat pump water	Friends or family	6	24%	2	28%	4	23%	0	0%	0	0%	6	25%	0	0%
	Personal experience	3	11%	1	15%	1	6%	1	100%	0	0%	2	9%	1	59%
	Social media	5	20%	1	15%	4	24%	0	0%	0	0%	5	21%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
heaters cool the air around the water heater?	Online research about water heaters	9	32%	2	30%	6	32%	0	0%	1	100%	8	31%	1	41%
	A contractor or plumber	12	47%	5	72%	6	35%	1	100%	0	0%	11	47%	1	59%
	I'm not sure	1	6%	0	0%	1	10%	0	0%	0	0%	1	7%	0	0%
D4 (n=411) Which of the following categories includes your age?	Under 18	1	0%	0	0%	1	0%	0	0%	0	0%	1	0%	0	0%
	18 to 24	14	4%	3	3%	7	3%	3	10%	1	3%	12	4%	2	2%
	25 to 34	74	18%	18	16%	35	18%	14	26%	7	15%	57	18%	17	18%
	35 to 44	95	22%	28	22%	47	25%	16	23%	4	6%	74	23%	21	17%
	45 to 54	68	18%	22	20%	37	19%	6	13%	3	9%	15	20%	14	12%
	55 to 64	72	18%	19	18%	32	17%	9	10%	12	32%	53	17%	19	20%
	65 and older	85	20%	23	21%	33	18%	14	19%	15	35%	54	18%	31	30%
	I'd rather not say	2	0%	1	1%	0	0%	1	0%	0	0%	1	0%	1	1%
D6 (n=411) Which of the following categories best describes the highest level of education you have completed?	Some high school	6	1%	1	1%	3	1%	2	7%	0	0%	4	1%	2	2%
	High school graduate or GED	81	19%	24	18%	35	17%	12	23%	10	25%	59	18%	22	19%
	Trade or technical school	32	7%	10	8%	10	5%	9	13%	3	6%	24	7%	8	8%
	Some college	105	25%	28	24%	47	24%	17	23%	13	31%	77	25%	28	25%
	College graduate	117	30%	31	30%	61	32%	16	30%	9	22%	84	29%	33	35%
	Some graduate school	16	5%	7	6%	7	5%	1	0%	1	3%	15	5%	1	1%
	Graduate degree	52	14%	13	14%	28	15%	5	3%	6	13%	41	15%	11	10%
	I'd rather not say	2	0%	0	0%	1	0%	1	0%	0	0%	2	0%	0	0%
D7 (n=411)	Less than $40,000	149	34%	49	38%	61	28%	22	47%	17	41%	99	30%	50	47%
	Between $40,001 and $60,000	86	21%	26	22%	41	22%	10	10%	9	22%	66	22%	20	18%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
Which of the following categories best describes your approximate annual household income from all sources in 2020, before taxes?	Between $60,001 and $80,000	71	17%	13	13%	36	18%	15	23%	7	16%	57	18%	14	12%
	Between $80,001 and $120,000	46	12%	11	12%	24	14%	8	7%	3	6%	41	14%	5	5%
	Between $120,001 and $250,000	41	12%	12	13%	22	13%	2	0%	5	13%	32	12%	9	10%
	Over $250,000	4	1%	1	1%	3	2%	0	0%	0	0%	4	2%	0	0%
	I'm not sure	3	1%	1	1%	0	0%	2	7%	0	0%	0	0%	3	4%
	I'd rather not say	11	2%	1	1%	5	3%	4	7%	1	3%	7	2%	4	5%
D8 (n=411) Do you consider yourself Hispanic or Latino?	Yes	30	8%	11	11%	11	6%	6	17%	2	6%	24	9%	6	6%
	No	379	92%	103	89%	180	94%	56	83%	40	94%	280	91%	99	94%
	I'd rather not say	2	0%	0	0%	1	0%	1	0%	0	0%	2	0%	0	0%
D9 (n=411) How would you describe yourself?	White	357	85%	101	86%	162	83%	55	83%	39	92%	257	82%	100	94%
	Black or African American	16	4%	7	6%	8	4%	0	0%	1	2%	13	5%	3	3%
	American Indian or Alaska Native	15	3%	3	2%	4	2%	4	8%	4	12%	8	2%	7	7%
	Asian	24	7%	0	0%	19	11%	3	6%	2	5%	21	8%	3	4%
	Native Hawaiian or Pacific Islander	5	1%	2	3%	2	1%	0	0%	1	2%	5	2%	0	0%
	Other	9	2%	5	5%	2	1%	2	5%	0	0%	9	3%	0	0%
	I'd rather not say	6	2%	2	2%	3	2%	1	0%	0	0%	6	2%	0	0%
D10 (n=411) How would you describe yourself?	Male	160	39%	51	42%	66	36%	24	33%	19	42%	121	39%	39	38%
	Female	248	61%	63	58%	124	63%	38	67%	23	58%	182	60%	66	62%
	Non-binary	2	1%	0	0%	2	1%	0	0%	0	0%	2	1%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	I'd rather not say	1	0%	0	0%	0	0%	1	0%	0	0%	1	0%	0	0%
D11 (n=411)	English	400	97%	110	96%	186	96%	62	97%	42	100%	297	96%	103	99%
What language is	Spanish	6	2%	4	4%	2	1%	0	0%	0	0%	5	2%	1	0%
primarily spoken in	Mandarin	1	1%	0	0%	1	1%	0	0%	0	0%	1	1%	0	0%
your home?	Cantonese	4	1%	0	0%	3	2%	1	3%	0	0%	3	1%	1	1%

