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# Northwest Heat Pump Water Heater Initiative Market Progress Evaluation Report #4

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# **Executive Summary**

The Northwest Energy Efficiency Alliance (NEEA) contracted with Cadeo (the team) in April 2018<sup>1</sup> to complete the fourth Market Progress Evaluation Report (MPER) of its Heat Pump Water Heater (HPWH) Initiative. The overarching goal of the initiative is to create a federal standard for water heaters greater than 45 gallons that would require a coefficient of performance (COP) of 2.0 or better.<sup>2</sup>

Working with NEEA, the team designed this MPER's research activities to address the following research objectives:

- Track initiative progress through a market update of sales
- Track customer satisfaction through an online survey of purchasers who received a utility rebate
- Improve NEEA's understanding of HPWH pricing practices
- Qualitatively assess the share of HPWH flowing to new construction

Research activities included interviewing five distributers and ten installers and conducting a consumer survey of recent HPWH purchasers. Additionally, the team gathered and/or reviewed sales and pricing data from several sources. The team identified five key findings based on its research activities:

#### 1. New construction is driving a large share of HPWH sales.

Installer and distributor interviews, as well as the market update analysis, indicated the new construction market is driving a large percentage of HPWH sales in the region. Builders, driven by manufacturer incentives and state energy-efficiency code requirements, are increasingly installing HPWH in new homes. Special pricing arrangements between manufacturers and builders play an important role in this trend. The builders' higher volumes garner attractive pricing from manufacturers for HPWH, which represent a least cost path to code compliance in many cases. The team further found that some contractors target new construction to sell bundles of energy-efficiency services and equipment that include HPWH. Utility rebates are also driving sales, but to a lesser extent. New construction comprises an overwhelming share of distributor sales (70 to 90%, based on distributor interviews) but only about 15% of 2017 distributor channel sales went through a utility rebate program. It is important to sustain and build on the success of HPWH in the new construction market to facilitate further market transformation.

Based on this finding, NEEA should consider exploring these builder and manufacturer agreements (which was not a focus of this MPER) and the other dynamics behind HPWH popularity in new construction to determine if any elements of this trend are transferable to the much larger, and slower-to-adopt, existing homes market. For instance, NEEA could investigate whether it has a potential role in facilitating special pricing arrangements between large installers (or groups of installers) and HPWH manufacturers. Because crossover between new construction and retrofits is low for installers, this is not a current practice; however, the team feels this tactic is a key opportunity to make inroads into the retrofit market.

Cadeo | ii

<sup>&</sup>lt;sup>1</sup> A project initiation meeting was held in February 2018 to scope research activities and inform research objectives.

<sup>&</sup>lt;sup>2</sup> Federal standards, set by the Department of Energy, are performance-based and technology neutral by law. However, based on currently available technology on the market, a COP of greater than 2.0 would effectively require heat pump technology. The current federal standards effectively require heat pump technology for electric storage water heaters with a capacity greater than 55 gallons.

#### 2. Lessons from tankless water heaters may offer a path to HPWH success.

The consumer satisfaction survey revealed that most purchasers of HPWH also considered a tankless water heater while making their buying decision. In addition, installers indicated they frequently supplied estimates for tankless heaters to customers. This indicates a high-awareness of tankless technology, though tankless had similar barriers to HPWH when it was first introduced to the market. The research team recommends observing and adapting the marketing and education tactics that helped advance tankless technology to NEEA's HPWH market transformation strategy. During interviews, installers said that, when they recommend a HPWH, customers will end up going with that choice 30 to 50 percent of the time. That percentage is much higher than the current 9 percent market penetration of HPWH; therefore, providing education and encouragement that sways installers to increase their HPWH recommendations to customers will have a direct impact on HWPH sales.

# 3. HPWH pricing<sup>3</sup> is erratic compared to traditional electric resistance models.

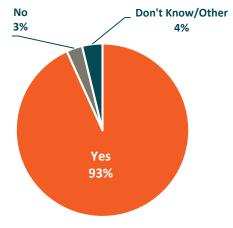
HPWH have a much wider range in installation and equipment costs compared to electric resistance tanks. This finding is consistent between installer and distributer interviews as well as the detailed pricing data analysis. The range in prices may make it difficult for consumers to make a well-informed decision on which type of water heater to purchase—a higher-than-necessary cost for a HPWH is difficult to overcome when compared to a more moderately priced ER model. This is partly a symptom of bringing a new product to market, and we expect the equipment prices to stabilize over time. However, the standard practice of providing one-price bids obfuscates the purchasing decision for customers because the costs of equipment and installation are not itemized. This allows installers to charge a higher installation price for HPWH, which is often done when an installer is not familiar with the technology (cost is inflated to allow for additional time to figure out how to install the new product, or a presumed higher-likelihood of a call back). It's easier to steer the customer towards the easy and comfortable ER installation by (consciously or unconsciously) pricing the new product out of contention. The research team recommends taking an educational approach with installers, such as offering a seminar on HPWH installation or pairing an experienced HPWH technician with an installer who is new to the technology. Additional consumer education

would round out this effort, by encouraging consumers to request multiple quotes so they are better prepared to make an informed buying decision.

#### 4. Purchaser satisfaction with HPWH remains very high.

The team's survey of HPWH purchasers who received a utility rebate showed satisfaction remains very high: 93% stated they would, or have already, recommended the technology to others. Key aspects to ownership such as operating noise and maintenance requirements also had high satisfaction scores.

Beyond satisfaction, the survey found HPWH purchasers generally obtain information about HPWH from their utility,



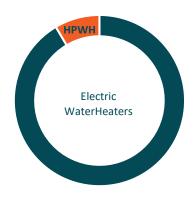
**Have/Would Recommend a HPWH** 

<sup>&</sup>lt;sup>3</sup> Referring to the price paid by the end-user (typically the homeowner).

the internet, and retailers. Installers were an infrequently cited source of HPWH information, which underscores the slow adoption of HPWH in the emergency replacement market, where consumers are most likely to rely on installer recommendations.

#### 5. Market share of HPWH remains relatively low.

Despite the rapid increase of HPWH installations in new construction, overall market share remains low with HPWH comprising just 9% of all electric storage water heater sales in the Northwest. Idaho and Montana, in particular, have very low HPWH market share at less than 2% in each state. Oregon and Washington each have 10% market share, with Oregon having the highest rate of claimed utility rebates between the two, pointing to high utility program engagement.



**2017 Installations** 

	Idaho	Montana	Oregon	Washington	Total
All electric water heater installations	17,000	12,000	40,200	87,700	156,900
HPWH installations	369	71	4,179	8,734	13,353
Total HPWH utility rebates	21	38	2,364	2,067	4,490

# 1. Background

The Northwest Energy Efficiency Alliance (NEEA) contracted with Cadeo (the team) to complete the fourth Market Progress Evaluation Report (MPER) of its Heat Pump Water Heater (HPWH) Initiative. NEEA is an alliance of over 140 utilities and energy efficiency organizations working on behalf of more than 13 million energy consumers (roughly 4.5% of the population of the U.S.). NEEA is dedicated to accelerating both electric and natural gas energy efficiency, leveraging its regional partnerships to advance the adoption of energy-efficient products, services, and practices.<sup>4</sup>

The initiative works to promote the adoption of HPWH in the Northwest by providing resources, tools, and other support to manufacturers, installers, and regional utility programs. The overarching goal of the initiative is to create a federal standard for water heaters greater than 45 gallons that would require a coefficient of performance (COP) of 2.0 or better. This standard would effectively require heat pump technology for tanks 45 gallons or greater (lower than the current 55-gallon threshold).

For this fourth MPER, the team sought to:

- Track initiative progress through a market update of sales
- Track customer satisfaction through an online survey of purchasers who received a utility rebate
- Improve NEEA's understanding of HPWH pricing
- Qualitatively assess the share of HPWH flowing to new construction

The team conducted several activities, which we describe briefly in the next sections and in more detail in the Methodology section of this report.

# **Interviews and Survey**

The team, in partnership with Wonderlust Collective, Inc., conducted in-depth distributor interviews to gain a better understanding of HPWH in the distributor market. The team completed five 45-minute interviews with representatives from water heater distributors around the Northwest. The style of the interview was a guided conversation that allowed the interviewers to probe distributors on specific topics. This allowed the questions to be tailored to the distributer's role and resulted in deeper insights than a more rigid survey approach. Key topic areas are outlined in Appendix A: HPWH Distributor Interview Guide.

To understand satisfaction levels with HPWH and purchasing patterns, the team conducted an online survey of 2017 HPWH purchasers, targeting HPWH utility incentive recipients. The survey was sent to approximately 1,000 purchasers<sup>5</sup> and the team received 242 responses. The survey instrument largely followed the same format of prior surveys conducted for MPER 1 and MPER 2 (so longitudinal findings could be assessed) but was modified to a shorter online format to improve completion rates. The survey

<sup>&</sup>lt;sup>4</sup> https://hotwatersolutionsnw.org/about

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<sup>&</sup>lt;sup>5</sup> The team sent the survey to 400 purchasers who received rebates from seven utilities representing a subset of Northwest utilities who provided HPWH rebates in 2017. One large utility sent the survey directly to their own customers, which is why the team cannot provide an exact count of purchasers to whom the survey was sent.

instrument is available in Appendix B: HPWH Purchaser Survey Instrument and frequency tables for all questions are presented in Appendix C: HPWH Purchaser Survey Results.

# **Investigation of Installer Pricing Practices**

The team investigated installer pricing practices through installer interviews, data collection, and data analysis. The core purpose of this activity was to assess how pricing practices and prices varied between installations of HPWH and comparable standard electric resistance water heaters. The team conducted ten thirty-minute phone interviews with regional installers in July of 2018. The discussion guide used for the research is included in Appendix D: HPWH Installer Discussion Guide.

The team also analyzed and compared typical equipment and installation costs for heat pump water heaters and electric resistance water heaters using customer rebate data from seven utilities in the Northwest, 2017 tax rebate data from the state of Oregon, and pricing data scraped from online retailer websites.

# **Market Update**

The team completed a market update to assess progress toward initiative goals using market and utility program data provided by NEEA, the 2016 Residential Building Stock Assessment (RBSA), past water heater market characterization studies, in-depth interviews with market actors, and Northwest Power and Conservation Council housing estimates. The team analyzed the following market attributes and quantitatively assessed HPWH sales across several dimensions:

- State
- Supply channel (retail versus distributor)
- New construction versus retrofit
- Rebated versus non-rebated (utility program participation)
- Emergency versus planned replacements
- Code-built versus above-code new construction

The next section presents the key findings from these activities.

# 2. Key Findings

The MPER activities resulted in five key findings for the initiative. For each of these key findings, the team provides recommended activities supported by the research. The team also offers additional results that offer further insight into the market. Each key finding points to two overarching takeaways from this MPER. First, the retrofit market is not yet transformed and requires new intervention approaches for successful market transformation. Second, there is currently strong momentum behind HPWH in the new construction market. NEEA may want to investigate potential activities aimed at sustaining that success and explore whether any key dynamics in the new construction market could be transferred through market intervention strategies to the retrofit market.

# 2.1 New construction is driving a large share of HPWH sales

Builders are increasingly specifying HPWH because the products make for a cost-effective path to good energy efficiency ratings and code compliance—especially when combined with bulk-purchase pricing,

bundled discounts on installation and services and, to a lesser extent, utility incentives. Given lower HPWH adoption in the much larger retrofit market, the team recommends that NEEA consider how to extend bulk purchasing and bundled pricing to that market. This form of pricing and purchasing is at the heart of success for HPWH in the new construction market and, if harnessed for the retrofit market, could be instrumental in market transformation. Success would require a better understanding of these bundled deals, since it was not a specific focus of the current MPER. This includes exploration of the expected persistent demand of HPWH in new construction, effectively understanding how stable the business model for HPWH is in new construction, and whether the new construction market is already transformed. Given the boom-and-bust cyclical nature of home building in the northwest, the team recommends that NEEA capitalize on the current momentum of the initiative in new construction and remain cognizant of the effect that a slowdown in new home construction could have on initiative progress.

The team also recommends NEEA explore the applicability of new construction tactics to the retrofit market. Code-driven home scores for new homes seem to be, in part, driving the market for HPWH. Home scores for existing homes, such as those required by the City of Portland when a home is listed for sale, could drive transformation in the retrofit market. The new construction practice of bundling products and services at an attractive price seems easily broadened to existing homes.

It would also be useful to explore why utility rebates play a smaller role in the new construction market. Understanding if barriers to greater rebate usage in new construction exist and helping to resolve such barriers would optimize the impact of the different strategies discussed above (home scores, special pricing, bundled packages and utility rebates) by ensuring they can all be brought to bear.

## 2.1.1 New construction HPWH installations are rising

The team learned through the distributor and installer interviews and the market update that HPWH sales are on the rise—especially in new construction. Builders are choosing more HPWH and tankless water

heaters for their projects. The research suggests that this recent rise in popularity is driven by multiple factors, including manufacturer incentives, area-specific code requirements and, to a lesser extent, utility rebates-

A primary factor driving HPWH installations in new construction are agreements between builders and manufacturers. These agreements—which have long existed for certain home appliances—have recently been adopted for HPWHs. For these agreements, the manufacturer typically offers attractive pricing in exchange for the builder's promise to purchase only from their product line. These agreements can have a ripple effect throughout the supply chain. Distributors mentioned they stock specific products in reaction to exclusive agreements between manufacturers and national builders. The builders also communicate their requirements for a certain brand to plumbers, which influences general plumber purchasing trends.

To better understand the agreements between manufacturers and builders and continue the uptake of

# **Distributor Viewpoints**

"The rebates not only make newer products more competitive, they also show there are alternatives to the traditional 50-gallon [unit]"

"This year has been a surprisingly good year for HPWH. There had been some awesome NEEA rebates which went away in 2017 but our sales have gone up a little bit. This is mostly driven by [large national] builders needing to build more energy efficient houses."