Table 31: DETAILED Post-CAMPAIGN CONSUMER SURVEY RESULTS

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
S_OwnRent (n=416) Do you own or rent your home?	Own	260	63%	67	63%	128	64%	39	53%	26	70%	176	61%	84	70%
	Rent	156	37%	41	37%	74	36%	22	47%	19	30%	112	39%	44	30%
S_HomeType (n=416) What type of home do you live in?	Single-family home	279	63%	71	64%	140	64%	40	57%	28	65%	190	62%	89	67%
	Townhouse/rowhouse	38	10%	9	9%	18	11%	7	13%	4	6%	27	11%	11	7%
	Mobile home	22	6%	3	2%	10	6%	4	10%	5	12%	12	5%	10	11%
	Apartment/condo (2-4 units)	18	5%	5	6%	9	5%	4	7%	0	0%	15	5%	3	4%
	Apartment/condo (5+ units)	59	16%	20	20%	25	14%	6	13%	8	18%	44	17%	15	12%
WH_Age (n=392) Approximately how old is your water heater?	Less than 1 year old	20	5%	3	3%	13	6%	1	3%	3	7%	13	5%	7	5%
	1 to 5 years old	153	38%	48	40%	72	38%	21	38%	14	33%	104	38%	49	41%
	6 to 10 years old	101	25%	21	20%	54	28%	15	24%	11	27%	67	25%	34	28%
	More than 10 years old	89	24%	24	26%	37	20%	17	28%	11	33%	65	25%	24	19%
	I'm not sure	29	8%	10	11%	14	7%	4	7%	1	0%	20	8%	9	8%
A1 (n=416) Before today, had you heard the terms "heat pump water heater" or "hybrid water heater"?	Yes	158	37%	46	40%	74	36%	20	32%	18	35%	105	36%	53	41%
	No	210	51%	50	48%	102	51%	34	58%	24	56%	142	50%	68	53%
	I'm not sure	48	12%	12	11%	26	14%	7	10%	3	9%	41	14%	7	6%
A2 (n=416)	Yes	171	39%	49	42%	80	38%	25	40%	17	36%	112	38%	59	46%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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Based on that description, have you heard of "heat pump water heaters" or "hybrid water heaters"?	No	212	52%	49	48%	104	52%	34	57%	25	58%	149	53%	63	49%
	I'm not sure	33	9%	10	10%	18	9%	2	3%	3	6%	27	10%	6	5%
A4 (n=171) Where or how have you heard about heat pump water heaters?	I currently own or use one	37	24%	13	27%	21	26%	3	15%	0	0%	27	25%	10	18%
	I previously owned or use one	19	12%	8	19%	6	8%	4	12%	1	4%	16	14%	3	4%
	From a friend or acquaintance	49	28%	11	24%	24	30%	9	36%	5	27%	31	28%	18	29%
	Utility print advertising or bill insert	13	7%	6	10%	4	5%	1	2%	2	11%	6	5%	7	14%
	Utility website	19	11%	8	15%	5	7%	1	2%	5	35%	11	10%	8	15%
	Smart Water Heat website	14	9%	4	9%	7	9%	2	7%	1	7%	9	9%	5	11%
	Hot Water Solutions website	7	5%	3	5%	3	5%	0	0%	1	7%	4	4%	3	6%
	Retail store display	19	13%	8	18%	9	11%	1	7%	1	4%	15	15%	4	6%
	Retail store salesperson	17	10%	7	12%	8	10%	2	4%	0	0%	12	10%	5	11%
	Printed newspaper ad	7	2%	3	4%	1	1%	2	4%	1	7%	3	1%	4	7%
	Print newspaper story	5	2%	2	4%	2	2%	1	2%	0	0%	3	2%	2	3%
	Online news story	16	9%	5	9%	9	11%	1	2%	1	4%	9	8%	7	13%
	Television ad	19	12%	7	13%	9	13%	2	4%	1	7%	14	12%	5	10%
	Social media, such as Facebook, Instagram, or YouTube	22	13%	9	16%	10	12%	1	7%	2	14%	12	11%	10	19%
	Contractor or installer	34	20%	11	22%	16	20%	5	14%	2	11%	24	21%	10	18%
	While researching on the Internet	28	16%	12	19%	13	17%	2	13%	1	4%	16	15%	12	21%
	Internet advertising	17	10%	3	5%	7	10%	4	21%	3	18%	12	10%	5	9%
	Utility newsletter	12	9%	6	14%	4	6%	1	5%	1	8%	9	10%	3	6%
	Other	4	1%	1	1%	1	1%	2	7%	0	0%	2	1%	2	3%
	I'm not sure	5	3%	0	0%	3	4%	0	0%	2	12%	4	3%	1	1%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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A6a (n=37) Please rate your satisfaction with the following aspects of your heat pump water heater. - The sound level of the heat pump water heater	Very dissatisfied	1	3%	0	0%	1	5%	0	0%	0	0%	1	3%	0	0%
	Somewhat dissatisfied	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Neither satisfied nor dissatisfied	3	7%	2	13%	1	5%	0	0%	0	0%	1	3%	2	14%
	Somewhat satisfied	10	28%	3	27%	7	32%	0	0%	0	0%	8	29%	2	29%
	Very satisfied	23	62%	8	60%	12	59%	3	100%	0	0%	17	65%	6	57%
A6b (n=35) Please rate your satisfaction with the following aspects of your heat pump water heater. - The change in your electricity bill since installing the heat pump water heater	Very dissatisfied	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Somewhat dissatisfied	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Neither satisfied nor dissatisfied	6	18%	2	21%	3	15%	1	50%	0	0%	4	17%	2	14%
	Somewhat satisfied	12	35%	5	36%	7	35%	0	0%	0	0%	9	38%	3	29%
	Very satisfied	17	47%	6	43%	9	50%	2	50%	0	0%	12	45%	5	57%
A6c (n=37) Please rate your satisfaction with	Very dissatisfied	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Somewhat dissatisfied	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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the following aspects of your heat pump water heater. - Your hot water supply	Neither satisfied nor dissatisfied	1	4%	1	7%	0	0%	0	0%	0	0%	1	3%	0	0%
	Somewhat satisfied	10	25%	6	43%	3	14%	1	50%	0	0%	5	19%	5	57%
	Very satisfied	26	71%	6	50%	18	86%	2	50%	0	0%	21	78%	5	43%
A6d (n=36) Please rate your satisfaction with the following aspects of your heat pump water heater. - The maintenance requirements of the heat pump water heater	Very dissatisfied	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Somewhat dissatisfied	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Neither satisfied nor dissatisfied	8	25%	5	46%	3	13%	0	0%	0	0%	6	27%	2	17%
	Somewhat satisfied	8	20%	3	23%	5	22%	0	0%	0	0%	5	17%	3	33%
	Very satisfied	20	55%	4	31%	13	65%	3	100%	0	0%	15	57%	5	50%
A6e (n=37) Please rate your satisfaction with the following aspects of your heat pump water heater. - The heat pump water heater overall	Very dissatisfied	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Somewhat dissatisfied	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Neither satisfied nor dissatisfied	1	2%	0	0%	1	4%	0	0%	0	0%	0	0%	1	14%
	Somewhat satisfied	8	20%	5	33%	2	9%	1	50%	0	0%	4	16%	4	43%
	Very satisfied	28	79%	8	67%	18	87%	2	50%	0	0%	23	84%	5	43%
A7 (n=37) Have you, or would you, recommend a	Yes, I have	12	31%	4	29%	8	35%	0	0%	0	0%	7	26%	5	57%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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heat pump water heater to a friend, colleague, or family member?	Yes, I would	22	60%	7	57%	12	61%	3	100%	0	0%	17	65%	5	43%
	No	1	3%	1	7%	0	0%	0	0%	0	0%	1	3%	0	0%
	I'm not sure	2	6%	1	7%	1	4%	0	0%	0	0%	2	6%	0	0%
A9a (n=171) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters are very efficient.	Strongly disagree	2	0%	0	0%	1	1%	1	0%	0	0%	1	0%	1	3%
	Somewhat disagree	6	3%	2	4%	2	3%	1	0%	1	9%	3	3%	3	5%
	Neither agree nor disagree	33	21%	8	20%	16	21%	6	27%	3	18%	24	23%	9	13%
	Somewhat agree	83	48%	26	54%	37	46%	13	55%	7	36%	54	48%	29	50%
	Strongly agree	47	27%	13	22%	24	29%	4	18%	6	36%	30	26%	17	29%
A9b (n=171) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters result in	Strongly disagree	3	1%	0	0%	1	1%	1	0%	1	8%	2	1%	1	3%
	Somewhat disagree	6	4%	1	2%	3	5%	1	0%	1	0%	5	5%	1	0%
	Neither agree nor disagree	48	30%	13	30%	24	29%	6	27%	5	33%	30	29%	18	32%
	Somewhat agree	86	51%	27	57%	39	49%	14	64%	6	33%	61	53%	25	43%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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lower electric bills than a typical water heater.	Strongly agree	28	14%	8	11%	13	16%	3	9%	4	25%	14	12%	14	22%
A9c (n=171) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters are eligible for tax credits and/or discounts from utility companies.	Strongly disagree	5	3%	1	2%	3	5%	1	0%	0	0%	5	4%	0	0%
	Somewhat disagree	8	5%	4	8%	2	3%	1	0%	1	8%	6	5%	2	5%
	Neither agree nor disagree	77	44%	17	37%	40	47%	12	50%	8	42%	47	42%	30	49%
	Somewhat agree	60	36%	22	44%	25	32%	7	33%	6	33%	40	37%	20	33%
	Strongly agree	21	12%	5	10%	10	13%	4	17%	2	17%	14	12%	7	13%
A9d (n=171) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters offer better value than typical electric water heaters.	Strongly disagree	4	2%	1	2%	3	3%	0	0%	0	0%	2	2%	2	3%
	Somewhat disagree	8	5%	2	6%	2	2%	3	17%	1	8%	4	4%	4	5%
	Neither agree nor disagree	57	34%	14	31%	29	36%	8	33%	6	33%	39	35%	18	32%
	Somewhat agree	74	43%	28	54%	30	38%	9	33%	7	42%	47	42%	27	47%
	Strongly agree	28	16%	4	7%	16	21%	5	17%	3	17%	20	17%	8	13%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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A9e (n=171) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters can be controlled from a smart phone.	Strongly disagree	4	2%	0	0%	3	5%	1	0%	0	0%	4	3%	0	0%
	Somewhat disagree	13	8%	2	6%	9	10%	1	0%	1	8%	8	7%	5	10%
	Neither agree nor disagree	86	52%	28	62%	37	47%	14	58%	7	42%	62	57%	24	38%
	Somewhat agree	46	24%	14	25%	18	22%	8	33%	6	25%	26	22%	20	33%
	Strongly agree	22	13%	5	8%	13	16%	1	8%	3	25%	12	11%	10	18%
A9f (n=171) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters are noisy.	Strongly disagree	35	20%	9	21%	17	19%	6	25%	3	18%	22	19%	13	21%
	Somewhat disagree	58	34%	17	36%	27	34%	10	42%	4	27%	39	35%	19	32%
	Neither agree nor disagree	61	37%	18	36%	26	36%	8	33%	9	55%	43	38%	18	32%
	Somewhat agree	12	6%	4	6%	6	7%	1	0%	1	0%	6	6%	6	11%
	Strongly agree	5	3%	1	2%	4	5%	0	0%	0	0%	2	2%	3	5%
A9g (n=171) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters are unreliable.	Strongly disagree	28	17%	8	19%	14	17%	4	17%	2	8%	19	17%	9	16%
	Somewhat disagree	71	39%	20	35%	33	39%	10	42%	8	50%	45	38%	26	43%
	Neither agree nor disagree	52	32%	16	37%	21	29%	10	42%	5	25%	37	35%	15	24%
	Somewhat agree	16	10%	4	7%	9	11%	1	0%	2	17%	9	9%	7	14%
	Strongly agree	4	2%	1	2%	3	3%	0	0%	0	0%	2	2%	2	3%
A9h (n=171)	Strongly disagree	9	5%	2	4%	4	5%	1	0%	2	9%	6	5%	3	5%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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Please assess how much you agree or disagree with the following statements. - Heat pump water heaters are expensive to install.	Somewhat disagree	18	10%	2	4%	11	14%	3	15%	2	9%	12	10%	6	11%
	Neither agree nor disagree	62	36%	19	42%	23	28%	12	54%	8	55%	40	35%	22	37%
	Somewhat agree	62	37%	19	42%	31	37%	9	31%	3	18%	42	38%	20	34%
	Strongly agree	20	12%	7	9%	11	16%	0	0%	2	9%	12	12%	8	13%
A9i (n=171) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters are expensive to service or repair.	Strongly disagree	7	4%	1	2%	5	6%	1	8%	0	0%	6	6%	1	3%
	Somewhat disagree	27	15%	7	19%	10	11%	6	23%	4	27%	19	16%	8	13%
	Neither agree nor disagree	79	47%	24	50%	37	48%	10	38%	8	45%	51	48%	28	46%
	Somewhat agree	45	26%	12	22%	23	28%	6	23%	4	27%	29	25%	16	28%
	Strongly agree	13	7%	5	7%	5	7%	2	8%	1	0%	7	6%	6	10%
A9j (n=171) Please assess how much you agree or disagree with the following statements. - Heat pump water heaters do not produce enough hot water.	Strongly disagree	20	12%	4	9%	12	14%	2	8%	2	8%	14	12%	6	11%
	Somewhat disagree	63	35%	20	40%	27	33%	11	42%	5	25%	39	34%	24	38%
	Neither agree nor disagree	64	39%	17	38%	30	40%	9	33%	8	50%	48	43%	16	27%
	Somewhat agree	18	10%	5	8%	8	10%	3	17%	2	17%	8	8%	10	19%
	Strongly agree	6	4%	3	6%	3	3%	0	0%	0	0%	3	3%	3	5%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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	Friends or acquaintances	198	47%	43	40%	105	52%	35	58%	15	28%	138	47%	60	45%
	Utility print advertising or bill inserts	41	10%	12	13%	21	10%	8	11%	0	0%	32	11%	9	8%
	Utility website	112	27%	27	25%	54	27%	19	29%	12	26%	84	28%	28	21%
A10 (n=416) When making a decision about purchasing mechanical equipment for your home, such as a furnace or water heater, what are your typical sources of information regarding which product to purchase?	Retail store – general	82	19%	15	14%	39	19%	14	23%	14	32%	57	18%	25	20%
	Retail store – displays	65	16%	16	15%	32	16%	12	17%	5	14%	49	16%	16	12%
	Retail store salespeople	101	25%	24	24%	53	27%	14	25%	10	21%	72	26%	29	22%
	Newspaper ads	10	3%	3	3%	5	3%	2	2%	0	0%	7	3%	3	3%
	Print newspaper stories	11	3%	6	5%	5	3%	0	0%	0	0%	9	4%	2	2%
	Online news stories	40	10%	11	10%	19	10%	5	9%	5	12%	26	10%	14	12%
	Television ads	40	10%	15	14%	18	9%	6	11%	1	1%	33	12%	7	6%
	Social media, such as Facebook, Instagram or YouTube	53	13%	17	15%	24	13%	7	12%	5	11%	39	14%	14	12%
	From a contractor or installer	167	39%	47	43%	72	35%	27	49%	21	47%	107	38%	60	47%
	Internet research or internet reviews	246	59%	57	52%	129	65%	37	63%	23	46%	171	60%	75	57%
	Internet advertising	63	15%	18	15%	31	16%	13	21%	1	3%	48	16%	15	12%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	Specific internet website	13	4%	6	5%	6	3%	0	0%	1	3%	8	3%	5	5%
	Utility newsletter	37	10%	16	15%	18	10%	2	3%	1	1%	28	11%	9	7%
	Other	11	3%	1	1%	7	4%	1	2%	2	4%	7	3%	4	3%
	Not applicable	2	1%	0	0%	2	1%	0	0%	0	0%	1	0%	1	1%
	I'm not sure	15	4%	4	3%	6	3%	3	5%	2	5%	12	4%	3	2%
	Consumer Reports	3	22%	1	17%	2	38%	0	0%	0	0%	2	27%	1	25%
A10_site (n=13)	Amazon	1	10%	1	17%	0	0%	0	0%	0	0%	1	9%	0	0%
Specific internet website	Google	6	51%	2	50%	3	50%	0	0%	1	100%	4	55%	2	50%
	YouTube	1	8%	0	0%	1	13%	0	0%	0	0%	1	9%	0	0%
	Other	2	9%	2	17%	0	0%	0	0%	0	0%	0	0%	2	25%
A11 (n=416)	Yes	73	17%	25	21%	33	16%	8	13%	7	15%	48	17%	25	20%
Have you purchased a new water heater in the past three years?	No	342	82%	83	79%	168	83%	53	87%	38	85%	239	83%	103	80%
	I'm not sure	1	0%	0	0%	1	0%	0	0%	0	0%	1	0%	0	0%
A12 (n=73)	My water heater was completely broken and did not provide any hot water	25	31%	7	27%	13	32%	3	33%	2	40%	15	27%	7	41%
Why did you purchase a new water heater?	My water heater worked poorly and/or needed repair	10	11%	4	15%	3	11%	2	0%	1	0%	8	15%	1	6%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	My water heater was old and/or close to failing	14	24%	4	19%	9	30%	0	0%	1	20%	17	31%	1	6%
	I wanted to install a more energy-efficient water heater	15	24%	7	27%	7	24%	0	0%	1	20%	13	24%	4	24%
	To serve an addition to my home	5	7%	3	12%	1	3%	0	0%	1	20%	1	2%	3	18%
	Other	3	3%	0	0%	0	0%	3	67%	0	0%	1	2%	1	6%
	I'm not sure	1	0%	0	0%	0	0%	0	0%	1	0%	0	0%	0	0%
A13 (n=54) Did your installer or contractor recommend a heat pump water heater to you?	Yes	28	53%	10	48%	15	63%	2	25%	1	33%	19	55%	9	50%
	No	22	38%	8	38%	9	37%	4	50%	1	33%	13	35%	9	43%
	I'm not sure	4	9%	2	14%	0	0%	1	25%	1	33%	3	10%	1	7%
A15 (n=416) What would cause you to purchase a new water heater (of any type)? Please select all that apply.	If it fails, breaks, or leaks	360	87%	86	82%	180	89%	55	90%	39	88%	257	89%	103	79%
	If it has some issues but needs repairs to work well	128	32%	34	31%	65	33%	15	30%	14	32%	89	32%	39	31%
	To save energy, even if it still works	98	25%	26	25%	52	26%	11	15%	9	21%	74	26%	24	19%
	To lower utility bills, even if it still works	123	31%	30	30%	65	33%	16	27%	12	25%	91	33%	32	24%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	If I was already renovating my home	81	20%	23	22%	38	19%	11	21%	9	18%	54	20%	27	22%
	Not applicable	4	1%	4	2%	0	0%	0	0%	0	0%	1	0%	3	2%
	I'm not sure	3	1%	1	1%	1	0%	0	0%	1	3%	2	1%	1	1%
A16 (n=134) Did/Have you Considered installing a heat pump water heater?	Yes	71	56%	25	61%	21	61%	8	30%	7	42%	48	59%	23	48%
	No	53	35%	12	29%	21	34%	12	50%	8	50%	29	32%	24	48%
	I'm not sure	10	8%	3	11%	3	5%	2	20%	2	8%	8	10%	2	3%
A17 (n=53) What is the primary reason you did not consider installing a heat pump water heater?	Existing equipment works fine	12	23%	1	8%	5	24%	4	50%	2	33%	8	21%	4	19%
	Prefer a different kind	1	2%	1	8%	0	0%	0	0%	0	0%	0	0%	1	6%
	May/plan to in the future	5	7%	0	0%	3	14%	1	0%	1	0%	3	10%	2	6%
	Cost	12	23%	2	17%	6	29%	1	0%	3	33%	7	28%	5	19%
	Not familiar enough with them	7	14%	1	8%	4	19%	2	25%	0	0%	5	17%	2	6%
	Concerns about their performance	1	2%	1	8%	0	0%	0	0%	0	0%	0	0%	1	6%
	Does not fit in my space	7	14%	2	17%	2	10%	2	25%	1	17%	2	10%	5	19%
	The installer/contractor did not mention them	2	2%	1	8%	0	0%	1	0%	0	0%	2	7%	0	0%
	Other	1	2%	0	0%	0	0%	0	0%	1	17%	0	0%	1	6%
	Not applicable	3	5%	1	8%	1	5%	1	0%	0	0%	1	3%	2	6%
	I'm not sure	2	5%	2	17%	0	0%	0	0%	0	0%	1	3%	1	6%
A19 (n=171) Have you heard of any brands that	Yes	44	29%	16	32%	24	33%	2	8%	2	17%	32	32%	12	24%
	No	97	55%	27	57%	37	48%	20	75%	13	75%	65	54%	32	53%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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make heat pump water heaters?	I'm not sure	30	16%	6	11%	19	20%	3	17%	2	8%	15	14%	15	24%
A20 (n=44) Which of the following heat pump water heater brands have you heard of, if any?	General Electric ("GE")	19	46%	8	56%	10	42%	1	56%	0	0%	16	49%	3	30%
	A.O. Smith	6	12%	3	15%	2	9%	1	56%	0	0%	3	8%	3	30%
	American	15	31%	7	33%	8	33%	0	0%	0	0%	8	25%	7	58%
	Kenmore	19	41%	7	43%	9	37%	2	100%	1	47%	13	40%	6	49%
	Reliance	7	15%	4	22%	2	10%	1	56%	0	0%	4	12%	3	26%
	State	3	8%	0	0%	3	14%	0	0%	0	0%	3	10%	0	0%
	Stiebel Eltron	3	7%	2	12%	1	4%	0	0%	0	0%	2	6%	1	11%
	U.S. Craftmaster	6	10%	4	19%	2	6%	0	0%	0	0%	1	3%	5	44%
	Whirlpool	21	47%	10	61%	10	41%	1	44%	0	0%	14	44%	7	58%
	AirGenerate	5	12%	2	12%	3	13%	0	0%	0	0%	3	9%	2	23%
	Electrolux	7	16%	3	16%	3	13%	0	0%	1	53%	5	15%	2	19%
	Rheem	10	22%	2	10%	6	26%	1	56%	1	53%	9	26%	1	7%
	Bradford White	4	7%	3	16%	0	0%	1	56%	0	0%	2	5%	2	19%
	Sanden	3	7%	2	12%	1	5%	0	0%	0	0%	1	4%	2	23%
	Hubbell	6	14%	3	15%	3	14%	0	0%	0	0%	3	10%	3	30%
	Jetglas	7	17%	3	18%	4	19%	0	0%	0	0%	5	16%	2	23%
	Lochinvar	2	5%	1	6%	1	5%	0	0%	0	0%	1	4%	1	11%
	Ruud	4	10%	1	6%	3	14%	0	0%	0	0%	3	10%	1	11%
	Richmond	4	10%	2	12%	2	10%	0	0%	0	0%	2	7%	2	23%
	Vaughn	3	6%	1	6%	2	7%	0	0%	0	0%	2	6%	1	6%
	I'm not sure	2	6%	1	9%	1	4%	0	0%	0	0%	2	7%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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HWS_Aware (n=416) Before today, had you heard of the "Hot Water Solutions" program?	Yes	32	8%	10	7%	14	7%	6	13%	2	6%	22	7%	9	11%
	No	363	88%	95	91%	175	87%	52	80%	41	88%	294	88%	70	84%
	I'm not sure	21	5%	3	2%	13	6%	3	7%	2	6%	17	5%	4	5%
HWS_First (n=32) How did you hear of HWS program?	Hot Water Solutions website	3	11%	2	23%	1	8%	0	0%	0	0%	2	11%	1	11%
	Friend or acquaintance	10	30%	4	36%	4	29%	1	16%	1	50%	5	26%	5	42%
	Utility print advertising or bill insert	3	12%	1	11%	2	16%	0	0%	0	0%	2	12%	1	11%
	Utility website	10	31%	4	45%	4	29%	2	25%	0	0%	7	32%	3	29%
	Retail store display	1	3%	0	0%	0	0%	1	20%	0	0%	1	4%	0	0%
	Retail store salesperson	4	12%	2	18%	1	7%	1	20%	0	0%	2	9%	2	18%
	Print newspaper ad	2	6%	2	22%	0	0%	0	0%	0	0%	0	0%	2	22%
	Print newspaper story	3	11%	2	22%	1	9%	0	0%	0	0%	1	7%	2	22%
	Online news story	6	23%	2	22%	4	32%	0	0%	0	0%	4	23%	2	22%
	Television ad	2	6%	1	7%	1	7%	0	0%	0	0%	1	5%	1	7%
	Social media, such as Facebook, Instagram or YouTube	11	35%	4	36%	7	48%	0	0%	0	0%	5	30%	6	49%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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	Contractor or installer	9	26%	4	36%	3	19%	2	39%	0	0%	4	19%	5	43%
	Internet research	7	22%	4	36%	2	17%	1	20%	0	0%	3	16%	4	37%
	Internet advertising	6	22%	1	11%	4	31%	1	20%	0	0%	5	26%	1	11%
	Boring but Efficient website	2	6%	1	7%	1	8%	0	0%	0	0%	1	6%	1	7%
	I'm not sure	2	5%	0	0%	0	0%	1	20%	1	50%	1	4%	1	9%
D1 (n=416) Which of the following statements best describes you?	I am the first among my friends to purchase new technology	26	7%	9	8%	16	8%	1	0%	0	0%	20	7%	6	6%
	I purchase new technology sooner than most of my friends	80	20%	23	20%	45	22%	5	6%	7	18%	58	20%	22	18%
	I am typically in the middle of the group when purchasing new technology	160	37%	35	31%	78	38%	30	48%	17	35%	113	37%	47	35%
	I purchase new technology after most of my friends have purchased it	71	17%	16	17%	33	17%	12	19%	10	24%	48	17%	23	18%
	I am one of the last people to purchase new technology	71	17%	23	24%	25	12%	12	23%	11	24%	46	17%	25	18%
	I'm not sure	8	2%	2	1%	5	3%	1	3%	0	0%	3	1%	5	5%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	Strongly disagree	8	2%	1	1%	5	3%	1	3%	1	3%	5	2%	3	2%
D2a (n=416) Please rate your level of agreement with the following statements. - I do research before making big purchases.	Somewhat disagree	9	2%	3	3%	1	0%	1	3%	4	12%	6	2%	3	2%
	Neither agree nor disagree	24	6%	8	7%	9	4%	4	6%	3	6%	16	6%	8	6%
	Somewhat agree	115	28%	31	30%	56	28%	14	19%	14	30%	82	29%	33	27%
	Strongly agree	260	62%	65	59%	131	64%	41	68%	23	48%	179	62%	81	62%
D2b (n=416) Please rate your level of agreement with the following statements. - I compare prices online for big purchases.	Strongly disagree	8	2%	1	1%	4	2%	1	3%	2	6%	5	2%	3	2%
	Somewhat disagree	7	2%	1	1%	2	1%	2	3%	2	6%	4	1%	3	4%
	Neither agree nor disagree	28	7%	7	7%	14	7%	2	3%	5	9%	20	7%	8	6%
	Somewhat agree	120	29%	36	32%	54	28%	15	23%	15	33%	85	29%	35	27%
	Strongly agree	253	61%	63	60%	128	63%	41	68%	21	45%	174	60%	79	61%
D2c (n=416)	Strongly disagree	12	3%	3	2%	3	2%	1	0%	5	12%	7	2%	5	4%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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Please rate your level of agreement with the following statements. - I seek out expert recommendations for big purchases.	Somewhat disagree	22	5%	6	6%	10	4%	4	6%	2	3%	12	4%	10	7%
	Neither agree nor disagree	50	13%	15	15%	27	14%	5	10%	3	9%	39	14%	11	10%
	Somewhat agree	191	46%	46	42%	97	49%	27	45%	21	47%	133	46%	58	46%
	Strongly agree	141	33%	38	35%	65	32%	24	39%	14	29%	97	33%	44	33%
D2d (n=416) Please rate your level of agreement with the following statements. - I will spend money upfront to save money in the long term.	Strongly disagree	7	2%	3	2%	1	0%	0	0%	3	6%	4	1%	3	2%
	Somewhat disagree	23	6%	8	8%	12	5%	2	3%	1	3%	16	6%	7	6%
	Neither agree nor disagree	80	18%	21	19%	31	15%	19	37%	9	21%	50	17%	30	24%
	Somewhat agree	194	46%	41	39%	106	53%	28	37%	19	42%	142	48%	52	40%
	Strongly agree	112	28%	35	32%	52	26%	12	23%	13	27%	76	28%	36	28%
D2e (n=416) Please rate your level of agreement with the following statements. - I am concerned about environmental issues.	Strongly disagree	9	2%	2	2%	2	1%	2	0%	3	6%	8	2%	1	0%
	Somewhat disagree	30	7%	5	5%	16	8%	2	3%	7	16%	16	6%	14	12%
	Neither agree nor disagree	66	15%	15	14%	31	15%	12	20%	8	19%	45	15%	21	16%
	Somewhat agree	164	38%	45	41%	73	36%	31	50%	15	34%	116	38%	48	40%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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	Strongly agree	147	37%	41	38%	80	40%	14	27%	12	25%	103	38%	44	33%
D2f (n=416) Please rate your level of agreement with the following statements. - I consider sustainability when making decisions about which products to purchase.	Strongly disagree	14	4%	3	3%	5	3%	3	3%	3	9%	12	4%	2	1%
	Somewhat disagree	25	6%	5	5%	13	6%	1	0%	6	15%	17	6%	8	6%
	Neither agree nor disagree	78	18%	23	21%	33	16%	12	20%	10	21%	52	18%	26	20%
	Somewhat agree	190	46%	50	46%	91	46%	32	53%	17	35%	136	46%	54	44%
	Strongly agree	109	27%	27	25%	60	29%	13	23%	9	21%	71	26%	38	29%
D2g (n=416) Please rate your level of agreement with the following statements. - Actions taken by individuals like me have an impact on the environment.	Strongly disagree	10	3%	3	3%	4	2%	0	0%	3	6%	8	3%	2	1%
	Somewhat disagree	25	6%	6	6%	13	7%	5	7%	1	3%	20	7%	5	5%
	Neither agree nor disagree	92	21%	18	17%	47	23%	16	23%	11	24%	64	21%	28	23%
	Somewhat agree	160	38%	46	41%	71	36%	24	40%	19	39%	111	39%	49	36%
	Strongly agree	129	32%	35	33%	67	32%	16	30%	11	27%	85	31%	44	35%
D2h (n=416) Please rate your level of agreement	Strongly disagree	11	3%	3	3%	5	3%	1	0%	2	6%	9	3%	2	2%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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with the following statements. - Energy efficiency is my primary consideration when choosing mechanical systems for my home, like a furnace, air conditioner, or water heater.	Somewhat disagree	28	6%	7	6%	16	8%	4	3%	1	0%	21	7%	7	5%
	Neither agree nor disagree	74	18%	19	17%	38	18%	11	20%	6	12%	53	18%	21	17%
	Somewhat agree	199	47%	48	43%	98	48%	29	47%	24	58%	136	47%	63	50%
	Strongly agree	104	26%	31	30%	45	23%	16	30%	12	24%	69	25%	35	26%
35 (n=416) Select the following ads you recall seeing online.	Ad # 1	27	6%	6	5%	15	7%	4	6%	2	5%	17	6%	10	9%
	Ad # 2	17	4%	8	7%	6	3%	2	2%	1	3%	10	4%	7	6%
	Ad # 3	18	4%	6	4%	9	4%	3	5%	0	0%	12	4%	6	4%
	Ad # 4	7	2%	2	1%	4	2%	1	3%	0	0%	5	2%	2	2%
	Ad # 5	19	4%	4	3%	10	5%	5	8%	0	0%	16	5%	3	2%
	Ad # 6	34	8%	7	6%	18	9%	4	7%	5	9%	24	8%	10	7%
	None of the above	301	73%	77	72%	146	73%	44	69%	34	78%	209	73%	92	72%
	I'm not sure	36	8%	7	7%	18	9%	4	12%	5	5%	25	9%	11	7%
36 (n=79) Did the ad(s) you saw have a positive, negative, or no impact on	Positive impact	61	79%	21	88%	27	77%	8	80%	5	60%	43	80%	18	76%
	No impact	16	18%	2	8%	8	21%	3	20%	3	40%	9	16%	7	24%
	I'm not sure	2	3%	1	4%	1	3%	0	0%	0	0%	2	3%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
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your opinion of heat pump water heaters?															
COOL_SPACE (n=171) Have you heard anyone say that heat pump water heaters cool the air around the water heater?	Yes	29	18%	14	28%	11	13%	1	8%	3	25%	16	16%	13	26%
	No	119	70%	31	63%	57	74%	18	62%	13	67%	80	71%	39	63%
	I'm not sure	23	12%	4	9%	12	13%	6	31%	1	8%	16	13%	7	11%
38 (n=29) Where did you hear that heat pump water heaters cool the air around the water heater?	Friends or family	16	63%	8	66%	8	77%	0	0%	0	0%	12	79%	4	31%
	Personal experience	4	13%	1	10%	2	12%	0	0%	1	32%	2	12%	2	14%
	Social media	10	35%	6	43%	4	35%	0	0%	0	0%	5	33%	5	39%
	Online research about water heaters	10	35%	5	33%	3	34%	1	100%	1	32%	4	27%	6	49%
	A contractor or plumber	4	13%	3	18%	1	11%	0	0%	0	0%	2	11%	2	17%
	I'm not sure	1	3%	0	0%	0	0%	0	0%	1	36%	1	5%	0	0%
48 (n=42) Where did you purchase your electric water heater?	Retail store (e.g., Home Depot, Lowe's, ACE Hardware, including online)	22	54%	11	71%	7	38%	1	100%	3	100%	57%	13	55%	9
	Contractor or installer	12	23%	2	12%	8	38%	1	0%	1	0%	23%	7	27%	5
	Plumbing supply house	3	7%	0	0%	3	14%	0	0%	0	0%	7%	2	9%	1
	Utility marketplace (e.g., Enervee)	2	6%	1	6%	1	5%	0	0%	0	0%	3%	1	9%	1
	Online / Internet / Website (e.g., Amazon.com), please specify	1	3%	1	6%	0	0%	0	0%	0	0%	3%	1	0%	0
	Directly from my utility (this may include units that were provided at no cost)	1	3%	0	0%	1	5%	0	0%	0	0%	3%	1	0%	0
	I did not purchase the electric water heater	1	3%	1	6%	0	0%	0	0%	0	0%	3%	1	0%	0