"If a manufacturer influences a national builder to use one kind of product exclusively, it means we then start supplying that product."

HPWH in new construction, the team recommends that NEEA conduct additional research with the builders and manufacturers engaged in such agreements.

## 2.1.2 Contractors target new construction efficiency requirements

In certain regions, where building code or energy scoring is a priority for new homes, some enterprising contractors are packaging their services and products with the promise of a certain energy score and the rebates that come along with it. In these instances, a contracting company will provide multiple services

## What the installers say

"If I can get to a customer of a new-construction build and talk to them about efficiency before the house is built, I'd say 98% of the time I can convince them into a heat pump water heater." that previously would have been completed by separate contractors. For example, the home insulation and air sealing, HVAC system, and water heating system are done by a single contractor instead of three separate contractors. Then the contractor completes the energy scoring paperwork and sells the "bundle" to a home builder for a lump sum. It is also important to note that the water heater is generally not specified in building plans for new homes. This provides flexibility and opportunity for these contractors and leads to increased HPWH sales, as they are an important component of the bundled package.

## 2.1.3 Installers rarely cross over between new construction and retrofits

Many large plumbing companies will work in both new construction and retrofit scenarios. However, installers mentioned that this practice is uncommon for individual installers, and plumbers typically specialize rather narrowly. Therefore, it's unlikely that installers experienced in HPWH installation in new construction will cross over to the retrofit market organically. To confirm this theory, more research should be done with general contractors and builders to find out if new construction installers could be effectively persuaded to cross over to retrofits if and when the new housing market slows down.

#### **Installer Viewpoint**

"[It's] not common for a plumber to do both retrofit and new construction – you have to come up through the trades with a lot of training hours, and sometimes coming through that you'll work for a shop that does nothing but [new] homes, some of the bigger contractors will get guys that do nothing but large commercial projects."

# 2.2 Lessons from tankless water heaters offer a path to success

The team recommends NEEA look to the success of tankless water heaters to understand what lessons learned can be applied to HPWH. While tankless are primarily gas storage alternatives, the team recommends understanding if their success in gaining traction can provide meaningful insight for HPWH in the electric storage water heater market. Specifically, the team recommends exploring these broad questions:

• How did tankless grow to command consumer interest and contractor attention? What marketing tactics can be leveraged? What specific value proposition (or message) resonated so strongly with consumers?

 What efforts helped installers become comfortable with tankless water heaters, both in selling and installing? Why did installers begin recommending tankless alternatives when replacing traditional models? How was that base of contractors developed?

## 2.2.4 More than half of HPWH purchasers considered tankless water heaters

The team surveyed 242 customers who recently purchased a HPWH and received a rebate through a utility energy efficiency program. Interestingly, more than half (57%) of the respondents also considered purchasing a tankless water heater in contrast to only 31% who also considered a traditional storage water heater, and a quarter who solely considered purchasing a HPWH. We recommend directly addressing tankless water heaters as a product that consumers are considering and provide them with an accurate comparison to HPWH. Customers not steeped in energy efficiency or water heating technology do not immediately understand the differences between tankless and HPWH. It is not clear from the survey results that respondents understood fuel type and other technology constraints associated with

# Distributor viewpoint on why plumbers do not promote HPWH

"It's hard for them to change what they've been doing for the last 50 years. They can install the traditional water heaters in their sleep, but many aren't comfortable doing something new." tankless. This suggests that consumers would benefit from marketing materials that meet them where they are in their understanding and clearly articulate the benefits and constraints of each technology.

Plumbers who install tankless water heaters do not describe it as an emerging technology. The conversation centers around the instances when it makes sense for a consumer to install a tankless water heater in a retrofit scenario, and most installers say they will give consumers the option of tankless. This is precisely the goal for

HPWH: remove the unfamiliarity of the technology so installers are comfortable recommending and installing them. By comparison, in the team's experience conducting mystery shopper calls, <sup>7</sup> HPWH technology is generally not offered, or, when it is, it is not well-explained by contractors or retailers. Tankless water heater sales are continuing to hold steady even though rebates have largely been

<sup>&</sup>lt;sup>6</sup> Respondents could provide multiple answers to this question with some indicating they considered both a storage water heater and a tankless in addition to the HPWH they ultimately purchased.

<sup>&</sup>lt;sup>7</sup> The team conducted mystery shopping research as part of HPWH MPER #3. For more details please refer to the final report here: <a href="https://neea.org/resources/northwest-heat-pump-water-heater-initiative-market-progress-evaluation-report-3">https://neea.org/resources/northwest-heat-pump-water-heater-initiative-market-progress-evaluation-report-3</a>"

discontinued. Both installers and distributors said in our interviews that they are very popular among consumers wanting to save space and energy, and sales "continue to trend upward."

#### Installer viewpoint on consumers and tankless water heaters

"Many Oregon residents are active and do multiple sports a year. I see a lot of people with a closet for skiing equipment, a closet for kayaking equipment, a closet for camping equipment, and so on. They don't want to devote the space to a water heating tank, so tankless is extremely attractive."

"Many people also like tankless so they do not have to worry about water leaks in temporary or vacation homes."

"[Our company doesn't] have a process on tankless, it was more reactionary to customers' needs and wants. There are a few people out there specifically interested in tankless. It feels like consumers are getting more educated on the options available."

"If the customer is motivated by energy efficiency or a bottomless need for water and are willing to pay, we will offer tankless. If they just think it's cool, we will offer it."

# 2.3 Significant range in HPWH price, compared to electric resistance

The team recommends developing a consumer guide with pricing-related information to aid customers in their interactions with installers and retailers. This guide would educate customers looking at new water heater options by providing guidance and information to inform their ability to assess bids they receive for retrofits. Suggestions could include requesting an itemized bid that separates equipment from labor price, checking a retailer web page for the posted tank price to compare with an installer quote, and, perhaps most critically, getting multiple bids. This guide may include a range of competitive prices for a HPWH installation, explanations of installation factors that could drive differences in the cost of an installation, or recommendations for questions to ask when reviewing contractor proposals. The primary purpose of the guide is to inform consumers in their decision making and encourage more competitive pricing practices for HPWH. In MPER 3 mystery shopper calls, the team found that retailers and installers frequently dissuaded customers from purchasing a HPWH due to costs. The team recommends combatting this issue with a two-pronged approach: educating consumers and increasing installer buy-in.

#### 2.3.1 Pricing practices show a market in early stages

HPWH pricing practices continue to reflect a market still maturing along the adoption curve. An indicator of markets in the early stages of development is *value-pricing*. This is the practice of quoting prices based on the customer's likely perception of value rather than competitor pricing and/or the result of a lack of information about typical prices by one, or both, parties to a transaction. Value pricing practices are consistent with what we heard in interviews with distributers and installers—they are pricing HPWH by what they think the market will bear.

Regional and utility incentives have had a significant impact on the HPWH market in the last decade, and rebates continue to be a major influence in how distributors and installers price their products. These rebates have varied year by year and can be different depending on a customer's state or utility provider.

Distributors and installers both mentioned that inconsistent rebate and tax credit structures have been difficult to navigate and led to greater variation in HPWH pricing.