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49 (n=41) Did you install the electric water heater yourself, or did you hire an installer to do it?	Installed it myself	15	36%	4	29%	7	33%	1	100%	3	100%	9	35%	6	36%
	Used a professional installer	26	64%	11	71%	13	67%	1	0%	1	0%	16	65%	10	64%
D4 (n=416) Which of the following categories includes your age?	18 to 24	34	7%	6	5%	18	8%	4	6%	6	12%	25	8%	6	7%
	25 to 34	70	17%	18	17%	36	18%	11	23%	5	12%	57	17%	15	18%
	35 to 44	99	24%	30	27%	50	25%	12	16%	7	12%	84	25%	17	20%
	45 to 54	57	14%	13	13%	30	15%	11	16%	3	9%	49	15%	8	10%
	55 to 64	58	14%	14	11%	27	14%	6	10%	11	26%	40	12%	16	19%
	65 and older	98	24%	27	28%	41	20%	17	29%	13	29%	77	23%	22	26%
D6 (n=416) Which of the following categories best describes the highest level of education you have completed?	Some high school	7	1%	2	2%	1	0%	2	3%	2	3%	2	1%	5	2%
	High school graduate or GED	69	16%	17	16%	36	18%	10	17%	6	11%	45	16%	24	20%
	Trade or technical school	14	3%	3	3%	9	4%	2	7%	0	0%	9	3%	5	4%
	Some college	118	28%	32	30%	49	24%	21	37%	16	37%	79	27%	39	32%
	College graduate	126	31%	31	27%	66	33%	16	27%	13	29%	89	31%	37	29%
	Some graduate school	15	4%	6	6%	5	3%	2	0%	2	6%	13	4%	2	1%
	Graduate degree	67	16%	17	15%	36	18%	8	10%	6	14%	51	17%	16	12%
D7 (n=416)	Less than $40,000	112	26%	34	33%	43	21%	22	39%	13	26%	68	25%	44	34%
	Between $40,001 and $60,000	98	22%	16	14%	48	23%	19	32%	15	32%	66	21%	32	24%

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Which of the following categories best describes your approximate annual household income from all sources in 2020, before taxes?	Between $60,001 and $80,000	62	15%	18	15%	36	17%	5	10%	3	6%	44	15%	18	13%
	Between $80,001 and $120,000	70	17%	17	16%	36	18%	10	13%	7	18%	53	18%	17	13%
	Between $120,001 and $250,000	57	15%	17	16%	31	16%	5	6%	4	12%	44	16%	13	12%
	Over $250,000	7	2%	1	1%	6	3%	0	0%	0	0%	5	2%	2	1%
	I'm not sure	2	1%	2	2%	0	0%	0	0%	0	0%	2	1%	0	0%
	I'd rather not say	8	2%	3	3%	2	1%	0	0%	3	6%	6	2%	2	1%
D8 (n=416) Do you consider yourself Hispanic or Latino?	Yes	25	6%	4	4%	15	8%	5	10%	1	3%	18	6%	7	6%
	No	387	93%	103	95%	186	92%	55	87%	43	94%	268	93%	119	93%
	I'd rather not say	4	1%	1	1%	1	0%	1	3%	1	3%	2	1%	2	1%
D9 (n=416) How would you describe yourself?	White	371	88%	99	91%	178	87%	58	94%	36	78%	253	87%	118	92%
	Black or African American	10	3%	2	2%	6	3%	0	0%	2	4%	9	3%	1	1%
	American Indian or Alaska Native	21	5%	8	9%	5	2%	1	3%	7	16%	14	5%	7	6%
	Asian	16	5%	1	1%	14	8%	1	2%	0	0%	15	6%	1	1%
	Native Hawaiian or Pacific Islander	4	1%	1	1%	3	2%	0	0%	0	0%	4	2%	0	0%
	Other	5	1%	2	2%	2	1%	0	0%	1	3%	4	1%	1	1%
	I'd rather not say	5	1%	0	0%	2	1%	2	4%	1	3%	3	1%	2	2%
D10 (n=416) How would you describe yourself?	Male	143	33%	34	29%	68	34%	26	40%	15	33%	101	33%	42	32%
	Female	269	66%	72	69%	133	66%	34	57%	30	67%	184	66%	85	67%
	Non-binary	3	1%	2	2%	1	0%	0	0%	0	0%	3	1%	0	0%

Survey Question	Response Options	Total		OR		WA		ID		MT		Urban		Rural	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	I'd rather not say	1	0%	0	0%	0	0%	1	3%	0	0%	0	0%	1	1%
D11 (n=416)	English	413	99%	108	100%	200	99%	61	100%	44	97%	285	99%	128	100%
What language is	Cantonese	1	0%	0	0%	1	0%	0	0%	0	0%	1	0%	0	0%
primarily spoken in	Tagalog	1	0%	0	0%	1	0%	0	0%	0	0%	1	0%	0	0%
your home?	I'd rather not say	1	0%	0	0%	0	0%	0	0%	1	3%	1	0%	0	0%

Appendix E Retailer Web-Scraping

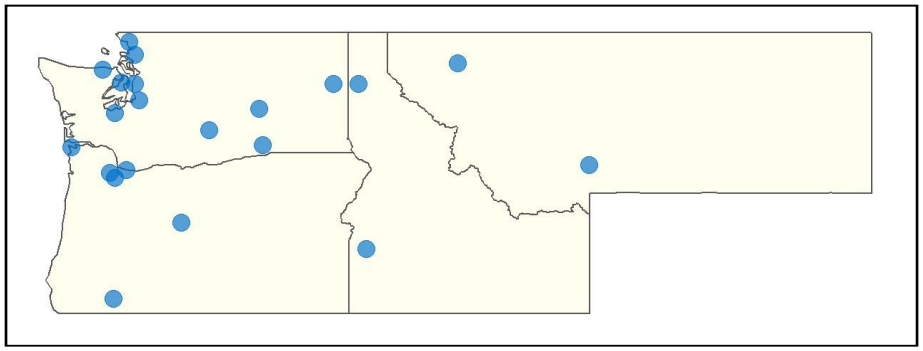
NMR developed software tools to gather, or scrape, water heater listing data from two major home improvement retailers' websites. The scraping tool downloaded detailed information from product listing pages, and the team compiled it to develop a picture of the HPWH stocking practices of these two retailers.

METHODOLOGY

In May 2023, NMR scraped electric water heater inventories from 21 big box store websites across two major retailers and the four states in NEEA territory. NMR scraped the same 21 stores included in the MPER #6 web-scraping effort. MPER #6 used a methodology to select stores based on the relative proportion of stores in the four states and the number of stores in rural vs. urban counties. Within these strata, NMR randomly sampled specific store branches in each state for MPER #6. The data scraped included equipment specifications and the number of items in stock. After collecting the data, NMR merged the scraped equipment data with store metadata. This joined data allowed for analysis of where water heaters, HPWH or not, are commonly stocked in NEEA territory. Figure 47 maps the locations of retailers whose inventories the team scraped. Using the same stores as MPER #6 allows for comparisons over time.

Readers should note that this approach allows one to see how many HPWH models are in-stock and readily available for emergency replacement installations, but it does not describe sales volumes. The number of models in stock and sales volumes are likely correlated, but one metric does not perfectly describe the other.

Figure 47: Web-Scraped Big Box Retailer Branches (n=21)



Small capacity systems omitted. The analysis omitted models with a nameplate capacity of 20 or fewer gallons. These smaller-capacity systems are meant for point-of-use water heating applications and are not true competitors of standard-size HPWH products.

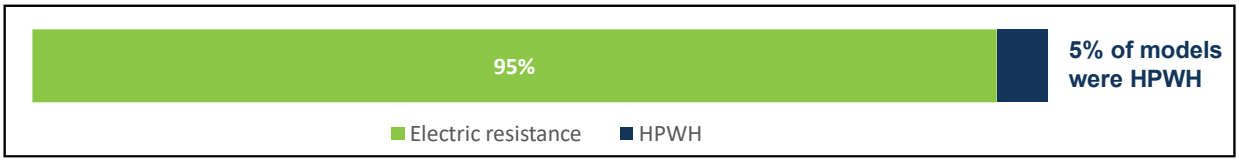
Commercial systems included. The analysis includes water heater models that the retailers identified as *commercial* models, given that many commercial electric resistance models can be used in residential applications.

Retailer names redacted. NMR provided NEEA with the results of this analysis by retailer. This report provides redacted results for the two retailers combined.

FINDINGS

Since MPER #6, HPWH models remain a small percentage of retailers' inventory. Overall, one in 25 (5%) electric water heater models listed on retailers' websites were HPWH models (MPI w).[32] This represents a small but statistically significant increase from the 4% found in MPER #6. In absolute terms, the number of HPWH model listings (n=152) increased by 50% from MPER #6 (n=100).

Figure 48: Percentage of Model Listings that were HPWHs (n=2,841)



Source: Web-scraping of 21 store locations across two major retailers.

The 2,841 model listings NMR scraped included duplicates of the same models found at different stores. After removing duplicates, there were 272 unique model numbers, only 18 of which were HPWH models (7%). As previously noted, these figures include models identified as commercial units but exclude small, point-of-use models (20 gallons of capacity or less).

Electric resistance models comprise the vast majority of model listings, but some of this is due to model proliferation among electric resistance units that does not exist in the HPWH market. The 254 unique electric resistance model numbers spanned 18 different tank sizes, while the nine unique HPWH model numbers spanned only 8 different tank sizes.

These retailers continue to keep HPWHs in stock, but at low volumes. The web-scraping was able to identify not only models listed as having units in stock, but also to obtain counts of the actual in-stock units. HPWHs represented only about 7% of the in-stock electric water heater units (MPI 1e and MPI 2), based on retailers' websites.

Figure 49: Percentage of Water Heater Stock that was HPWH (n=1,190)

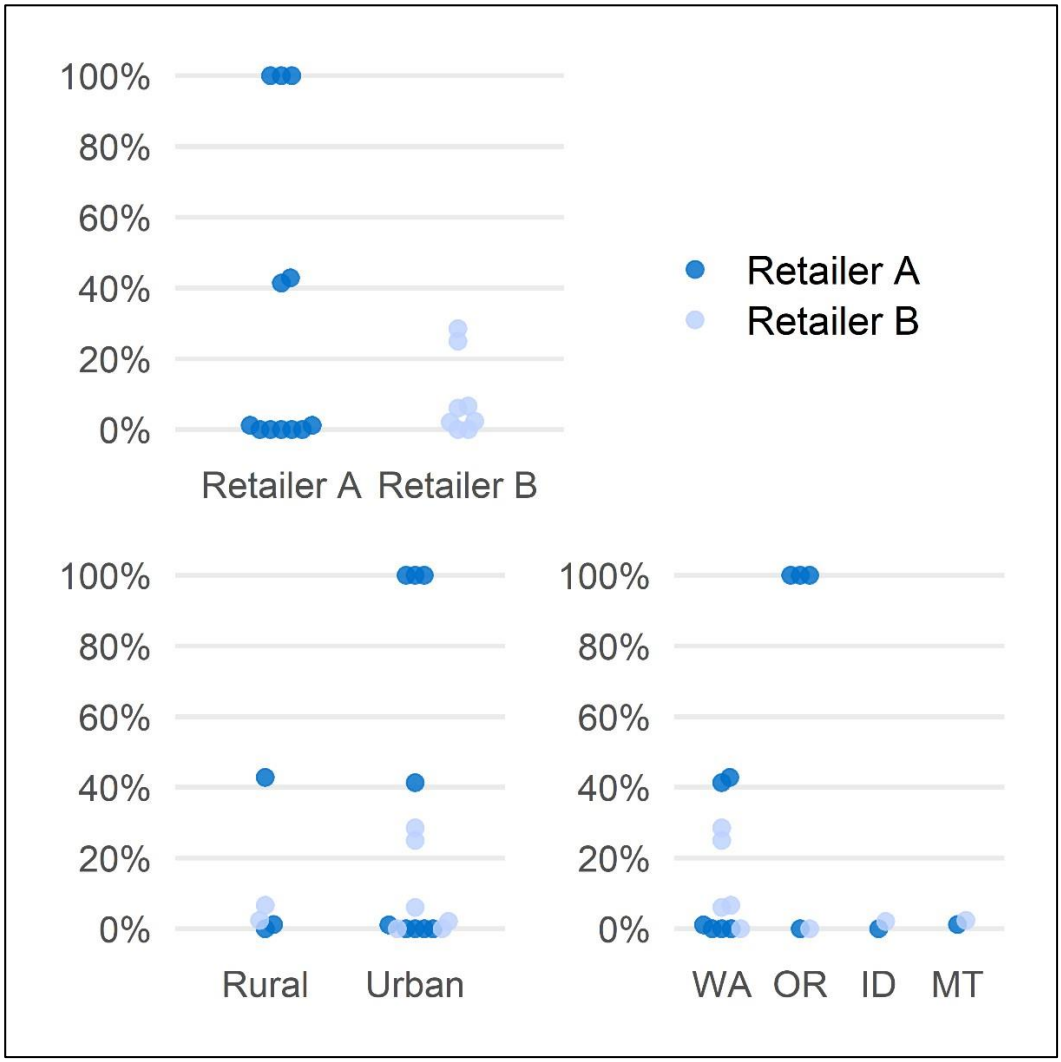
Source: Web-scraping of 21 store locations across two major retailers.

Most stores keep HPWHs in stock, but the portion of stock that is HPWH varies substantially, even across the same retailers' stores. Nearly two out of three store locations (62%) had HPWHs in stock (Figure 49). Unlike in MPER #6, both retailers had locations that did not have any HPWHs in stock. Most

[32] The team treated each model listing downloaded as a unique listing; the same model umber carried across two stores would be treated as two model listings for this analysis.

of the locations without HPWHs in stock were in urban areas, supporting the idea that stocking HPWHs is not something that solely or exclusively happens in urban areas. (Though the more populous areas do appear to experience the preponderance of sales, based on market sizing estimates.) Among the individual store locations stocking HPWHs, HPWHs made up from 1% to 100% of the stores' in-stock electric water heaters. The wide variance likely reflects specific regional demand issues, such as the existence of utility incentives, which tend to drive demand for units. The stores whose in-stock electric units were all HPWHs were three branches of the same retailer, all of which were located in urban parts of Oregon.

Figure 50: Percentage of In-Stock Water Heaters that were HPWHs, by Retailer



Source: Web-scraping of 21 store locations across two major retailers.

Stores located in utility territories that offer HPWH incentives stock more HPWHs. Stores in utility service territories that offer HPWH incentives (n=16) have 4.7 HPWHs in stock, on average, compared to 1.7 in-stock HPWHs in locations that do not offer any HPWH incentives (n=5). Retailer representatives

interviewed for MPER #7 also mentioned that the availability of utility incentives is one of the factors driving stocking practices.

Even after accounting for utility incentives, the average HPWH is $1,300 more expensive than an electric resistance storage water heater of a similar size. Large-capacity HPWHs (greater than 55 gallons) cost $400 to $500 more, on average, than HPWHs that are 50 gallons or smaller. Commercial units of the same capacity (60 to 80 gallons) are approximately the same price as a similarly sized HPWH.

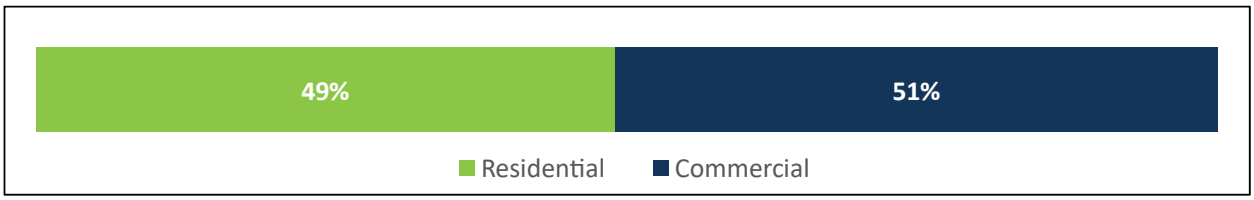
Figure 51: Price of Electric Storage Water Heaters by Size

Gallons	Electric resistance		HPWH	
	n	Average price	n	Average price
20 to 30	31	$482	0	--
>30 to 40	68	$627	5	$1,924
>40 to 50	49	$743	7	$2,034
>50 to 60	13	$1,252	0	--
>60 to 70	3	$2,481*	4	$2,422
>70 to 80	9	$2,738*	7	$2,574

* Commercial units; residential solar water heaters of these tank sizes were excluded from the price comparison.

Commercial electric resistance products – a potential alternative to large HPWHs – are still commonly available, but rarely kept in stock. Retailers did not list any HPWH models as commercial products. However, the websites identified half (51%) of the scraped electric models (and 53% of the electric *resistance* models) as commercial products (Figure 52), down from seven in ten (69%) models in MPER #6. One of the two retailers carried all of these units; none were listed as in-stock. In other words, half of gathered listings were for commercial models, though given that they do not appear to be kept in stock, they may not necessarily be a prime focus of the emergency replacement market, where installers want to be able to offer their customers an immediate swap-out.[33]

Figure 52: Percentage of Electric Resistance Model Listings that were Commercial



Source: Web-scraping of 21 store locations across two major retailers.

Small tank electric resistance models are common but are omitted from the above findings because they are not direct competitors with full-size equipment. One in four (25%) water heater models initially scraped were rated at 20 or fewer gallons of capacity (922 small tank models, in total).[34] Of

[33] The team identified models as commercial based on how they were categorized or labeled by the retailer. These commercial units represented 130 (48%) of the unique models numbers that the team scraped and included in this analysis (n=272) (i.e., after compiling duplicate model numbers across branches).
[34] These small systems represented 175 (39%) of the unique models initially scraped (n=447).

these, 48 units were in stock. These small units were omitted entirely from the results described above, given that small, point-of-use models do not tend to compete directly with full-sized HPWH systems.

Appendix F Logic Model Review

Methodology

The study included a brief logic model and MPI review that involved the following tasks:

- Documenting changes in the current logic model against the previous version (specific MPI measurements are included in Appendix G)
- Interview NEEA staff to better understand the current state of the initiative
- Reviewing the current logic model and MPIs and comparing them with the most recent (2022) Operations Plan to ensure that they accurately reflect current and planned initiative activities and expected outcomes

Logic Model and MPI Review Findings

Overall. The team confirmed that the current logic model accurately reflects the program, including the planned changes based on discussions with program staff, comparison with prior MPERs, and the 2022 Operations Plan, but the current MPI table (last updated in 2018) does not reflect more recent updates to outcomes included in the 2021 Logic Model.

Changes to outputs. One of the tasks under the logic model review was to review elements of the logic model that were not previously measured in MPER #6. The logic model in place as of 2023 has not changed relative to the logic model in place at the time MPER #6 was completed (early 2022). The logic model at that point was the same as the version reviewed for MPER #5 (completed in late 2019), except for an update to *Output: Marketing efforts to increase consumer awareness* that leads to *Outcome IX: Consumers are aware of, and purchase, HPWH.*

Related recommendation. *None.*

Changes to barriers and activities. The logic model review found that the logic model *barriers and activities* have been updated since the team reviewed the logic model for MPER #6. The following initiative activities have been revised to reflect current initiative goals and respond to key barriers, as described in the 2022 Operations Plan:

- The program focused its efforts on developing a national strategy, facilitating the adoption of the federal efficiency standard by advocating for HPWHs, and providing support to regional utilities (as mentioned in 2022 Operations Plan)
- The program expanded its focus on increasing consumer awareness and distributor stocking of HPWHs, especially in Northwest regions with lower uptake (as mentioned during the NEEA staff interview)
- The program expanded its marketing and training activities to also include research into challenging installations to develop installation best practices that can be used to update installation guides and trainings. This research is shared with utilities, manufacturers, and distribution channel to encourage utilities to continue to support HPWHs (as mentioned in the 2022 Operations Plan)

Related recommendation. *None.*

Changes to outcomes. The *outcomes* included in the logic model reviewed for MPER #7 are similar to those reviewed in MPER #6, with the exception of a minor change NEEA made to *Long Term Outcome: Federal Efficiency Standard <55 gallon is enacted*, which used to reference ">45 gallon" rather than "<55 gallon". NEEA's edit aligns with the fact that in 2015, updates to the National Appliance Energy Conservation Act (NAECA) substantially raised the federal minimum efficiency requirements of large residential electric water heaters (more than 55 gallons) to be unreachable without the use of heat pump technology. Now that these standards have been in place for several years, it is logical to adjust the outcome to target the portion of the residential water heating market that does not require heat pump technology.

Related recommendation. *None.*

The MPER research team also notes that Outcome 2 focuses on retailers increasingly *promoting* and selling HPWHs, while Outcome 3 focuses on distributors increasingly *stocking* and selling them.

Related recommendation. Given that MPERs #6 and #7 have both measured and made recommendations based on stocking trends at retailers, consider adding "stocking" to Outcome 2, along with an associated MPI.

Changes to MPIs. The MPI table reviewed for MPER #7 that was attached to the 2021 Logic Model was itself last updated in 2018 and did not incorporate more recent changes to the logic model. The team recommends updating the MPI table attached to the logic model to reflect the most recent logic model. Table 32 compares the outcomes included in the 2021 Logic Model with the outcomes listed in the 2018 MPI table, noting differences in red. Notably, Outcome 9 does not have any designated MPIs.

Related recommendation. The current MPI table should be updated to mirror the outcomes from the 2021 Logic Model.

Related recommendation. MPIs should be added related to Outcome 9, regarding consumer awareness of HPWHs, as this outcome has no specific MPIs.

Table 32: Comparison of Logic Model Outcomes from 2021 Version and 2018 MPI Table

Outcome from 2021 Logic Model	Outcome from 2018 MPI Table
1: Installers increasingly recommend/install HPWHs	1: Installers increasingly sell/install HPWHs
2: Retailers increasingly promote/sell HPWHs	2: Retailers increasingly sell HPWHs
3: Distributors increasingly stock/sell HPWHs	3: Distributors increasingly sell HPWHs
4: Purchasers are satisfied with AWHS qualified products	4: Purchasers continue to be satisfied with AWHS-qualified products
5: Regional and national utilities continue to support quality installations of HPWHs through incentives and financing	5: Regional and outside NEEA territory utilities continue to support quality installations of HPWHs through incentives and financing
6: Manufacturers and utilities standardize and adopt Demand Response programs and/or protocols	8: Manufacturers and utilities standardize and adopt Demand Response program and/or protocol
7: Major manufacturers offer AWHS-qualified products across the full category products	7: All three major manufacturers offer AWHS-qualified products
8: Utilities and aggregators increasingly leverage Demand Response capabilities	6: Regional and national utilities and aggregators adopt Demand Response standards
9: Consumers are increasingly aware of, and purchase, HPWH	N/A
10: Federal test procedure incorporates recommendations by energy advocates	9: Federal test procedure incorporates recommendations by energy advocates
11: ENERGY STAR incorporates key elements of AWHS	10: ENERGY STAR or equivalent incorporates key elements of AWHS and Demand Response protocol
Long term: Federal Efficiency Standard <55 gallon is enacted	11: Federal Efficiency Standard >45 gallon
Final: HPWHs are the dominant and accepted practice for residential electric water heaters installed for both replacement and new construction	Final: HPWHs are the dominant and accepted practice for residential water heaters installed for both replacement and new construction

Appendix G MPI Measurements

MPI Measurements

The team measured one or more indicators for each of the outcomes slated for measurement in MPER #7, for a total of ten MPIs. Table 33 shows the outcomes, MPIs, and current values. Detailed descriptions of each MPI can be found in the sections of the report noted for each MPI in the "Location" column.

Table 33: MPER #7 MPI Tracking

Outcomes and Related MPIs	Metric	MPER Data Source	Location of Detailed Results	Measurement 1	Measurement 2 (if applicable)	Measurement 3 (if applicable)
I. Installers increasingly recommend/sell/install HPWHs.						
1 a. Trained installers report higher confidence in and awareness of HPWHs	Rate of HWS-trained installer awareness of HPWHs, whether or not AWHS-qualified Rate of HWS-trained installer confidence in HPWHs & related (e.g., ability to install correctly, probability of callbacks, etc.)	Installer survey	Appendix B	Installer survey Q15 "Agree" or Strongly agree" to the following statements – all installers (n=97), trained installers (n=14): My company's installation technicians can easily install heat pump water heaters correctly: all 84%, trained 93% Replacing an electric resistance water heater with a heat pump water heater will lower a customer's overall energy bill: all 79%, trained 93% HPWHs are reliable: all 55%, trained 64% HPWHs are good replacements for traditional electric resistance water heaters: all 57%, trained 71% My company is likely to get customer complaints or service requests soon after installing a heat pump water heater: all 39%, trained 50%	Installer survey Q10 Percentage of installers who had heard of "heat pump water heaters" or "hybrid water heaters:" 100%	Installer survey Q11 Percentage of installers who are very familiar with HPWHs: 74%
1 b. HWS trained installers' year-over-year installations of AWHS qualified products increase	Rate at which HWS-trained installers report installations of HPWHs, whether or not AWHS-qualified	Installer survey	Appendix B	Installer survey Q25 Percentage of electric storage water heater installations that were HPWHs: 13% (unit-weighted)		
1 c. Share of professional installers that have installed AWHS qualified products increases each year	Number of installers that have installed AWHS products	Installer survey	Appendix B	Installer survey Q12 Percentage of installers that install HPWHs: 71%		
1 d. Installers' recommendations of HPWHs in emergency	Rate of installer recommendations of	Installer survey	Appendix B	Installer survey Q35		

Outcomes and Related MPIs	Metric	MPER Data Source	Location of Detailed Results	Measurement 1	Measurement 2 (if applicable)	Measurement 3 (if applicable)
and/or non-emergency scenarios increase year-over-year	HPWHs in emergency scenarios			Percentage of the time installers recommend HPWH to a customer when replacing a failed water heater: 31% (average), 10% (median)		
1 e. Share of sales for emergency replacement increases each year	Rate of emergency replacement sales of HPWHs, whether or not AWHS-qualified	Installer survey Retailer web-scraping	Appendix B Appendix E	Installer survey Q27 Percentage of total HPWH installations that were to customers replacing a failed water heater: 21% (unit-weighted)	Percentage of in-stock electric water heater listings that are HPWH: 7%	
II. Retailers increasingly sell HPWHs.						
2. Year-over-year sales of AWHS qualified products increase through the retail channel	Retail sales of HPWHs, whether or not AWHS-qualified	Market sizing update Retailer web-scraping	Appendix B Appendix C	Percentage of residential HPWHs sold in the Northwest through retailers in 2021: 28%	Percentage of available electric model listings that are HPWH: 5% (excluding electric point-of-use models)	Percentage of unique electric water heater model listings that are HPWH: 7% (excluding electric point-of-use models)
III. Distributors increasingly stock and sell HPWHs.						
3 a. Year-over-year sales of AWHS qualified products increase	Distributor sales of HPWHs, whether or not AWHS-qualified	Market sizing update	Appendix A	Market share of HPWH installations in 2021: 14.6%	Percentage of residential HPWHs sold in the Pacific Northwest through distributors in 2021: 72%	
IV. Purchasers are satisfied with AWHS-qualified products.						
4 a. At least 90% of purchasers are satisfied with qualified products	Percentage of purchasers satisfied with HPWH	Consumer survey	Appendix D	Consumer survey Q19 Percentage satisfied with the HPWH overall: 90%		
4 b. Percentage of purchasers who would recommend HPWHs does not decline year-over-year	Percentage of purchasers who would recommend HPWH	Consumer survey	Appendix D	Consumer survey Q20 Percentage who have or would recommend HPWH to a friend, colleague, or family member: 87%		
IX. Consumers are aware of HPWHs.						
9. Year-over-year increase in awareness and adoption of HPWHs among consumers in single-family homes		Consumer survey	Appendix D	Consumer survey Q19 Percentage of consumers who had heard of “heat pump water heaters” or “hybrid water heaters:” 41%		

Appendix H Survey Instruments

Installer Survey Guide – Web Version

Recruitment Email

Subj: Water heater survey from NEEA--$50 gift card to complete

Dear [First Name] [Last Name],

I am writing to ask for your help in a study of **water heaters in the Northwest.** Braun Research Interviewing (BR Interviewing) and NMR Group (NMR) are conducting this study on behalf of The Northwest Energy Efficiency Alliance (NEEA). Your feedback will help ensure that NEEA's work addresses the needs of water heater installers like you.

If you are eligible to take the survey, **NMR will send you a $50 electronic gift card in appreciation of your time**. Your responses will be kept **confidential – we will not publicize, share, or sell your information**. Your responses will only be released in summaries in which no individual's answers can be identified.

We expect the survey to take about 20 minutes to complete. **To complete the survey online**, please follow this link [ADD HYPERLINK] or paste this web address into your browser: [LINK].

To complete the survey over the phone, please email Cynthia Miller of BR Interviewing at cmiller@braunresearch.com or leave a message at 908-242-6937. Please provide your name and phone number and they will call you back.

If you have any other questions about the study, please contact Christine Smaglia of NMR at [EMAIL].

We greatly appreciate your taking the time to provide thoughtful answers for this important study.

Sincerely,

[Braun study manager]

Intro

The Northwest Energy Efficiency Alliance (NEEA) has partnered with NMR Group and BR Interviewing to better understand the experience of water heater installers. Your feedback will help ensure that NEEA's work addresses the needs of water heater installers like you.

If you are eligible and complete the survey, **NMR will send you a $50 electronic gift card in appreciation of your time**. Your responses will be kept confidential – we will not publicize, share, or sell your information.

If you have technical problems with the survey, please contact [BR Interviewing study manager] at [EMAIL] or leave a message at [PHONE NUMBER].

If you have any other questions about the study, please contact Christine Smaglia of NMR at [EMAIL].

Screening and Background

1. Did your company install any **residential** water heating equipment in any of the following states in 2022? Select all that apply. [ALLOW MULTIPLE RESPONSES]
    a. Oregon
    b. Washington
    c. Idaho
    d. Montana
    e. None of the above [EXCLUSIVE RESPONSE; TERMINATE]

Termination message: We are sorry, but you do not qualify for this survey. Thank you for your time.