In retrofit scenarios, plumbers usually provide a single price in their quotes, without breaking out installation cost and equipment price by line item. One installer mentioned that it is simpler for the customer to only see one price. However, this simplicity may be causing some customers to "overpay" for HPWHs (relative to electric resistance tanks), or be dissuaded from choosing a HPWH, because they don't have the details to make quality comparisons.

Beyond these qualitative findings, the team sought to quantify the price difference to the consumer (both for equipment and labor price) between traditional electric WH and heat pump WH. To do this, the team first collected available utility rebate and state tax credit data on recent HPWH purchases, as well as data on electric resistance equipment price from retailers in the Northwest. Once all the data was collected, the team sifted through each set to understand the field name definitions, reporting practices, and to search for outliers and erroneous entries. For this exercise, the team decided to discard the data from the seven utilities that provided records of recent HPWH purchasers because of inconsistencies in reporting and a lack of field definitional clarity.

After subtracting out 249 utility rebate records, the team was left with a final data set of 289 HPWH purchase records from Oregon tax credit data during 2015-2017. Eighty one percent of those records were GE models. To normalize the sample of HPWH data, the team decided to control for factors that would impact the price of a HPWH. Given the limited sample size of data, the most effective way to

#### **Installer viewpoint**

"Quotes are only broken out if the customer asks me to. Otherwise, I give a lump sum"

"It's a lump sum price, but in the description, we itemize everything that you're going to get.

control for tank size, brand, and presence of add-on features was to analyze a single water heater model. The team used the most common model in the data set, a 50-gallon Geospring with model number 'GE50DFEJXX' <sup>10</sup> (82 instances). As shown in Table 1, in the eighty-two instances of this specific Geospring model from 2015-2017 that received an Oregon tax credit, this HPWH's equipment price had a standard deviation of \$307.10, which is significantly higher than the standard deviation of \$91.82 for comparable electric resistance tanks <sup>11</sup>.

There was an initial concern about using a GE model to analyze pricing practices because GE exited the HPWH market at the end of 2016. It is logical that the price of the Geospring model would have fluctuated during the latter half of 2017 as the discontinued product was put on clearance; however, the sales that were analyzed for this model were from 2015 through March of 2017—before clearance pricing would have taken effect. Even so, the team considered using a different model in its analysis, but the most common non-GE water heater in the data was a Rheem model that was represented in just eleven sales.

<sup>&</sup>lt;sup>8</sup> It is important to note that the team is not making a value judgment about market actor pricing practices. Choosing to price a product or a service at a level the market will accept is hardly an uncommon or even controversial practice.

<sup>&</sup>lt;sup>9</sup> These utilities initially provided records to generate a contact list for the purchaser survey. While the team could not explicitly leverage this utility rebate data for the pricing analysis, it was integral to the research findings from other activities.

<sup>&</sup>lt;sup>10</sup> GE discontinued their production of HPWH in late 2016-2017. Bradford White then bought this Geospring appliance line. The team thinks that this specific tank is an accurate representation of HPWH sales given that GE held a large market share, and the majority of tanks sold in the available data were GE products. There may have been pricing effects from GE's exit, however the team believes that this tank is the most accurate depiction of real consumer price.

<sup>&</sup>lt;sup>11</sup> The coefficient of variance for HPWH was 2.2 times higher than the coefficient of variance for electric resistance tanks,

We considered including other brands of 50-gallon tanks in the analysis but opted not to do so because the sample size improvement was marginal and the analytical cost of introducing other variables was too high. Though the sample is not ideal, the team thinks the finding that HPWH have a much wider range in pricing compared to electric resistance tanks is an accurate representation of the water heater market. The quantitative findings expressed in this section, though from an incomplete data set, are consistent with findings from the team's mystery shopper calls, market actor interviews, and developing markets in general.

Cost of Equipment	HPWH Rebate Data (Single Model: GE50DFEJXX*)	Electric Resistance 50 Gal
Mean	\$824.71	\$542.37
Standard Deviation	\$307.10	\$91.82

**Table 1: Comparison of HPWH and ER Price Deviation** 

The high variation in total installed price of HPWH is also evident in the new construction market. Two different distributors mentioned that installers enjoy greater latitude when deciding what to charge for "specialty" installations.

In some cases, physical installation constraints unique to HPWH can cause longer—and therefore more expensive—installations than standard electric resistance tanks of the same capacity. These challenges include adding ventilation, creating more space, installing a new drainage pipe, or other modifications to ensure the HPWH will work effectively. The team analyzed

#### **Installer viewpoint**

"Plumbers will tell builders I'm going to charge you more for water heaters that are more difficult to install. The builders are okay with this because they are receiving more incentive from the manufacturer."

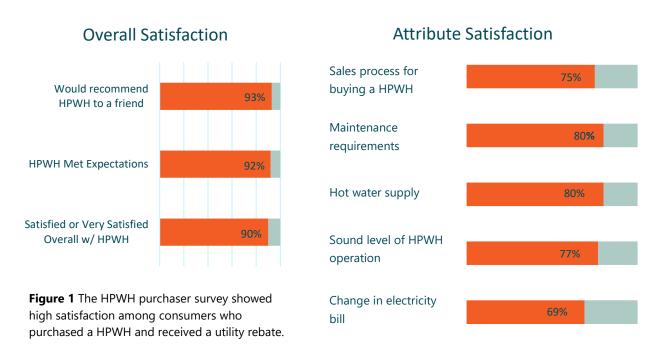
customer data on HPWH installation labor cost and found a standard deviation of \$1,479.79 for the cost of labor. This number may be skewed slightly high due to the significant number of DIY installations for HPWH early adopters (who would have reported zero labor costs). The team did not have pricing data for electric resistance tank labor costs, but from our literature review and installer interviews, the evidence showed that installers are much more consistent in their labor costs for ER tanks, likely because they are a commodity. This relatively large variance in total installation cost (equipment plus labor) of HPWH suggests potential for pricing to standardize as the market matures, leading to a lower average price.

# 2.4 Purchaser satisfaction with HPWH remains high

HPWH have a very high customer satisfaction rate, above ninety percent. Though slight adjustments in customer and installer communications may incrementally improve satisfaction, little or no intervention with *purchasers* of HPWH is required. Survey results did, however, underscore the need for market intervention targeted at *installers*. Educating installers about the high satisfaction levels among customers who have purchased HPWH is likely to help improve installer confidence and lead to installers increasing the rate at which they introduce the technology to customers who do not ask about it specifically during

the job estimating process. Focusing on installers is expected to have the most impact, though efforts to maintain retailer and consumer education remain important <sup>12</sup>.

## Purchaser Satisfaction with HPWH



For key aspects related to owning and purchasing a HPWH, the team compiled satisfaction ratings and comments provided by those who expressed dissatisfaction. The remainder of this section explores those results with recommended NEEA activities to improve satisfaction.

Although satisfaction was high across all categories, purchasers expressed the least satisfaction with the sound of their HPWH. Setting expectations with customers about noise levels prior to purchase could be challenging, considering 63% of respondents self-installed their HPWH. NEEA should continue working with manufacturers to reduce fan noise; some models are very quiet (e.g., Rheem), but there is room for improvement with other models.

<sup>&</sup>lt;sup>12</sup> MPER 2 found similarly high satisfaction rates among customers. The small discrepancy between studies is most likely due to a different sample frame of purchasers and a different mode of response. The results of the phone survey in MPER 2 were 95% satisfied HPWH purchasers. Pg. 23 https://neea.org/resources/northwest-heat-pump-water-heater-initiative-market-progress-evaluation-report-2

# What those who are dissatisfied say about hot water supply

"I thought we were to be able to have two showers back to back but no...sometimes not even one. We've set it to full electric now."

"We had to install a booster to be able to fill our tub, wasn't an issue with the one we replaced." In addition to the noise factor, a small number of respondents noted dissatisfaction with electric bill savings and the recovery time of their HPWH. While HPWH electricity savings are significant, they might not be noticeable due to low electricity rates in the region. While marketing materials should continue to focus on efficiency and electricity savings (nearly half of respondents cited efficiency as their primary reason for purchasing a HPWH), those materials should be clear about what this will mean for a monthly bill. Rather than presenting the potential savings, showing the energy waste associated with electric resistance water heaters could be helpful in boosting

satisfaction. The recent Hot Water Solutions video <sup>13</sup> is a good example of framing in terms of avoiding waste rather than saving money.

General satisfaction with hot water supply is high and could potentially be increased by educating retailers and installers about tank size. A HPWH operating in heat-pump-only mode will not recover as quickly as an electric resistance water heater, so encouraging consumers to increase their tank size might avoid recovery-time dissatisfaction. The current advanced specification <sup>14</sup> provides a guide to assist with this sizing and encourages installers to engage the customer with questions like "How many showers do you typically take?" and "Do you take them back to back?" leading to a recommendation that instills customer confidence. It is important to ensure the correct sizing for the customers' needs, lest they switch their HPWH to full-electric mode and negate all the kWh savings. Helping customers to understand how HPWH work and what tank size will best serve their needs may prevent both dissatisfaction and inefficiency.

The team also recommends finding simple ways to increase retailer knowledge and facilitate conversations with customers. A common thread among customers who were dissatisfied with the sales process of purchasing their HPWH said that their retailer had limited to no knowledge of HPWH benefits or technology. For example, a laminated "cheat sheet" would provide an easy reference for retailers when they discuss options with customers. NEEA should explore whether manufacturers would offer sponsored trainings for retailers such as Lowe's and The Home Depot, similar to those done for distributors. There are likely challenges to that in terms of staffing availability; though providing training via webinar is a low-cost solution that would help better inform retailers and equip them to confidently recommend the product to customers.

#### 2.5 Market share of HPWH remained low in 2017

The share of HPWH in the market remains relatively low despite the significant inroads HPWH have made in new construction. Even though HPWH are doing very well in new construction, with HPWH installed in

<sup>13</sup> https://youtu.be/aHhRZ4vpN7U

<sup>&</sup>lt;sup>14</sup> https://neea.org/img/documents/advanced-water-heater-specification.pdf

nearly a third of all new homes, HPWH represent only about 9% of 2017 electric water heater installations in existing and new single-family and manufactured homes.<sup>15</sup> This is because new construction comprises only 14% of the relative annual market for new electric water heaters in the Northwest. The remaining 86% is planned and emergency replacements <sup>16</sup> in existing construction, with planned replacements taking up the lion's share, as shown in Table 2. For this reason, the team recommends that NEEA focus efforts on the entire retrofit market using different tactics for emergency and planned replacements.

Table 2: 2017 Market Size, HPWH Installations, and Market Share by Installation Type

	Relative Market Size	HPWH Installations	Relative Market Share	Overall Market Share
Total	156,900	13,353	8.5%	8.5%
New construction	22,600	Between 7,500 and 9,500	33 to 44%	5 to 6%
Planned replacements	76,250	Between 2,900 and 4,500	4 to 6%	2 to 3%
Emergency replacements	58,050	Between 975 and 1,400	1.7 to 2.5%	<1%

#### 2.5.2 Retrofit market

For this MPER, emergency replacement is defined as the need to replace the previous water heater because it completely failed and was incapable of providing hot water. Instances where the water heater was in working condition—even if it was not working very well—are defined as planned replacement. The team has two sources of emergency versus planned replacement estimates: NEEA's 2018 water heater market characterization study and the purchaser satisfaction survey conducted for this MPER. Table 3 shows that each source indicates a higher incidence of planned versus emergency replacements. This result is consistent with previous MPERs.

**Table 3: Emergency and Planned Installation Estimates by Source** 

Sample	Source	Emergency	Planned
Water heater purchasers	NEEA's 2018 water heater market characterization study	37%	63%
HPWH purchasers (who received a utility rebate)	MPER 4 purchaser satisfaction survey	22%	78%

<sup>&</sup>lt;sup>15</sup> This includes new and existing homes.

<sup>&</sup>lt;sup>16</sup> A replacement is considered emergency if the existing water heater completely failed and was incapable of providing hot water.

#### **Distributor Viewpoint**

"Our plumbers are more hesitant to recommend a HPWH for an emergency replacement because they feel more comfortable with what they're used to."
"We know installers charge more for emergency replacements of newer models because it's more expensive and more difficult for them to install. However, it doesn't seem like they are pushing as hard for the upsell."

As is well known, installers are the key to the emergency replacement market because consumers in an emergency are more reliant on installer recommendations and product availability than consumers making a planned replacement. The team's market actor interviews confirmed most installers recommend a 'like-for-like" exchange when heading to an emergency replacement job; they generally consider HPWH too expensive to risk an upsell or too difficult to install when a traditional water heater is a much easier transaction. The team suggests continuing to focus efforts on reaching installers as a tactic for transforming the emergency

replacement portion of the retrofit market. Such efforts might include engaging one of the larger contractors to request they require their installers to quote both HPWH and ER models for emergency replacement call-outs for a prescribed trial period and evaluate the sales results. NEEA could facilitate this effort by providing a one-page information sheet about HPWH that installers could use to explain the technology.

Since most retail sales of HPWH are installed in existing homes as planned replacements, the team's recommendations in Section 2.3.2 for retail tactics such as sales person education and published guides are especially applicable to the planned replacement portion of the retrofit market.

To provide further insight into retrofit categorization, the entire electric water heater market was divided into emergency and planned replacement using NEEA's water heater market characterization study estimates; the purchaser survey estimates were used to divide HPWH installations. See Table 4 for the breakdown by state. Although fewer total electric water heater installations in Idaho and Montana is consistent with the smaller populations in those states without a corresponding difference in the saturation of electric water heating (RBSA 2016), the market share for HPWH is significantly smaller (1% to 2% of the total market versus 10% in Oregon and Washington). This indicates there is an opportunity to improve market penetration in the more rural states; however, given the small market size of ID and MT, the team does not believe the expense of specifically targeting those states (with higher incentives, for example) would be justified by the resulting impact.