2. Which of the following activities represents your company's main line of work?
    1. Installing equipment in residential new construction (newly built homes that are not yet occupied)
    2. Replacing or servicing equipment in existing homes
    3. Installing, replacing, or servicing equipment in commercial or industrial facilities.
    4. Other; please describe: [REQUIRE TEXT ENTRY]

3. [IF Q2 = 3] You said that your company's main line of business is working in commercial or industrial facilities. For the rest of this survey, **please be sure to provide answers that relate to your work in residential settings only**.
    1. I will be sure to provide answers that relate to my work in residential settings only
    2. My company does not do any work in residential settings [TERMINATE]

Termination message: We are sorry, but you do not qualify for this survey. Thank you for your time.

[DISPLAY IF Q2 = 1 OR 2] For this survey, we are only asking about your work in **residential** settings. If you happen to also do work in commercial or industrial facilities, **please limit your responses to your work in residential settings**.

Company Structure

4. Besides installing water heating equipment, what other services does your company provide? Please select all that apply. [ALLOW MULTIPLE RESPONSES]
    1. HVAC installation and/or maintenance
    2. Plumbing
    3. Electrical
    4. Construction or general contracting services
    5. Other, please specify: [REQUIRE TEXT ENTRY]
    6. My company does not provide other services.

5. Which of the following best describes your company?
    1. A business with a single location
    2. A company with multiple locations
    3. Other; please describe: [REQUIRE TEXT ENTRY]

6. [IF Q5 ≠ 1] Where is your business headquartered? [REQUIRE TEXT ENTRY: City/Town, State]

7. Approximately how many people in total work for your company? [IF Q5 ≠ 1 Think only about your locations in these four states, if applicable: Oregon, Washington, Idaho, and/or Montana"]? [REQUIRE NUMERIC RESPONSE; PROVIDE OPTION FOR "DON'T KNOW"]

8. Please indicate your role(s) at the company. Select all that apply. [ALLOW MULTIPLE RESPONSES]
    1. I own the company
    2. I install or service water heaters
    3. I make recommendations about what customers should install
    4. I manage installation technicians
    5. I am in a sales position
    6. Other, please describe: [REQUIRE OPEN-END RESPONSE]

HPWH Awareness

9. Before today, had you heard the term "heat pump water heater" or "hybrid water heater"?
    1. Yes
    2. No
    98. I'm not sure

10. [IF Q49 = 1 "As you may already be aware, heat"; IF Q49 = 2 or 98 "Heat"] pump water heaters, also known as electric hybrid water heaters, use an electric heat pump to transfer heat from the air outside of the unit to the water in the tank. They work like a refrigerator, but in reverse. They are *not* the same as a tankless water heater. A heat pump water heater has a cylinder-shaped water storage tank, like a standard water heater. A tankless water heater has a smaller metal box mounted on a wall, with no storage tank.

    Based on that description, have you heard of "heat pump water heaters" or "hybrid water heaters"?
    a. Yes
    b. No
    98. I'm not sure

[DISPLAY TEXT] For the rest of this survey, we will use the term "heat pump water heater" to refer to this type of water heater.

11. [IF Q50 = 1] Before this survey, which of the following best describes your level of familiarity with heat pump water heaters?
    1. Not very familiar - heard of them but never worked with them
    2. Somewhat familiar - worked with them occasionally
    3. Very familiar - worked with them regularly

Installation Practices

12. What types of water heaters does your company install in residential homes? Please select all that apply. [RANDOMIZE 1 TO 4; ALLOW MULTIPLE RESPONSES]
    1. Electric resistance storage
    2. Gas storage
    3. On-demand/tankless
    4. Heat pump water heater
    5. Other; please specify: [REQUIRE TEXT ENTRY]
    98. I'm not sure [EXCLUSIVE RESPONSE]

13. [DISPLAY OPTIONS 1-5 SELECTED IN Q52] What is the most profitable type of water heater for your company to install in residential homes?
    1. Electric resistance storage
    2. Gas storage
    3. On-demand/tankless
    4. Heat pump water heater
    5. [PIPED TEXT ENTRY IF Q52 = 5]
    6. Other; please specify: [REQUIRE TEXT ENTRY]
    98. I'm not sure [EXCLUSIVE RESPONSE]

14. [IF Q53 ≠ 98] Why is that? [REQUIRE TEXT ENTRY]

Familiarity and Confidence

15. Please assess how much you agree or disagree with the following statements. [RANDOMIZE ORDER]
    a. I prefer installing "tried-and-true" water heaters to newer water heater technologies.
    b. [IF Q50 = 1] Heat pump water heaters are reliable.
    c. [IF Q50 = 1] Heat pump water heaters are good replacements for traditional electric resistance water heaters.
    d. [IF Q50 = 1] My company's installation technicians can easily install heat pump water heaters correctly.
    e. [IF Q50 = 1] My company is likely to get customer complaints or service requests soon after installing a heat pump water heater.
    f. [IF Q50 = 1] My company regularly recommends heat pump water heaters to customers.
    g. [IF Q50 = 1] Heat pump water heaters remove heat from the room where they are located.

h. [IF Q50 = 1] Replacing an electric resistance water heater with a heat pump water heater will lower a customer's overall energy bill.
i. My company makes more money when we sell a larger number of low-cost water heaters than when we sell a smaller number of high-cost water heaters.
j. [IF Q50 = 1] I can get heat pump water heaters quickly from local distributors.

1. Strongly disagree
2. Somewhat disagree
3. Neither agree nor disagree
4. Somewhat agree
5. Strongly agree
98. Don't know

16. [IF Q55e = 4 OR 5] What are the common customer complaints [IF INSTALLED HPWH] "you receive" or [IF NOT INSTALL HPWH: "you would expect to receive"] after installing heat pump water heaters, if any? [SHOW TABLE WITH OPTION TO ENTER UP TO FOUR STATEMENTS ON SEPARATE ROWS]

17. [IF AN ANSWER WAS GIVEN IN Q56] For each of the customer complaints you identified, please explain how you would generally respond to the issue. [REQUIRE TEXT ENTRY FOR EACH STATEMENT CARRIED FORWARD FROM Q16]

18. [IF Q55c = 1 OR 2] Why do you feel that heat pump water heaters are not good replacements for electric resistance water heaters? Select all that apply. [RANDOMIZE ORDER; ALLOW MULTIPLE RESPONSES]

1. Lack of product support at the manufacturer level
2. Lack of product support at the distributor level
3. Lack of consumer awareness
4. My company had a bad experience with a heat pump water heater installation in the past
5. The difficulty of installation
6. High upfront cost
7. Payback period is too long
8. Difficulty finding heat pump water heaters in stock
9. Other; please describe: [REQUIRE TEXT ENTRY]
98. I'm not sure [EXCLUSIVE RESPONSE]

19. [IF Q50 = 1] How frequently do installation technicians face challenges with the following aspects of a heat pump water heater installation? [RANDOMIZE ORDER]
a. Pipe configuration
b. No nearby drain for condensate
c. New wiring/electrical work required
d. Inadequate make-up air/airflow

e. Heat pump water heater too large to fit where old water heater was
f. Complications related to floorplan and noise (noise from heat pump water heater would be a nuisance in desired installation location)
g. Complications related to floorplan and cold air (cold air generated by heat pump water heater would be a nuisance in desired installation location)
h. Installing ductwork
i. Other; please describe: [REQUIRE TEXT ENTRY]

1. Always
2. Very frequently
3. Occasionally
4. Rarely
5. Very rarely
6. Never
98. I'm not sure

20. [IF Q50 = 1] On average, how many hours does it take to install each of the following water heaters in a typical home:
    a. Electric resistance storage tank: __ hours [REQUIRE NUMERIC ENTRY; OPTION FOR DK/N/A]
    b. **Un-ducted** heat pump water heater: __ hours [REQUIRE NUMERIC ENTRY; OPTION FOR DK/N/A]
    c. **Ducted** heat pump water heater: ___hours [REQUIRE NUMERIC ENTRY; OPTION FOR DK/N/A]

21. [IF Q50 = 1] Please estimate what percentage of heat pump water heater installations require ducting to be installed.
    ___ % [REQUIRE NUMERIC ENTRY WITH OPTION FOR "I'M NOT SURE"]

22. [IF Q50 = 1] Heat pump water heaters can be set in different modes:
    - heat pump only (most efficient),
    - hybrid or mixed operation (primarily operates in heat pump mode but uses electric resistance as backup), or
    - electric resistance only (least efficient).

    When installing a heat pump water heater in a customer's home, what mode would you usually recommend to the customer?
    1. Heat pump only
    2. Hybrid or mixed operation
    3. Electric resistance only
    4. It depends
    98. I'm not sure

23. [IF Q62 = 2, 3, OR 4] Why do you say that? [REQUIRE TEXT ENTRY]

Sales and Revenues from HPWH

24. IF Q52 = 1 OR 4] How many *residential electric storage water heaters* did your company install in 2022*?* [IF Q52 = 4 "Please include installations of heat pump water heaters in your estimate."] Your best estimate is fine.

    ___ [REQUIRE NUMERIC RESPONSE]

25. [IF Q64 > 0] Of the approximately [PIPE NUMBER FROM Q64] *residential electric storage water heaters your company installed in 2022*, about what percent were heat pump water heaters? Your best estimate is fine.

    ___% [REQUIRE NUMERIC RESPONSE 0 to 100]

26. [IF Q65 > 0] Of the *heat pump water heaters your company installed in 2022*, about what percent of units were …
    a. 55 gallons or greater? ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    b. Less than 55 gallons? ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    Total: ___% [AUTOMATIC SUM: REQUIRE A + B = 100]

27. [IF Q65 > 0] Thinking about *all the heat pump water heaters your company installed in 2022*, about what percent of units were to customers who were…
    a. replacing a failed water heater? ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    b. replacing an old/near-failure water heater? ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    c. replacing a fully functioning water heater? ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    d. installing a water heater in a newly constructed home? ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    Total: ___% [AUTOMATIC SUM: REQUIRE A THROUGH + D = 100]

28. Thinking about your company's *overall business revenues* in 2022*,* about what percent was from water heater sales and installations?
    a. ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    b. Comments: [TEXT ENTRY, OPTIONAL]

29. [IF Q65 > 0] Thinking about your company's *revenues just from sales and installations of water heaters* in 2022, about what percentage was from heat pump water heaters?
    a. ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    b. Comments: [TEXT ENTRY, OPTIONAL]

30. When you replace a large capacity (≥55 gallons) electric resistance storage water heater for a residential customer, what is your typical replacement strategy?

    1. Replace with a heat pump water heater
    2. Replace with a single, smaller residential electric resistance storage water heater
    3. Replace with two smaller residential electric resistance storage water heaters
    4. Replace with a single commercial electric resistance storage water heater

5. Replace with an electric tankless water heater
6. Replace with a gas storage water heater
7. Replace with a gas tankless water heater
8. Other; please describe: [REQUIRE TEXT ENTRY]

31. [IF Q52 = 1] When installing smaller electric resistance storage tank water heaters (<55 gallons), how often do you install mixing valves in order to increase the amount of hot water produced by the smaller tank?

    1. Never
    2. Rarely
    3. Sometimes
    4. Always
    5. Other; please describe: [REQUIRE TEXT ENTRY]
    98. I'm not sure

32. [IF Q71 = 3 OR 4] Do you [PIPE Q71 VALUE "sometimes" or "always"] install mixing valves on these smaller tanks to avoid installing a heat pump water heater?

    1. Yes
    2. No
    3. Other; please specify: [REQUIRE TEXT ENTRY]

33. What types of water heating equipment does your company typically keep on hand for **emergency replacements**? Select all that apply. [RANDOMIZE ORDER OF 1-4; ALLOW MULTIPLE RESPONSES]

    1. Electric resistance storage
    2. Gas storage
    3. On-demand/tankless
    4. Heat pump water heater
    5. Other; please specify: [REQUIRE TEXT ENTRY]
    6. None of the above [EXCLUSIVE RESPONSE]
    98. Don't know [EXCLUSIVE RESPONSE]

HPWH Recommendations

34. [IF Q50 = 1] In what percent of the homes that you visit could you install a heat pump water heater without making more changes to the installation area than is typical for a storage water heater? Think only of existing homes, **not** newly built homes. Your best guess is fine.

    ___% [REQUIRE NUMERIC RESPONSE 0 to 100]

35. [IF Q50 = 1] In each of the following scenarios, what percent of the time would you recommend heat pump water heaters to a customer? [REQUIRE NUMERIC RESPONSE 0 to 100]

    a. To replace a fully functioning water heater __ %
    b. To replace an old/near-failure water heater __ %

c. To replace a failed water heater __ %
d. For new construction (new homes that are not yet occupied, where the customer is the builder/developer) __ %

36. [IF Q75e > 0%] When you have recommended heat pump water heaters to a customer who is **replacing a fully functioning water heater**, what percentage of the time have they agreed to install one?

    a. ___% [REQUIRE NUMERIC RESPONSE 0 to 100]

    b. I have never recommended a heat pump water heater to a customer replacing a fully functioning water heater

    c. Comments: [OPTIONAL TEXT ENTRY]

37. [IF Q75f > 0%] When you have recommended heat pump water heaters to a customer who is **replacing an old water heater that still works but is near the point of failure,** what percentage of the time have they agreed to install one?

    a. ___% [REQUIRE NUMERIC RESPONSE 0 to 100]

    b. I have never recommended a heat pump water heater to a customer replacing a near-failure water heater

    c. Comments: [OPTIONAL TEXT ENTRY]

38. [IF Q75g > 0%] When you have recommended a heat pump water heater to a customer who is **replacing a failed water heater**, what percentage of the time have they agreed to install one?

    a. ___% [REQUIRE NUMERIC RESPONSE 0 to 100]

    b. I have never recommended a heat pump water heater to a customer replacing a failed water heater

    c. Comments: [OPTIONAL TEXT ENTRY]

39. [If Q75c < 50%] You said you recommend heat pump water heaters to customers who need to replace a failed water heater about [PIPE Q75C PERCENTAGE]% of the time. Why don't you recommend heat pump water heaters more often in this situation? [REQUIRE TEXT RESPONSE]

40. [IF Q75h > 0%] When you have recommended a heat pump water heater to a builder/contractor **working on building a new home**, what percentage of the time have they agreed to install one?

    a. ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    b. I have never recommended a heat pump water heater to a builder/contractor for a new home
    c. Comments: [OPTIONAL TEXT ENTRY]

41. [IF Q50 = 1] In the next year or two, how often do you expect you will recommend heat pump water heaters to your customers?

    a. Much more often than you do now

b. Somewhat more often than you do now
c. At the same rate as you do now
d. Somewhat less often than you do now
e. Much less often than you do now

42. [IF Q50 = 1] Why do you say that you will recommend heat pump water heaters to your customers [PIPE Q81 RESPONSE]? [REQUIRE TEXT ENTRY]

Updated Standards and Access to Information

43. [IF Q1 = WASHINGTON] Have you heard of the new standard, ANSI/CTA-2045, which requires all new electric storage water heaters manufactured after January 1, 2023, to have a communications port?

    1. Yes
    2. No
    98. I'm not sure

44. [IF Q83 = 1] Do you think the new standard is a positive or negative development?

    1. Positive
    2. Negative
    3. Neither positive or negative
    98. I'm not sure

45. [IF Q84 = 2 OR 3] Why do you say that? [REQUIRE TEXT ENTRY]

Training

50. Have you, or has someone else at your company, ever participated in a Hot Water Solutions training or orientation session about heat pump water heaters sponsored by the Northwest Energy Efficiency Alliance? (Hot Water Solutions trainings have been offered in-person and via webinar, so you may have attended in person or online.)
    1. Yes
    2. No
    98. I'm not sure

51. Before today, have you heard of Hot Water Solutions? [https://hotwatersolutionsnw.org]
    1. Yes
    2. No
    3. I'm not sure

Closing

50. [IF Q50 = 1] In closing, how likely are you to recommend heat pump water heaters to a friend or colleague?
    Please use a score of 0 to 10 where 0 is "not at all likely" and 10 is "extremely likely".

51. Please let us know if you have any additional thoughts about heat pump water heaters. [OPTIONAL TEXT ENTRY]

52. Please enter the email address where you would like us to send your gift card.
    1. Email address: [restrict to email address]
    2. I am not accepting an incentive for this survey.

    [FINISH SURVEY] Thank you for your feedback!

INSTALLER SURVEY GUIDE – PHONE VERSION

Recruitment Email

Subj: Water heater survey from NEEA--$50 gift card to complete

Dear [First Name] [Last Name],

I am writing to ask for your help in a study of **water heaters in the Northwest.** Braun Research Interviewing (BR Interviewing) and NMR Group (NMR) are conducting this study on behalf of The Northwest Energy Efficiency Alliance (NEEA). Your feedback will help ensure that NEEA's work addresses the needs of water heater installers like you.

If you are eligible to take the survey, **NMR will send you a $50 electronic gift card in appreciation of your time**. Your responses will be kept **confidential – we will not publicize, share, or sell your information**. Your responses will only be released in summaries in which no individual's answers can be identified.

We expect the survey to take about 20 minutes to complete. **To complete the survey online**, please follow this link [ADD HYPERLINK] or paste this web address into your browser: [LINK].

To complete the survey over the phone, please email please contact [BR Interviewing study manager] at [EMAIL] or leave a message at [PHONE NUMBER]. Please provide your name and phone number and they will call you back.

If you have any other questions about the study, please contact Christine Smaglia of NMR at [EMAIL].

We greatly appreciate your taking the time to provide thoughtful answers for this important study.

Sincerely,

[Braun study manager]

Intro

Hello, this is _____ calling from BR Interviewing. The Northwest Energy Efficiency Alliance (NEEA) has partnered with NMR Group and BR Interviewing to better understand the experience of water heater installers. Your feedback will help ensure that NEEA's work addresses the needs of water heater installers like you.

Upon completion of the survey, **NMR will send you a $50 electronic gift card in appreciation of your time**. Your responses will be kept confidential – we will not publicize, share, or sell your information.

[DO NOT READ; PROVIDE IF RESPONDENT REQUESTS MORE INFORMATION*: If you have any other questions about the study, please contact Christine Smaglia of NMR at [EMAIL*].

Screening and Background

1. Did your company install any **residential** water heating equipment in any of the following states in 2022? Select all that apply. [ALLOW MULTIPLE RESPONSES]
    a. Oregon
    b. Washington
    c. Idaho
    d. Montana
    e. [DO NOT READ] *None of the above* [EXCLUSIVE RESPONSE; TERMINATE]

Termination message: We are sorry, but you do not qualify for this survey. Thank you for your time.

2. Which of the following activities represents your company's main line of work?
    5. Installing equipment in residential new construction (newly built homes that are not yet occupied)
    6. Replacing or servicing equipment in existing homes
    7. Installing, replacing, or servicing equipment in commercial or industrial facilities.
    8. Something else: [RECORD]

3. [IF Q2 = 3] You said that your company's main line of business is working in commercial or industrial facilities. For the rest of this survey, **please be sure to provide answers that relate to your work in residential settings only**.
    3. [DO NOT READ] *I will be sure to provide answers that relate to my work in residential settings only*
    4. [DO NOT READ] *My company does not do any work in residential settings* [TERMINATE]

Termination message: We are sorry, but you do not qualify for this survey. Thank you for your time.

[READ IF Q2 = 1 OR 2] For this survey, we are only asking about your work in **residential** settings. If you happen to also do work in commercial or industrial facilities, **please limit your responses to your work in residential settings**.

Company Structure

4. Besides installing water heating equipment, does your company provide any other services? [ALLOW MULTIPLE RESPONSES; DO NOT READ LIST]
    7. [DO NOT READ] *HVAC installation and/or maintenance*
    8. [DO NOT READ] *Plumbing*
    9. [DO NOT READ] *Electrical*

10. [DO NOT READ] *Construction or general contracting services*
11. [DO NOT READ] *Other*: [RECORD]
12. [DO NOT READ] *My company does not provide other services.*

6. Which of the following best describes your company?
    4. A business with a single location
    5. A company with multiple locations
    6. [DO NOT READ] *Other:* [RECORD]

46. [IF Q5 ≠ 1] Where is your business headquartered? [Record City/Town, State]

47. Approximately how many people in total work for your company? IF Q5 ≠ 1 Think only about your locations in these four states, if applicable: Oregon, Washington, Idaho, and/or Montana.] [RECORD NUMERIC RESPONSE]

[Do not read:]
98. Don't know

48. What is your role at the company? Please select all that apply from the following list. [ALLOW MULTIPLE RESPONSES]
    7. I own the company
    8. I install or service water heaters
    9. I make recommendations about what customers should install
    10. I manage installation technicians
    11. I am in a sales position
    12. Another role: [RECORD]
    98. [DO NOT READ] I'm not sure

HPWH Awareness

49. Before today, had you heard the term "heat pump water heater" or "hybrid water heater"?
    3. [DO NOT READ] *Yes*
    4. [DO NOT READ] *No*
    98. [DO NOT READ] *I'm not sure*

50. [IF Q49 = 1 "As you may already be aware, heat"; IF Q49 = 2 or 98 "Heat"] pump water heaters, also known as electric hybrid water heaters, use an electric heat pump to transfer heat from the air outside of the unit to the water in the tank. They work like a refrigerator, but in reverse. They are *not* the same as a tankless water heater. A heat pump water heater has a cylinder-shaped water storage tank, like a standard water heater. A tankless water heater has a smaller metal box mounted on a wall, with no storage tank.

Based on that description, have you heard of "heat pump water heaters" or "hybrid water heaters"?

c. [DO NOT READ] *Yes*
d. [DO NOT READ] *No*
e. [DO NOT READ] *I'm not sure*

[Do not read:]

98. Don't know

[READ] For the rest of this survey, we will use the term "heat pump water heater" to refer to this type of water heater.

51. [IF Q50 = 1] Before this survey, which of the following best describes your level of familiarity with heat pump water heaters?
    4. Not very familiar – I've heard of them but never worked with them;
    5. Somewhat familiar – I've worked with them occasionally; or
    6. Very familiar – I've worked with them regularly

    98. [DO NOT READ] *Don't know*

Installation Practices

52. What types of water heaters does your company install in residential homes? Please select all that apply. [ALLOW MULTIPLE RESPONSES]
    6. Electric resistance storage
    7. Gas storage
    8. On-demand/tankless
    9. Heat pump water heater
    10. Another type: [RECORD]

    [Do not read:]
    98. Don't know [EXCLUSIVE RESPONSE]

53. [DISPLAY OPTIONS 1-5 SELECTED IN Q52] What is the most profitable type of water heater for your company to install in residential homes?
    7. Electric resistance storage
    8. Gas storage
    9. On-demand/tankless
    10. Heat pump water heater
    11. [PIPED TEXT ENTRY IF Q52 = 5]
    12. Another type: [REQUIRE TEXT ENTRY]

    [Do not read:]
    98. Don't know

54. [IF Q53 ≠ 98] Why is that? [REQUIRE TEXT ENTRY]

Familiarity and Confidence

55. [IF Q10 = 1 "I am going to read you a list of statements. For each one," IF Q10 ≠ 1 "For the following statement,"] please assess how much you agree or disagree, using the following scale: strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, or strongly agree. [RANDOMIZE ORDER]
    a. I prefer installing "tried-and-true" water heaters to newer water heater technologies.
    b. [IF Q50 = 1] Heat pump water heaters are reliable.
    c. [IF Q50 = 1] Heat pump water heaters are good replacements for traditional electric resistance water heaters.
    d. [IF Q50 = 1] My company's installation technicians can easily install heat pump water heaters correctly.
    e. [IF Q50 = 1] My company is likely to get customer complaints or service requests soon after installing a heat pump water heater.
    f. [IF Q50 = 1] My company regularly recommends heat pump water heaters to customers.
    g. [IF Q50 = 1] Heat pump water heaters remove heat from the room where they are located.
    h. [IF Q50 = 1] Replacing an electric resistance water heater with a heat pump water heater will lower a customer's overall energy bill.

i. My company makes more money when we sell a larger number of low-cost water heaters than when we sell a smaller number of high-cost water heaters.
j. [IF Q50 = 1] I can get heat pump water heaters quickly from local distributors.

1. Strongly disagree
2. Somewhat disagree
3. Neither agree nor disagree
4. Somewhat agree
5. Strongly agree
99. [DO NOT READ] *Don't know*

56. [IF Q55e = 4 OR 5] What are the common customer complaints [IF INSTALLED HPWH] "you receive" or [IF NOT INSTALL HPWH: "you would expect to receive"] after installing heat pump water heaters, if any? [SHOW TABLE WITH OPTION TO ENTER UP TO FOUR STATEMENTS ON SEPARATE ROWS]

57. [IF AN ANSWER WAS GIVEN IN Q56] For each of the customer complaints you identified, please explain how you would generally respond to the issue. [RECORD RESPONSE FOR EACH STATEMENT CARRIED FORWARD FROM Q16]

58. [IF Q55c = 1 OR 2] Why do you feel that heat pump water heaters are not good replacements for electric resistance water heaters? [INTERVIEWER SELECT RELEVANT RESPONSE(S) AND CONFIRM WITH INTERVIEWEE; ALLOW MULTIPLE RESPONSES]

1. Lack of product support at the manufacturer level
2. Lack of product support at the distributor level
3. Lack of consumer awareness
4. My company had a bad experience with a heat pump water heater installation in the past
5. The difficulty of installation
6. High upfront cost
7. Payback period is too long
8. Difficulty finding heat pump water heaters in stock
9. [DO NOT READ] *Other reason:* [RECORD]
98. [DO NOT READ] *I'm not sure* [EXCLUSIVE RESPONSE]

59. [IF Q50 = 1] I will read a list of potential challenges installation technicians could face during a heat pump water heater installation. Please assess how frequently these occur, using the following scale: always, very frequently, occasionally, rarely, very rarely, or never. [RANDOMIZE ORDER OF A THROUGH H]
    a. Pipe configuration
    b. No nearby drain for condensate
    c. New wiring/electrical work required
    d. Inadequate make-up air/airflow

e. Heat pump water heater too large to fit where old water heater was
f. Complications related to floorplan and noise (noise from heat pump water heater would be a nuisance in desired installation location)
g. Complications related to floorplan and cold air (cold air generated by heat pump water heater would be a nuisance in desired installation location)
h. Installing ductwork
i. [DO NOT READ] *Other installation challenge*: [RECORD]

7. Always
8. Very frequently
9. Occasionally
10. Rarely
11. Very rarely
12. Never
98. [DO NOT READ] *Don't know*

60. [IF Q50 = 1] On average, how many hours does it take to install each of the following water heaters in a typical home:
    a. Electric resistance storage tank: __ hours [RECORD]
    b. **Un-ducted** heat pump water heater: __ hours [RECORD]
    c. **Ducted** heat pump water heater: ___hours [RECORD]

    [Do not read:]
    98. Don't know

61. [IF Q50 = 1] Please estimate what percentage of heat pump water heater installations require ducting to be installed.
    ___ % [RECORD]

    [Do not read:]
    98. Don't know

62. [IF Q50 = 1] Heat pump water heaters can be set in different modes:
    - heat pump only (most efficient),
    - hybrid or mixed operation (primarily operates in heat pump mode but uses electric resistance as backup), or
    - electric resistance only (least efficient).

    When installing a heat pump water heater in a customer's home, what mode would you usually recommend to the customer?
    1. Heat pump only
    2. Hybrid or mixed operation
    3. Electric resistance only
    4. It depends
    98. [DO NOT READ] *I'm not sure*

63. [IF Q62 = 2, 3, OR 4] Why do you say that? [REQUIRE TEXT ENTRY]

Sales and Revenues from HPWH

64. [IF Q52 = 1 OR 4] How many *residential electric storage water heaters* did your company install in 2022*?* [IF Q52 = 4 "Please include installations of heat pump water heaters in your estimate."] Your best estimate is fine.

    ___ [REQUIRE NUMERIC RESPONSE]

65. [IF Q64 > 0] Of the approximately [PIPE NUMBER FROM Q64] *residential electric storage water heaters your company installed in 2022*, about what percent were heat pump water heaters? Your best estimate is fine.

    ___% [REQUIRE NUMERIC RESPONSE 0 to 100]

66. [IF Q65 > 0] Of the *heat pump water heaters your company installed in 2022*, about what percent of units were …

    a. 55 gallons or greater? ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    b. Less than 55 gallons? ___% [REQUIRE NUMERIC RESPONSE 0 to 100]

    Total: ___% [SUM: REQUIRE A + B = 100; DO NOT READ BUT DISPLAY TO ASSIST INTERVIEWER]

67. [IF Q65 > 0] Thinking about *all the heat pump water heaters your company installed in 2022*, about what percent of units were to customers who were…

    a. replacing a failed water heater? ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    b. replacing an old/near-failure water heater? ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    c. replacing a fully functioning water heater? ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    d. installing a water heater in a newly constructed home? ___% [REQUIRE NUMERIC RESPONSE 0 to 100]

    Total: ___% [SUM: REQUIRE A THROUGH + D = 100; DO NOT READ BUT DISPLAY TO ASSIST INTERVIEWER]

68. Thinking about your company's *overall business revenues* in 2022*,* about what percent was from water heater sales and installations?
    a. ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    b. [DO NOT READ] *Comments?* [OPTIONAL TEXT ENTRY]

69. [IF Q65 > 0] Thinking about your company's *revenues just from sales and installations of water heaters* in 2022, about what percentage was from heat pump water heaters?
    a. ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    b. [DO NOT READ] *Comments?* [OPTIONAL TEXT ENTRY]

70. When you replace a large capacity (≥55 gallons) electric resistance storage water heater for a residential customer, what is your typical replacement strategy? [INTERVIEWER: DO NOT READ; CHOOSE CLOSEST SELECTION TO INTERVIEWEE RESPONSE AND CONFIRM VERBALLY OR RECORD VERBATIM IN "OTHER"]

    1. Replace with a heat pump water heater
    2. Replace with a single, smaller residential electric resistance storage water heater
    3. Replace with two smaller residential electric resistance storage water heaters
    4. Replace with a single commercial electric resistance storage water heater
    5. Replace with an electric tankless water heater
    6. Replace with a gas storage water heater
    7. Replace with a gas tankless water heater
    8. Other: [RECORD]

71. [IF Q52 = 1] When installing smaller electric resistance storage tank water heaters (<55 gallons), how often do you install mixing valves in order to increase the amount of hot water produced by the smaller tank?

    1. Never
    2. Rarely
    3. Sometimes
    4. Always
    5. [DO NOT READ] *Other:* [REQUIRE TEXT ENTRY]
    98. [DO NOT READ] *I'm not sure*

72. [IF Q71 = 3 OR 4] Do you [PIPE Q71 VALUE "sometimes" or "always"] install mixing valves on these smaller tanks to avoid installing a heat pump water heater?

    1. [DO NOT READ] *Yes*
    2. [DO NOT READ] *No*
    3. [DO NOT READ] *Other:* [REQUIRE TEXT ENTRY]

73. I will read a list of water heating equipment. Please tell me which of the following, if any, your company typically keeps on hand for emergency replacements? [RANDOMIZE ORDER OF 1-4; ALLOW MULTIPLE RESPONSES]

    7. Electric resistance storage
    8. Gas storage
    9. On-demand/tankless
    10. Heat pump water heater
    11. Any other types: [RECORD]
    12. [DO NOT READ] *None of the above* [EXCLUSIVE RESPONSE]
    99. [DO NOT READ] *Don't know* [EXCLUSIVE RESPONSE]

HPWH Recommendations

74. [IF Q50 = 1] In what percent of the homes that you visit could you install a heat pump water heater without making more changes to the installation area than is typical for a storage water heater? Think only of existing homes, **not** newly built homes. Your best guess is fine.

    ___% [REQUIRE NUMERIC RESPONSE 0 to 100]

75. [IF Q50 = 1] In each of the following scenarios, what percent of the time would you recommend heat pump water heaters to a customer? [REQUIRE NUMERIC RESPONSE 0 to 100]

    e. To replace a fully functioning water heater __ %
    f. To replace an old/near-failure water heater __ %
    g. To replace a failed water heater __ %
    h. For new construction (new homes that are not yet occupied, where the customer is the builder/developer) __ %

76. [IF Q75e > 0%] When you have recommended heat pump water heaters to a customer who is **replacing a fully functioning water heater**, what percentage of the time have they agreed to install one?

    d. ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    e. [DO NOT READ] *I have never recommended a heat pump water heater to a customer replacing a fully functioning water heater*
    f. [DO NOT READ] *Comments?* [OPTIONAL TEXT ENTRY]

77. [IF Q75f > 0%] When you have recommended heat pump water heaters to a customer who is **replacing an old water heater that still works but is near the point of failure,** what percentage of the time have they agreed to install one?

    d. ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    e. [DO NOT READ] *I have never recommended a heat pump water heater to a customer replacing a near-failure water heater*
    f. [DO NOT READ] *Comments?* [OPTIONAL TEXT ENTRY]

78. [IF Q75g > 0%] When you have recommended a heat pump water heater to a customer who is **replacing a failed water heater**, what percentage of the time have they agreed to install one?

    d. ___% [REQUIRE NUMERIC RESPONSE 0 to 100]
    e. [DO NOT READ] *I have never recommended a heat pump water heater to a customer replacing a failed water heater*
    f. [DO NOT READ] *Comments?* [OPTIONAL TEXT ENTRY]

79. [If Q75c < 50%] You said you recommend heat pump water heaters to customers who need to replace a failed water heater about [PIPE Q75C PERCENTAGE]% of the time. Why don't you recommend heat pump water heaters more often in this situation? [REQUIRE TEXT RESPONSE]

80. [IF Q75h > 0%] When you have recommended a heat pump water heater to a builder/contractor **working on building a new home**, what percentage of the time have they agreed to install one?

d. ___% [REQUIRE NUMERIC RESPONSE 0 to 100]

e. [DO NOT READ] *I have never recommended a heat pump water heater to a builder/contractor for a new home*

f. [DO NOT READ] *Comments?* [OPTIONAL TEXT ENTRY]

81. [IF Q50 = 1] In the next year or two, will you recommend heat pump water heaters to your customers:

f. Much more often than you do now
g. Somewhat more often than you do now
h. At the same rate as you do now
i. Somewhat less often than you do now; or
j. Much less often than you do now?

82. [IF Q50 = 1] Why do you say that you will recommend heat pump water heaters to your customers [PIPE Q81 RESPONSE]? [REQUIRE TEXT ENTRY]

Updated Standards and Access to Information

83. [IF Q1 = WASHINGTON] Have you heard of the new standard, ANSI/CTA-2045, which requires all new electric storage water heaters manufactured after January 1, 2023, to have a communications port?

3. [DO NOT READ] *Yes*
4. [DO NOT READ] *No*
98. [DO NOT READ] *I'm not sure*

84. [IF Q83 = 1] Do you think the new standard is a positive or negative development?