Table 4: Emergency vs. Planned Electric Water Heater Installations by State 17









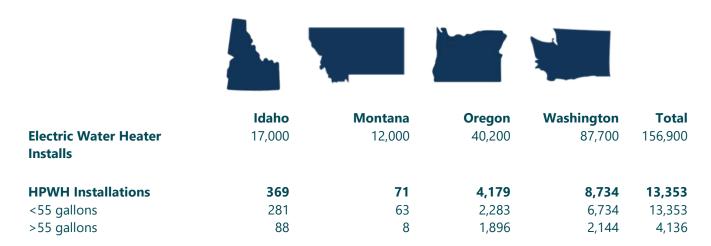
	Idaho	Montana	Oregon	Washington	Total
<b>Electric Water Heater</b>	17,000	12,000	40,200	87,700	156,900
Installs					
Emergency	6,300	4,400	14,900	32,400	58,100
Planned	10,700	7,600	25,300	55,300	98,800
HPWH Installations	369	71	4,179	8,734	13,353
Emergency	83	16	939	1,963	3,001
Planned	286	55	3,240	6,771	10,352
<b>HPWH Overall Market</b>					
Share	2%	1%	10%	10%	9%
HPWH emergency market share	1%	0.4%	6%	6%	5%
HPWH planned market share	3%	0.7%	13%	12%	10%
Total Rebated HPWH	21	38	2,364	2,067	4,490
Replacement	19	38	1,688	1,408	3,153
New construction	0	0	381	231	612
Voluntary new homes	2	0	295	428	725

<sup>&</sup>lt;sup>17</sup> This table summarizes installations for single-family and manufactured homes including new construction and existing homes.

#### 2.5.3 Tank Size

Water heater tank size is important because the overarching goal of the initiative is to create a federal standard for water heaters greater than 45 gallons that would require a COP of 2.0 or better, effectively requiring heat pump technology to meet the efficiency mandate. The current threshold is 55 gallons. Table 5 breaks out electric water heater installations by tank size, by state.

Table 5: Electric Resistance and HPWH Installations by State 18 and Tank Size



The most common tank size in homes is <55 gallons. The >55-gallon installations may be, in part, attributable to NAECA.

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<sup>&</sup>lt;sup>18</sup> This table summarizes installations for single-family and manufactured homes including new and existing construction.

# 2.5.4 Supply channel

The team relied on NEEA estimates from manufacturer shipment model information to estimate market share by supply channel (retail versus distributor). The distributor share is estimated at 75% for HPWH in 2017. That market share estimate combined with manufacturer shipments and other market information results in an estimated 10,000 HPWH sold through the distribution channel in 2017, compared to fewer than 3,500 through retailers.

Distributor interviews yielded that 70 to 90% of HPWH sales through the distribution channel are for new construction. When tied to overall channel estimates, approximately 7,000 to 9,000 HPWH were purchased in 2017 through distributors and installed in new construction homes.

A summary of HPWH installations by supply channel is presented in Table 6.

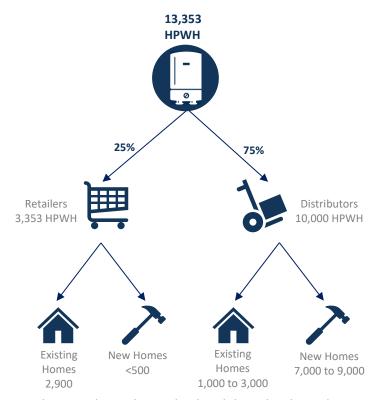


Figure 2 shows the market breakdown by channel

**Table 6: 2017 HPWH Installations by Installation Type and Channel** 

	Distributer Channel	Retail Channel
Total	10,000	3,353
Above-code* new construction	725	0
To-code new construction	Between 6,300 and 8,300	474
Planned replacements	Between 775 and 2,200	2,115
Emergency replacements	Between 225 and 675	751

<sup>\*</sup> **Key Assumptions:** HPWH in above-code homes were purchased through distributors and all above-code homes went through a utility program

In the distributor channel, new construction HPWH sales outnumber retrofit HPWH sales by a significant margin. This underscores the need for continued NEEA engagement efforts with distributors and inroads with installers to push market adoption in the retrofit market.

To understand the flow of utility rebates through the retail and distributor channels, the team used channel share information from the purchaser survey and compared it to the utility program rebate data

(See Table 7). From this comparison, the team estimates nearly 3,000 of the 3,353 units sold through retailers received a utility rebate—nearly 90%. In contrast, only an estimated 16% of units sold through the distribution channel received a utility rebate. <sup>19</sup> This scenario shows that a significant number of HPWH were sold through the distributor channel without consumers claiming utility program rebates, while nearly 90% of HPWH sold by retailers received these rebates. Perhaps NEEA could explore whether utility rebate programs are being effectively marketed to distributors.

**Table 7: 2017 HPWH Installations by Market Channel and Rebate Status** 

	Retail	Distributor	Total
Total	3,353	10,000	13,353
Utility rebates	2,915	850	3,765
Above-code* new construction rebates	0	725	725
Non-rebated units	453	8,410	8,863

<sup>\*</sup> **Key Assumption:** HPWH in above-code homes were purchased through distributors

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<sup>&</sup>lt;sup>19</sup> These incentives are distinct from those NEEA paid to manufacturers in 2017 and NEEA SPIFs to distributors for a portion of 2017.

# 3. Additional Results

In this section, the team provides additional results to inform initiative understanding of the HPWH market.

# Distributor perspective

While all the distributors interviewed stock HPWH, they had varying degrees of confidence in their outlook for the technology.

# One quarter of rebate recipients changed their tank size

Customers changed their tank size in about 25 percent of retrofit installations. An increase in tank size seems reasonable—it is more curious that 11% of purchasers *decreased* their tank size. The proportion of large tanks reported by purchasers did not directly correlate to those reported by utility programs or through manufacturer shipment data. This is likely due to a mis-reporting of tank size by purchasers, especially those who did not install the HPWH themselves.

#### **Distributor Perspectives**

"You can make a strong case for the HPWH, especially if you store it in the garage. It's not Hawaii, but we still get warm enough to see a real difference."

"The day the rebates dry up we won't sell another one. The builders will go back to whatever is cheapest to install or whatever new product lines their pocket the most."

"See why it's a good option for their customers as well as for them – HPWH are more profitable."

Table 8: 2017 Purchaser Re	ported Tank Size Changes
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Tank size changes	n	%
Downsized	24	11%
Upsized	31	14%
No change (<55 gallons)	83	37%
No change (55+ gallons)	73	32%

# Installers are not a primary source of HPWH information for purchasers

The internet, retailers, and utility communications were the predominant paths of information about HPWH for purchaser (see Table 9). This corroborates the team's recommendation that educating installers should be an area of focus.

This path of information is indicative of a planned replacement scenario where consumers have completed prior research to their water heater installation. Seventy-seven percent of the people surveyed bought a HPWH as a planned replacement. Only 6% of that group first heard about HPWH from the installer, since they most likely had prior contact with the HPWH option in their research before speaking with an installer. Given that most HPWH are either in new construction or planned replacements, it

suggests that installers are not recommending HPWH in emergency replacement scenarios, which is a large share of the market. For future market transformation, NEEA must continue to target this segment of the market to ensure that installers are quoting and recommending HPWH to customers in emergency scenarios.