1. Positive
2. Negative
3. Neither positive or negative
99. [DO NOT READ] I'm not sure

85. [IF Q84 = 2 OR 3] Why do you say that? [REQUIRE TEXT ENTRY]

Training

86. Have you, or has someone else at your company, ever participated in a Hot Water Solutions training or orientation session about heat pump water heaters sponsored by the Northwest Energy Efficiency Alliance? (Hot Water Solutions trainings have been offered in-person and via webinar, so you may have attended in person or online.)

3. [DO NOT READ] *Yes*
4. [DO NOT READ] *No*
98. [DO NOT READ] *I'm not sure*

87. Before today, have you heard of the website Hot Water Solutions?
    2. [DO NOT READ] *Yes*
    4. [DO NOT READ] *No*
    98. [DO NOT READ] *I'm not sure*

Closing

Pre-Campaign Consumer Survey Guide

Intro

Welcome to NMR Group's water heater study. Your responses will provide valuable information about water heaters in the Northwest, and they will be kept completely confidential. This survey will take about 10 minutes. If you have any questions or need help with completing the survey, please reach out to [EMAIL].

Whenever you see text with a box around it, like the one below, you can click on it for more information.

Screener

1. S_New. In the past two years, have you participated in a panel survey about water heaters?
   1. Yes [SKIP TO C1]
   2. No

2. S_StateCounty. What state and county do you live in? (Please answer for your primary residence.) [SHOW DROP DOWN MENU FOR STATE. STATE-SPECIFIC DROPDOWN MENU FOR COUNTY WILL APPEAR AFTER STATE IS SELECTED. COUNTY DROPDOWN MENU WILL INCLUDE "I'm not sure"]
   1. Oregon
   2. Washington
   3. Idaho
   4. Montana
   5. Another state [SKIP TO C1]

3. S_ZIP. What is your zip code?

4. S_OwnRent. Do you own or rent your home?
   1. Own
   2. Rent
   98. I'm not sure [SKIP TO C1]

5. S_Decisions. Are you involved in making decisions about major purchases for your home?
   1. Yes
   2. No [SKIP TO C1]

6. S_HomeType. What type of home do you live in? [INCLUDE PHOTO EXAMPLES]
   1. A free-standing, single-family home
   2. A townhouse or rowhouse. These share at least one side with another building, but have no other units above or below. There are no shared hallways, stairs, or basements.
   3. Mobile home
   4. Apartment or condominium in a building with 2 to 4 units.
   5. Apartment or condominium in a building with 5 or more units.
   98. I'm not sure [SKIP TO C1]

Water Heater Characteristics

7. S_WHOwn. Does your home have its own water heater?
   1. Yes
   2. No [SKIP TO A0]
   98. I'm not sure [SKIP TO A0]

   8. S_WHType. What type of water heater do you have? [SHOW EXAMPLE PHOTOS AND POPUP DEFINITIONS FOR EACH]
   1. Storage or tank water heater ["A storage water heater is typically located on the floor, and is typically a large cylinder shape."]
   2. On-demand / tankless ["An on-demand water heater is a smaller metal box typically mounted on a wall."]
   3. Indirect storage tank attached to boiler ["Indirect water heaters use the heat from your boiler to warm the water stored in the tank; they are usually connected to a boiler with pumps and pipes."]
   98. I'm not sure

9. S_WHFuel. What fuel does your water heater use? [ADD POPUP DEFINITIONS FOR EACH]
   1. Electricity ["Electric water heaters only use electricity to heat water."]
   2. Natural Gas or Propane ["Natural gas comes to your home via underground pipes. Propane is delivered to your home and stored in a tank."]
   3. Fuel oil ["Fuel oil is delivered to your home and stored in a tank."]
   4. Another fuel type; please specify:
   98. I'm not sure

Water Heater Fuel Help

10. S_WHFuelHelp1. [IF S_WHfuel=98] If you're not sure what fuel your water heater uses, we can walk you through it. Go to your water heater and look for a yellow "ENERGY GUIDE" label. It might say "KWH" for electric, "therms" for natural gas, "BTU" for propane, or "fuel oil" for oil systems. [SHOW PICTURE OF ENERGY GUIDE] Based on what you see, what fuel does your water heater use?
    1. Electricity ("KWH") [SKIP to next section]
    2. Natural gas ("therms") or Propane ("BTU")
    3. Oil
    4. I don't see a label
    98. I'm not sure

    11. S_WHFuelHelp2. [IF S_WHfuelHelp1=4 OR 98] Look for the manufacturer's label on the water heater that shows the brand, model number, and serial number. These usually specify the fuel. Electric water heaters usually indicate a "wattage" rating. [SHOW EXAMPLES]
    1. Electricity [SKIP TO NEXT SECTION]
    2. Natural Gas or Propane
    3. Oil

4. I don't see a label
98. I'm not sure

12. S_WHFuelHelp3. [IF S_DHWfuelHelp2 = 4 OR 98)] Does your water heater have an exhaust vent pipe at the top? It would be more than 2 inches wide, and could be made out of metal or white PVC. It would either be connected to a chimney or it would exhaust to the outside of your home. [SHOW EXAMPLE PHOTO]
    1. Yes
    2. No
    98. I'm not sure

13. S_WHFuelHelp4. [IF S_DHWfuelHelp3 = 2 OR 98] Your system sounds like it may be electric, since it doesn't have a vent pipe. Can you find an electrical plug or wiring connected to the tank? It might be coming out of the top of the tank, or out of the side. [SHOW EXAMPLE PHOTO]
    1. Yes
    2. No
    98. I'm not sure

14. WH_Age. Approximately how old is your water heater? If you are able to access your water heater, the manufacturer's label that shows the brand, model number, and serial number usually provides the date of manufacture. [SHOW EXAMPLE PHOTO]
    1. Less than 1 year old
    2. 1 to 5 years old
    3. 6 to 10 years old
    4. More than 10 years old
    98. I'm not sure

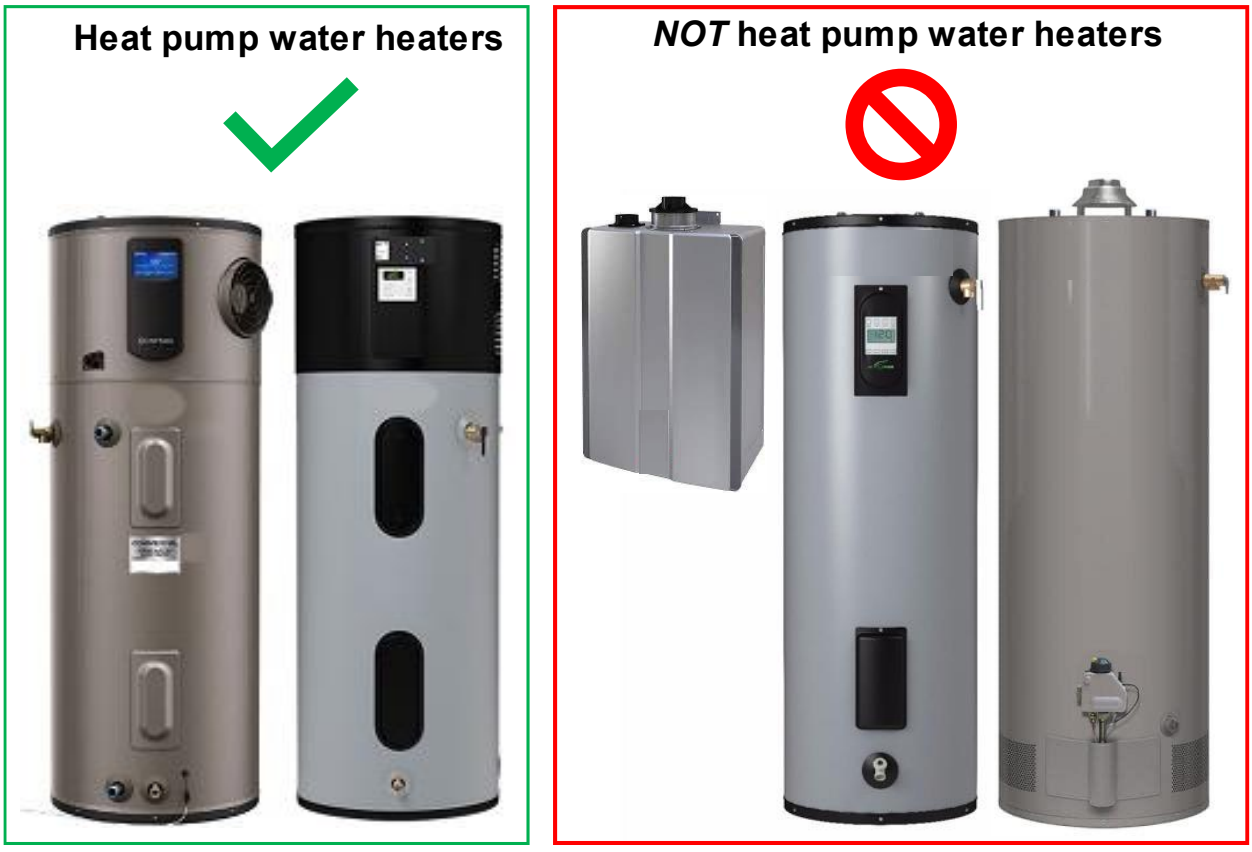
Awareness, Interest, and Perceptions

15. A0. Before today, had you heard the term "heat pump" related to any appliances?
    1. Yes
    2. No
    98. I'm not sure

16. A1. Before today, had you heard the terms "heat pump water heater" or "electric hybrid water heater"?
    1. Yes
    2. No
    98. I'm not sure

17. A2. Heat pump water heaters, or electric hybrid water heaters, use an electric heat pump to transfer heat from outside of the unit to the water in the tank rather than generating heat directly. You may have also seen them advertised as "electric hybrid water heaters" or "electric hybrid heat pump water heaters". They work like a refrigerator, but in reverse. This is *not* the same as a

tankless water heater. A tankless water heater is a small metal box mounted on a wall and it has no storage tank.) A heat pump water heater runs on electricity and has a cylinder-shaped tank like a standard electric storage water heater, except it has vents at the top and behind them are fans that pull surrounding air into the unit. In some cases, a heat pump water heater may have ducts (large silver tubes that direct air into or away from the unit). In the photo below, the units on the left are heat pump water heaters; the units to the right are *not*. [SHOW EXAMPLE PHOTOS]



Based on this description, have you heard of "heat pump water heaters" or "electric hybrid water heaters"?

1. Yes
2. No
98. I'm not sure

[DISPLAY TEXT] For the rest of this survey, we will use the term "heat pump water heater" to refer to this type of water heater.

18. A4. [IF A2 = 1] Where or how have you heard about heat pump water heaters? Please select all that apply. [ROTATE OPTIONS 3 THROUGH 18]
    1. I currently own or use one
    2. I previously owned or used one
    3. From a friend or acquaintance

4. Utility print advertising or bill insert
5. Utility website
6. “Smart Water Heat” website
7. “Hot Water Solutions” website
8. Retail store display
9. Retail store salesperson
10. Printed newspaper ad
11. Print newspaper story
12. Online news story
13. Television ad
14. Social media, such as Facebook, Instagram, or YouTube
15. Contractor or installer
16. While researching on the Internet
17. Internet advertising
18. Utility newsletter
97. Other, please specify: [REQUIRE OPEN END RESPONSE]
98. I’m not sure

19. A6. [IF A4 = 1] Please rate your satisfaction with the following aspects of your heat pump water heater. [INCLUDE N/A OPTION]
    - Very dissatisfied
    - Somewhat dissatisfied
    - Neither satisfied nor dissatisfied
    - Somewhat satisfied
    - Very satisfied

    a. The sound level of the heat pump water heater
    b. The change in your electricity bill since installing the heat pump water heater
    c. Your hot water supply
    d. The maintenance requirements of the heat pump water heater
    e. The heat pump water heater overall

20. A7. [IF A4 = 1] Have you, or would you, recommend a heat pump water heater to a friend, colleague, or family member?
    1. Yes, I have
    2. Yes, I would
    3. No
    97. Other, please specify: [REQUIRE OPEN END RESPONSE]
    98. I’m not sure

21. A9. [IF A2 = 1] Please assess how much you agree or disagree with the following statements. [RANDOMIZE; COLOR ONLY FOR REVIEWERS’ BENEFIT FOR POSITIVE AND NEGATIVE STATEMENTS]
    - Strongly disagree
    - Somewhat disagree

- Neither agree nor disagree
- Somewhat agree
- Strongly agree

a. Heat pump water heaters are very efficient.
b. Heat pump water heaters result in lower electric bills than a typical electric water heater.
c. Heat pump water heaters are eligible for tax credits and/or discounts from utility companies.
d. Heat pump water heaters offer better value than typical electric water heaters.
e. Heat pump water heaters can be controlled from a smart phone.
f. Heat pump water heaters are noisy.
g. Heat pump water heaters are unreliable.
h. Heat pump water heaters are expensive to install.
i. Heat pump water heaters are expensive to service or repair.
j. Heat pump water heaters do not produce enough hot water.

22. A10. When making a decision about purchasing mechanical equipment for your home, such as a furnace or water heater, what are your typical sources of information regarding which product to purchase? Please select all that apply. [ROTATE RESPONSES 1 THROUGH 16; ALLOW MULTIPLE RESPONSES]
    1. Friends or acquaintances
    2. Utility print advertising or bill inserts
    3. Utility website
    4. Retail store – general
    5. Retail store displays
    6. Retail store salespeople
    7. Newspaper ads
    8. Print newspaper stories
    9. Online news stories
    10. Television ads
    11. Social media, such as Facebook, Instagram or YouTube
    12. Contractors or installers
    13. Internet research or Internet reviews
    14. Internet advertising
    15. Specific internet website, please specify: [REQUIRE OPEN END RESPONSE]
    16. Utility newsletter
    97. Other, please specify: [REQUIRE OPEN END RESPONSE]
    98. I'm not sure

23. A11. Have you purchased a new water heater in the past three years?
    1. Yes
    2. No
    98. I'm not sure

24. A12. [IF A11 = 1] Why did you purchase a new water heater? [ROTATE RESPONSES 1 THROUGH 6]

1. My water heater was completely broken and did not provide any hot water
2. My water heater worked poorly and/or needed repair
3. My water heater was old and/or close to failing
4. I wanted to install a more energy-efficient water heater
5. To serve an addition to my home
6. I wanted a water heater with a specific feature: (please specify the feature)
97. Other; please specify: [REQUIRE OPEN END RESPONSE]
98. I'm not sure

25. A13. [IF A2 = 1 AND A11 = 1] Did your installer or contractor recommend a heat pump water heater to you?
    1. Yes
    2. No
    98. I'm not sure

26. A15. What would cause you to purchase a new water heater (of any type)? [MULTIPLE RESPONSE]
    1. If it fails, breaks, or leaks
    2. If it has some issues but needs repairs to work well
    3. To save energy, even if it still works
    4. To lower utility bills, even if it still works
    5. If I was already renovating my home
    97. Other; please specify: [REQUIRE OPEN END RESPONSE]
    98. I'm not sure

27. A16. [IF A2 = 1 & A4 ≠ 1] [IF A11A11 = 1 "Did you consider"] [IF A11 ≠ 1 "Have you ever considered"] installing a heat pump water heater?
    1. Yes
    2. No
    98. I'm not sure

28. A17. [IF A4 ≠ 1 AND A2 = 1)) AND A16 = 2] What is the primary reason you [IF A11 = 1 "did not"] [IF A11 ≠ 1 "would not"] consider installing an electric hybrid heat pump water heater? [ROTATE RESPONSES 1 THROUGH 8]
    1. Existing equipment works fine
    2. Prefer a different kind
    3. May/plan to in the future
    4. Cost of installation
    5. Cost of maintenance or repairs
    6. Not familiar enough with them
    7. Concerns about their performance
    8. Does not fit in my space
    9. [SHOW IF A11 = 1] The installer/contractor did not mention them
    10. [SHOW IF A11 = 1] The installer/contractor recommended against them
    11. [IF S_WHFuel = 2, 3, OR 4] I do not want to switch water heating fuels

12. Other, please specify
98. I'm not sure

29. A19. [A2 = 1] Have you heard of any brands that make heat pump water heaters?
    1. Yes
    2. No
    98. I'm not sure

30. A20. [A2 = 1 AND A19 =1] Which of the following heat pump water heater brands have you heard of, if any? [RANDOMIZE OPTIONS 1 THROUGH 20]
    1. General Electric ("GE")
    2. A.O. Smith
    3. American
    4. Kenmore
    5. Reliance
    6. State
    7. Stiebel Eltron
    8. U.S. Craftmaster
    9. Whirlpool
    10. AirGenerate
    11. Electrolux
    12. Rheem
    13. Bradford White
    14. Sanden
    15. Hubbell
    16. Jetglas
    17. Lochinvar
    18. Ruud
    19. Richmond
    20. Vaughn
    97. Other; please specify: [REQUIRE OPEN ENDED TEXT RESPONSE]
    98. I'm not sure

HWS Awareness

31. HWS_Aware. Before today, had you heard of the "Hot Water Solutions" program?
    1. Yes
    2. No
    98. I'm not sure

32. HWS_First. [IF HWS_Aware = 1] How did you first hear of the "Hot Water Solutions" program? [RANDOMIZE]
    1. Hot Water Solutions website [LINK TO WEBSITE]
    2. Friend or acquaintance
    3. Utility print advertising or bill insert

4. Utility website
5. Retail store display
6. Retail store salesperson
7. Print newspaper ad
8. Print newspaper story
9. Online news story
10. Television ad
11. Social media, such as Facebook, Instagram or YouTube
12. From a contractor or installer
13. Internet research
14. Internet advertising
15. Boring But Efficient website [LINK TO WEBSITE boringbutefficient.com]
16. Other [PLEASE SPECIFY:]
98. I'm not sure

Characteristics

33. D1. Which of the following statements best describes you?

1. I am the first among my friends to purchase new technology
2. I purchase new technology sooner than most of my friends
3. I am typically in the middle of the group when purchasing new technology
4. I purchase new technology after most of my friends have purchased it
5. I am one of the last people to purchase new technology
98. I'm not sure

34. D2. Please rate your level of agreement with the following statements: [ROTATE ORDER]

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

a. I do research before making big purchases.
b. I compare prices online for big purchases.
c. I seek out expert recommendations for big purchases.
d. I will spend money upfront to save money in the long term.
e. I am concerned about environmental issues.
f. I consider sustainability when making decisions about which products to purchase.
g. Actions taken by individuals like me have an impact on the environment.
h. Energy efficiency is my primary consideration when choosing mechanical systems for my home, like a furnace, air conditioner, or water heater.