**Table 9: 2017 Rebate Recipient Information Sources** 

	First source of information	Other sources
Internet advertising/research	24%	29%
Utility newsletter, print ad, bill stuffer, website	24%	15%
Retailer store or salesperson	17%	16%
Friend or acquaintance	11%	5%
Installer/contractor	6%	3%

# 4. Methodology

The team conducted the following activities to evaluate the HPWH market:

- In-depth interviews with distributors
- Online survey of HPWH purchasers
- Investigated of installer pricing practices, including installer interviews
- Market update

Each activity provided valuable information for the research objectives using qualitative and quantitative approaches. All information garnered from the research activities was integrated in the analysis of the HPWH market.

# 4.1 Distributor In-Depth Interviews

This activity had two primary goals. The first was to evaluate whether distributors increasingly stock HPWH, a key market transformation indicator identified and evaluated in MPER 3. Interviews were also conducted to gather qualitative information about the share of HPWH flowing to new construction. This was in part to inform the market update.

This task was conducted in partnership with Wonderlust Collective, Inc. to gain a better understanding of HPWH in the distributor market. The team completed five 45-minute interviews with representatives from water heater distributors around the Northwest. Though the team used NEEA contacts to recruit interviewees, NEEA was not mentioned to the people who were interviewed to reduce the chance of bias. Distributers who are involved, as well as distributers who do not participate in NEEA's hot water solutions program, were included in the interviews to get a broad market perspective. For a mix of viewpoints, the team spoke with different-sized distributors located across the Northwest to add geographic diversity. Ultimately the team spoke with one large distributor, three mid-size (6-10 Northwest branches), and one mid-size distributor that specialized in tankless water heaters.

The interview guide sought to prompt distributors on the following topics:

- Role and impact of heat pump water heaters on the industry
- Role of tankless water heaters on the heat pump water heater market
- Impact HPWH and tankless WH have on the industry and in relation to traditional gas and electric water heaters
- Current market trends
- Current inventory and stocking practices
- Current pricing models and impact of product, incentives, rebates, etc.
- Role of HPWH in new construction
- Price differential between electric resistance tanks and HPWH

The interview guide is provided in Appendix A: HPWH Distributor Interview Guide.

# 4.2 HPWH Purchaser Survey

For 2018, many utilities (particularly in Oregon) have moved to midstream rebates. This shift away from downstream rebates (where customers provide installation address and demographic information) highlights the value of 2017 rebate applications and contact information, since this information is unlikely to be available in future years. The purchaser survey was conducted to assess customer satisfaction with HPWH and identify sources of awareness and key decision drivers before losing the direct line end-user rebates offer into the purchaser market

The team partnered with Irwin Broh Research to conduct a survey of HPWH utility incentive recipients (for calendar year 2017) to understand their satisfaction levels with HPWH and purchasing patterns. A subset of Northwest utilities who provided HPWH rebates in 2017 provided customer contact information for 400 purchasers. The survey was sent to approximately 1,000 purchasers<sup>20</sup> and the team received 242 responses.

The survey instrument largely followed the format of prior surveys (MPER 1, MPER 2) but was more limited in length to improve the completion rate and was reoriented to an online survey.

The team received raw and formatted data, which was analyzed to:

- Evaluate HPWH purchaser satisfaction
- Estimate the share of emergency replacements in HPWH purchases
- Identify primary sources of information about HPWH for purchasers
- Understand purchasing patterns, e.g., self-installation, purchase location (distributor versus retailer)

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<sup>&</sup>lt;sup>20</sup> The team sent the survey out to purchasers from seven utilities and one large utility sent the survey out to their own customers, which is why we cannot provide an exact count of purchasers to whom the survey was sent.

	MPER 1	MPER 2	MPER 4 (Current)
Mode	Phone	Phone	Online
Sample Size	195	134	242
	Demographics	Demographics	Purchase decision
Main Objectives	Sources of awareness	Decision factors	Satisfaction
	Satisfaction	Satisfaction	

**Table 10: Purchaser Satisfaction Surveys Comparison** 

It is worth noting that all three MPER survey samples consisted of customers who had purchased a heat pump water heater and received a utility rebate. This sample was not meant to be representative of the population of heat pump water heater owners. Additional sources of potential bias in the sample include:

- MPER 4 survey contains only a subset of Northwest utilities
- survey participants had the opportunity to opt in or out of the survey.

The survey instrument is available in Appendix B: HPWH Purchaser Survey Instrument and frequency tables for all questions are presented in Appendix C: HPWH Purchaser Survey Results.

# 4.3 Installer Pricing Practices

Activities for investigating installer pricing practices sought to more accurately characterize pricing practices in the water heating market and quantitatively test the hypothesis installers are overcharging for HPWH installations relative to the level of effort. There were two activities associated with this research: installer interviews and pricing data analysis, described in the next sections.

# 4.3.1 In depth interviews

Installer interviews had two primary objectives. At the highest level, the team sought to better understand installers' perspective of the HPWH market given that installers are critical to market transformation, particularly in the retrofit market. At a more detailed level, the interviews were used to characterize pricing differences between technologies, installation scenarios, and labor costs.

The team conducted 10 thirty-minute phone interviews among regional installers in July of 2018. The team initially targeted 15 interviews stratified among several different attributes such as geographic location, size of plumbing company, interaction level with NEEA, and whether the installer had experience with HPWH. Installers proved a difficult market actor to reach for several reasons, namely, they spend a large part of their time working in the field and have highly variable schedules. Initially, the interview included a \$50 incentive and was blinded to remove bias. After limited initial success, the team increased the incentive to \$100 and unblinded the interview to leverage NEEA recognition and energy efficiency as a recruiting tool. In addition to those changes, the team reached out to plumbing trade organizations and other contacts tangentially related to the plumbing industry who served as intermediaries between interviewers and their plumbing contacts. The team made contact, through email and phone calls, to over 100 installers and was able to secure 12 interviews. Two of these interviews fell through, resulting in 10 completed interviews. The discussion guide used for the research is included in the appendix of this

report. While key topic areas and questions are listed explicitly, interviewers guided conversations with installers to understand their perspective, but did not dictate the questions in a survey format.

The purpose of this research was to gain deeper understanding of the hot water tank industry, with an eye to specific learning around the following areas:

- Qualitative information about how installers position water heater options,
- Share of heat pump water heaters flowing to the new construction market
- Pricing approaches for electric resistance (ER) and heat pump water heaters (HPWH)
- Barriers to greater heat pump water heater installation
  - If those barriers vary between emergency and planned replacements, and any lessons about how water heating technologies break into the market through the case study of tankless water heaters.
- Role and impact of heat pump water heaters on the industry
- Role of tankless water heaters on the industry with implications to the heat pump water heater market
- The difference of pricing drivers between:
  - o New construction and retrofit
  - o ER and HPWH
  - o Emergency situations versus planned replacements

## 4.3.2 Pricing Data Analysis

In parallel with installer interviews, the team collected and analyzed pricing data on HPWH and electric resistance water heater equipment and installation costs. This data included customer rebate data from utilities in the Northwest, Oregon tax credit data from 2015-2017, and web-scraped pricing data from online retailers (such as Lowes, The Home Depot and Sears). These data sources all reported price characteristics in a different way, so the team took steps to standardize the data format across all sources.