Demographics

34. D4. Which of the following categories includes your age?
    1. Under 18
    2. 18 to 24
    3. 25 to 34
    4. 35 to 44
    5. 45 to 54
    6. 55 to 64
    7. 65 and older
    99. I'd rather not say

35. D6. Which of the following categories best describes the highest level of education you have completed?
    1. Some high school
    2. High school graduate or GED
    3. Trade or technical school
    4. Some college
    5. College graduate
    6. Some graduate school
    7. Graduate degree
    97. Other, please specify: [REQUIRE OPEN END RESPONSE]
    98. I'm not sure
    99. I'd rather not say

36. D7. Which of the following categories best describes your approximate annual household income from all sources in 2020, before taxes?
    1. Less than $40,000
    2. Between $40,001 and $60,000
    3. Between $60,001 and $80,000
    4. Between $80,001 and $120,000
    5. Between $120,001 and $250,000
    6. Over $250,000
    98. I'm not sure
    99. I'd rather not say

37. D8. Do you consider yourself Hispanic or Latino?
    1. Yes
    2. No
    98. I'd rather not say

38. D9. How would you describe yourself? Please select all that apply. [MULTIPLE RESPONSES]
    1. White
    2. Black or African American
    3. American Indian or Alaska Native
    4. Asian

5. Native Hawaiian or Other Pacific Islander
97. Other; please specify: [REQUIRE OPEN END RESPONSE]
98. I'd rather not say

39. D10. How would you describe yourself?
    1. Male
    2. Female
    3. Prefer to self-identify, please specify:
    4. I'd rather not say

40. D11. What language is primarily spoken in your home? [SKIP TO C3]
    1. English
    2. Spanish
    3. French
    4. Arabic
    5. Portuguese
    6. Mandarin
    7. Cantonese
    8. Russian
    9. Ukrainian
    10. Tagalog
    11. Korean
    12. Vietnamese
    13. Japanese
    14. Marshallese
    15. Punjabi
    97. Other; please specify: [REQUIRE OPEN END RESPONSE]
    99. I'd rather not say

Characteristics

41. C1. Unfortunately, you do not qualify for this survey. Thank you very much for your time.

42. C3. Those are all the questions that we have. Thank you for your help with this survey. Do you have any comments that you'd like to share about heat pump water heaters?
    1. Yes [REQUIRE OPEN END RESPONSE]
    2. No

43. C4. Thank you for providing this photo. Depending on the type of water heater you have, we will follow up with you to continue the survey.

Post-Campaign Consumer Survey Guide

Survey instrument is the same as the pre-campaign survey guide with the exception of the following questions:

Post-Campaign Awareness

35. [ASK IN SECOND WAVE SURVEY ONLY] Select the following ads you recall seeing online. Please select all that apply. [MULTIPLE RESPONSE]

1. 

2. 

3. 

4.

5.

6.

7. None of the above [EXCLUSIVE ANSWER]
98. I'm not sure [EXCLUSIVE ANSWER]

36. [ASK IN SECOND WAVE SURVEY ONLY, IF Q35 <7] Did the ad(s) you saw have a positive, negative, or no impact on your opinion of heat pump water heaters?

    1. Positive impact
    2. Negative impact
    3. No impact
    98. I'm not sure

Cooling Impacts

37. [IF A2 = 1] COOL_SPACE. Have you heard anyone say that heat pump water heaters cool the air around the water heater?
    1. Yes
    2. No
    98. I'm not sure

38. [IF COOL_SPACE = 1] Where did you hear that heat pump water heaters cool the air around the water heater? Please select all that apply. [ROTATE OPTIONS 1 THROUGH 5]
    1. Friends or family
    2. Personal experience
    3. Social media
    4. Online research about water heaters
    5. A contractor or plumber
    6. Other; please specify: [REQUIRE OPEN END RESONSE]
    98. I'm not sure

Purchase and Installation

48. [(IF S_WHFUEL, S_WHFUELHELP1, S_FUELHELP2, OR S_FUELHELP4 = 1) & A11 = 1] Where did you purchase your electric water heater? [RANDOMIZE OPTIONS 1 THROUGH 6]
    1. Retail store (e.g. Home Depot, Lowe's, ACE Hardware, including online)
    2. Contractor or installer
    3. Plumbing supply house
    4. Utility marketplace (e.g. Enervee)
    5. Online / Internet / Website (e.g. Amazon.com), please specify: [REQUIRE TEXT ENTRY]
    6. Directly from my utility (this may include units that were provided at no cost)
    7. I did not purchase the electric water heater
    8. Other, please specify: [REQUIRE TEXT ENTRY]
    98. I'm not sure

49. [(IF S_WHFUEL, S_WHFUELHELP1, S_FUELHELP2, OR S_FUELHELP4 = 1) & (Q48 ≠ 7) & (A11 = 1)]. Did you install the electric water heater yourself, or did you hire an installer to do it?
    1. Installed it myself
    2. Used a professional installer
    3. Other, please specify: [REQUIRE TEXT ENTRY]
    98. I'm not sure

Retailer Interview Guide

Introduction

[As these will be interviews, this is an example introduction, and will vary be person.] The Northwest Energy Efficiency Alliance (NEEA) has partnered with NMR Group to better understand the market for heat pump water heaters in the Northwest. Your responses will be kept completely confidential – we will anonymize responses and not report any identifying information.

In appreciation of your time, NMR will send you a $100 electronic gift card as a gift for you and your team.

Throughout this conversation, we refer to heat pump water heaters (also known as electric hybrid water heaters) [CLARIFY AS NECESSARY].

Intro

1. Please describe your role at your company and how long you've been there.
2. We have some questions about water heater stocking and sales practices at [COMPANY]. Based on your experience, will you be speaking to trends at your store only, multiple stores, regionally, or nationally?
3. About what percentage of your business revenues at your [IF Q2 = NATIONAL OR REGIONAL "company"; IF Q2 = STORE/BRANCH "store"] come from heat pump water heater sales and installations, vs. other water heaters?
    a. [IF ANSWER KNOWN] About what percentage of your *overall* business revenues come from heat pump water heater sales and installations?
    b. [IF ANSWER KNOWN] About what percentage of your *overall* business revenues come from all electric resistance water heater sales and installations, *including* heat pump water heaters?
4. What resources, if any, do your sales staff rely on to learn about water heater options, including heat pump water heaters?
    a. [IF NOT MENTIONED; ONLY ASK OF CONTACTS NOT DIRECTLY PROVIDED BY NEEA] Have you heard of the Northwest Energy Efficiency Alliance (NEEA)? How about Hot Water Solutions?

Stocking, Sales, and Recommendation

5. [IF Q2 = NATIONAL] What factors are driving the decision to stock heat pump water heaters at your stores in the Northwest? [Probe for customer demand, rebates, NEEA/utilities, etc.]
    a. Please describe any regional variations in the stocking practices of heat pump water heaters. (Probe for urban/rural, utility territory, etc.)
6. Compared to 2021, did the number of heat pump water heaters your [IF Q2 = NATIONAL OR REGIONAL "company"; IF Q2 = STORE/BRANCH "store"] sold in 2022 [IF Q2 = NATIONAL OR REGIONAL "in the Northwest"] increase, decrease, or stay the same?

a. Why do you say that?

7. Over the next year, do you expect the number of heat pump water heaters your [IF Q2 = NATIONAL OR REGIONAL "company"; IF Q2 = STORE/BRANCH "store"] will sell [IF Q2 = NATIONAL OR REGIONAL "in the Northwest"] to increase, decrease, or stay the same?

   a. Why do you say that?
   b. Does this depend on the availability of the availability of utility incentives?

8. What percentage of your heat pump water heater sales are for installation in new homes, versus retrofits in existing homes?

9. What percentage of heat pump water heater sales are from residential customers (compared to sales to contractors?)

10. [FOR REGIONAL OR BRANCH MANAGERS] When homeowners purchase water heaters at your store, do they generally know what type of water heater they plan to purchase or are they making decisions in-store?

    a. What about contractors?

11. [FOR REGIONAL OR BRANCH MANAGERS] When customers approach in-store sales representatives with questions about water heaters, under what circumstances do they recommend heat pump water heaters? (Probe: emergency replacement scenarios)

12. What, if any, impact does the availability of a federal tax credit have on your sales of heat pump water heaters?

    a. Have you noticed any difference in sales since January 1, 2023 [IF NEEDED: ", when the tax credits for heat pump water heaters increased from $300 to 30% of project cost (up to $2,000)"]?

13. [NATIONAL OR IF REGIONAL OR STORE MANAGER IN UTILITY TERRITORY WITH INCENTIVE] What impact does the availability of a utility rebate have on your sales of heat pump water heaters in the Northwest?

    a. How easy is it for customers to take advantage of the utility rebate when purchasing an eligible HPWH?

14. [IF REGIONAL OR STORE MANAGER] How often are customers aware of the tax credits and/or utility incentives?

    a. [IF NOT] Are salespeople trained to inform customers about the tax credits and/or utility incentives?

15. [IF REGIONAL OR STORE MANAGER] Does your store offer any other promotions on heat pump water heaters?

    a. [IF YES] Please describe how these promotional prices affect sales of HPWHs.

16. Have you heard of the new standard in Washington state, ANSI/CTA-2045, which requires all new electric storage water heaters manufactured after January 1, 2023, to have a communications port?
    a. [IF YES]: What impact, if any, do you think this will have on the heat pump water heater market? (Probe: pricing, sales, recommendation rate to customers)
    b. [IF IMPACT IDENTIFIED IN PART A] What if this standard was adopted at the federal level?

Marketing

[ASK CORPORATE/NATIONAL-LEVEL CONTACTS ONLY]

17. Who are your primary target markets for heat pump water heaters? (Probe: general households or specific demographics, new home builders, home remodelers, etc.)
    a. What are your key marketing messages?
18. Does marketing differ between store locations in different states or area of the state (Oregon, Washington, Idaho, and/or Montana)? [PROBE FOR URBAN/RURAL; UTILITY TERRITORY]
    a. Has NEEA influenced your marketing efforts in any way?
19. [IF RETAILER RECEIVES MARKETING SUPPORT FROM NEEA] Do you have any recommendations for NEEA or the utilities regarding how best to support your store in selling heat pump water heaters?
    a. [IF ONLY RESPONSE IS "INCENTIVES", PROBE:] What about manufacturer support, training resources, or customer education?
20. Have you or do you plan to change how you market heat pump water heaters in any way?
    a. [IF YES] What changes have you made? (Probe for messaging, channels, impact of Inflation Reduction Act)

HPWH Pricing

21. In the past year, have the costs to obtain HPWH (for stock) increased, decreased, or stayed the same? Why?
    a. Do you think that prices will increase, decrease, or stay the same over the next two years? Why?
22. Approximately what percentage of customers use financing when purchasing heat pump water heaters?
    a. Is this higher, lower, or the same as the percentage of customers that use financing when purchasing other types of water heaters?

Barriers and Challenges

23. What are the biggest consumer barriers to purchasing a heat pump water heater? (Probe: technology concerns, familiarity, local codes, cost, installation time/cost, availability for emergency replacement)
24. Are there any ways that NEEA or utilities could increase the rate at which heat pump water heaters are selected in emergency situations by your customers?
25. [IF REGIONAL OR BRANCH MANAGER] In the past year, have any of your HPWHs been returned due to technical failures?
    a. [IF YES] (Probe for details on percentage, models, reasons, etc.)
    b. Are all of the returned products covered by warranty?

Conclusion

26. Is there anything else you'd like us to know about your company's experience with heat pump water heaters in the Northwest?

Thank you very much for your time! [Obtain contact information if not already gathered.]

Memorandum

March 19, 2024

TO: Anu Teja, Srenior MRE Scientist

CC: Stephanie Quinn - Manager, Program Management; Amy Webb - Sr. Mgr., MRE

FROM: Emily Rosenbloom – Senior Program Manager, Heat Pump Water Heater

SUBJECT: Response to Heat Pump Water Heater Market Progress Evaluation Report #7

NEEA posted its 7th Market Progress Evaluation Report (MPER) for the Heat Pump Water Heater program in November of 2023. The purpose of this memorandum is to summarize the program's response to the major findings and associated recommendations of MPER #7. Note that MPER #7 included 10 key findings and 15 related recommendations. This response addresses only a subset of those recommendations that the program team judged would have the most meaningful impact on the program (in terms of overall strategy, specific interventions, program logic, and/or resources). Where the MPER's recommendations imply a modification in program strategies or activities, this memo outlines the program's anticipated adaptation and timeline for doing so. NEEA programs are not required to accept every MPER recommendation. In instances where the program chooses to reject (or accept with caveats) an MPER recommendation, this memo provides a rationale.

Key Finding #2: Installers have become much more familiar with HPWHs, but still do not often recommend them.

Related recommendation. Continue or even ramp up HWS training efforts, specifically about quality installation practices and identifying scenarios where the systems will perform as expected. Where possible, consider hands-on training for installers with limited HPWH experience. The general population of water heater installers (MPER #7) have positive impressions of HPWHs, but HWS-trained installers surveyed several years ago (MPER #5) were far ahead in terms of comfort with HPWHs. These HWS-trained installers may also be avoiding installation pitfalls, helping them maximize customer satisfaction and reduce callbacks. (Page 2)

Program's Response: In addition to the training assets already in place, a primary program focus in 2024 is expanding Hot Water Solution's in person training opportunities and online resources. In 2024, the program will develop and rollout an in person hands-on training experience for installers across the region. An emphasis of the training will be ensuring quality installation practices and identifying installation scenarios that can readily accommodate HPWHs ensuring installation ease and optimized consumer experience. By building a reliable reputation for these types of installations, installer confidence and customer satisfaction with heat pump water heaters will strengthen.

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Key Finding #4: Cost continues to be a significant barrier to HPWH adoption.

Related recommendation. Continue working with manufacturers and installers to identify ways to make HPWHs more affordable to purchase and install. This could include a mix of strategies known to NEEA, such as helping installers follow best practices for installation, teaching installers about which homes are going to be the strongest candidates for installation and require limited modification, working with utilities to boost incentive amounts and availability, or even promoting new product development, such as 120-volt plug-in models that can be installed without the need for (or cost of) an electrician. (Page 3)

Program's Response: The program will continue to work with manufacturers and installers to understand how to utilize the Inflation Reduction Act (IRA) funding in their sales pitch to consumers as well as ensuring installers know how to access existing financing options provided through manufacturers. As mentioned above, and a reoccurring theme throughout this memo, 2024 will be focused on building installer experience and knowledge of best practices with straightforward installations with a goal of decreasing installation cost, as confidence and installation efficiency grow. Additionally, the program will continue conversations about financing options with key manufacturers and how to help installers access existing resources.

The program will not emphasize the 120-volt plug-in models as solution as this technology is primarily targeted at gas-replacement. However, in 2024 the program will be launching a design-innovation project that offers manufacturers financial support to design and develop low-cost solutions specifically tailored for space-constrained installations.

Key Finding #5: Most HPWH installations require accommodations that can increase installation time and cost, but a substantial portion of homes – at least 29% – can still readily accommodate HPWHs.

Related recommendation. In the short term, NEEA should encourage installers to focus on the portion of the market that installers already think can readily accommodate a HPWH (29%, on average). With additional training from HWS, the share of the market considered "low-hanging fruit" should grow in the medium and longer term, as HWS-trained installers reported in MPER #5 that that figure was closer to half of homes. (Page 5)

Program's Response: NEEA fully endorses this recommendation. The program will persist in efforts to develop and promote solutions for challenging installations, but it will notably prioritize reaching the "low hanging fruit" or straightforward installations within the region in the coming year(s). With a concentration on uncomplicated and easily accommodated installations, the program aims to enhance installer confidence and comprehension of the technology's value. This focus intends to equip them with greater resilience in problem-solving for more difficult future installations.

Key Finding #7: While installers in Montana and Idaho are less familiar with HPWHs and less likely to recommend them, overall familiarity is up, and NEEA's recent marketing campaign may be helping boast customer receptiveness in these states.

Related recommendation. Continue targeting rural consumers in HPWH awareness campaigns (and HWS trainings), building on the success from the most recent "Boring but Efficient" campaign. (Page 5)

Program's Response: The program is developing plans for running a digital consumer marketing campaign in the first half of 2024 to increase awareness of the technology and enhance understanding of the value proposition of HPWHs. The campaign aims to reach both urban and rural consumers.

The HPWH Program acknowledges the importance of regular evaluations, both as a demonstration of our fiduciary duty to our funders and other stakeholders, a way to assess progress toward our market transformation goals, and as a tool for adaptive management of the program. We appreciate the opportunity to reflect on these evaluation results and to leverage them in the ongoing effort to improve the program and hasten progress toward our market transformation goals. If you have any questions about the Program's response to the findings of MPER 7, please contact me at Erosenbloom@gmail.com.