The cost of HPWH is highly variable. Even when controlling for a specific brand, model, and size water heater the standard deviation in equipment cost was \$307.10. Comparing that to the standard deviation for an electric resistance tank, \$91.82, indicates that the HPWH market is still immature.

# 4.4 Market Update

The team reviewed and analyzed market and utility program information collected by NEEA, this included:

- Manufacturer HPWH shipment counts for the region
- Utility-provided HPWH rebate counts
- Distributor water heater sales data (September through December 2017) collected through a NEEA-administered HPWH special pricing agreement program (SPIF).
- Next Step Homes program information

The team used other data sources to more comprehensively understand the HPWH market. Total regional retrofits and new construction installations were estimated by Russell Research for NEEA's Water Heater Market Characterization Study (April 2018). The team compared those aggregate estimates to results from the prior MPER stock turnover model updated with 2016 Residential Building Stock Assessment (RBSA)

water heat saturations and found the results were consistent.<sup>21</sup> The team used the Council housing stock forecast, which we calibrated to Residential Building Stock Assessment (RBSA) housing counts for 2011<sup>22</sup> to estimate installations by vintage (new construction and existing construction) and by housing type (single family, manufactured, and low-rise multifamily). This was then used to subtract multifamily installations from the total applicable market to account for in-unit HPWH installation challenges, an assumption supported by the absence of HPWH in 2016 RBSA multifamily units. The Council housing estimates were also used to estimate the number of new construction units since the market characterization estimates did not provide that level of detail. The overall process for this adjustment is illustrated in Appendix E.

In addition to these data sources, the team relied on information collected through the MPER research activities. For example, distributor interviews provided inputs for estimating the number of HPWH installed in new construction and HPWH purchaser survey results provided estimates of units sold through retailers versus distributors, which are described in the Market Update section of this report. Voluntary new homes program data from utilities was used to estimate the saturation of electric water heaters in new construction.

Using the available data, the team analyzed the following market attributes:

- State
- Supply channel (retail versus distributor)
- New construction versus retrofit
- Rebated versus non-rebated (utility program participation)
- Emergency versus planned replacements
- Code-built versus above-code new construction

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<sup>&</sup>lt;sup>21</sup> The market characterization estimated installations by state, which the stock turnover model does not.

<sup>&</sup>lt;sup>22</sup> RBSA for Single-Family, Multifamily, and Manufactured Homes, 2011

# **Appendix A: HPWH Distributor Interview Guide**

# Instrument Information

**Table 1: Overview of Data Collection Activity** 

Descriptor	This Instrument
Instrument Type	In-depth Interview
Estimated Time to Complete	45 minutes
Population Description	Distributors
Completion Goal	Five
Contact List Source	NEEA contact list
Type of Sampling	Purposive: Target specific contacts who can provide proper context with which to evaluate the HPWH market.
Fielding Firm	Cadeo

# Objectives and Target Individuals for Discussions

To track progress against HPWH Initiative goals, as laid out in the logic model, Cadeo will conduct interviews with five distributors. A second objective for this task is to gather qualitative information about the share of HPWHs that are flowing to the new construction market. Additional interview topics will be determined by the NEEA Initiative team. In some cases, distributors sell to both contractors and consumers. In such cases, we will target interviewees on the contractor or "pro" side of the business because that is the channel we aim to characterize within this set of market actors.

# In-Depth Interview Guide

#### Introduction

Hello, this is [NAME] with [ORGANIZATION]. I would first like to thank you for taking the time to speak with us today. As I said, I work for [ORGANIZATION], which is an independent research company. Other companies hire my firm when they want to objectively understand opinions and perspectives about a topic. We will keep your responses anonymous, so none of your statements will be associated with your name or your company.

[If the distributor has questions about who this information will be provided to] Currently, we are working on behalf of the Northwest Energy Efficiency Alliance (NEEA) to help them better understand the heat pump water heater market.

Our interview today will last around 45 minutes. With your permission, I'd like to record our call today. The purpose of recording is to allow me not to take notes while we're talking – my team and I will listen back to the recording to summarize our discussion and then delete the recording.

Do you have any questions before we get started?

# Introductory (1-2 minutes)

- 1. To get started, please describe your role at [DISTRIBUTOR COMPANY].
- 2. What do you believe is the most important factor to being successful in your role?

# Water Heater Market (10 minutes)

- 3. Can you provide me with an overview of the water heater market? [**PROBES**: What products are available in the market? What are the "work horse" products? What are the newest products that you think are going to be successful? Why?]
- 4. Tell me about water heater sales. What sales trends are you seeing in the water heater market? [**PROBES**: Why do you think these trends are happening? How do you think these trends will change in the next few years?]
- 5. Thinking now strictly about heat pump water heaters, can you tell me a little bit about that market? [PROBES: What are the sales trends in HPWHs? How have HPWH sales changed in the last few years? Looking forward, do you expect your sales of heat pump water heaters to increase, decrease, or remain flat in 2018?
- 6. I'd like to ask about your contractor customers. Can you tell me how the contractors typically go about procuring water heaters from you? [PROBES: Do they call in orders or do they always come in to the branch? Do they seek advice on product selection?]
- 7. Can you tell me about contractor demand for HPWHs? [**PROBES**: Is it trending higher/lower? Can you profile what types of contractors are typically purchasing HPWHs? Do you feel more pull from contractors for HPWHs or is there push from manufacturers and utility organizations?]
- 8. How often do you make product recommendations to contractors? [**PROBES**: What circumstances might cause you to make recommendations? What circumstances would you recommend a HPWH? What would you recommend when they ask about replacing a large tank ER water heater? If they do not typically recommend HPWH, what might make you recommend them more often? Why?]
- 9. When you hear the term 'emergency replacement' as related to water heaters, what would that mean to you? For purposes of this conversation, when I refer to "emergency replacement" I mean a replacement taking place because the water heater has completely failed. [PROBES: Do you typically know if a given water heater you sell is for an emergency replacement (versus a planned replacement or new construction)? If so, how do you know? How often would you say HPWHs (instead of ERHW) are selected for emergency replacements? What do you think are the main reasons a HPWH would be installed versus an ERWH? Do you expect the rate at which HPWH are being used in emergency situations to change in the next few years? If so, why? Can contractors typically buy a HPWH for emergency replacements as easily as they can electric resistance tanks? If yes, is this the same across all contractors? How about across all markets/geographies in your service territories? If no, why not?]

10. Now, I want you to think about those times when a water heater is being replaced, and it is NOT an emergency (i.e. a planned replacement). What do you think are the most common reasons for planned replacements? [**PROBES**: How consistent has that been year over year? Are some reasons for planned replacements becoming more prevalent? Less prevalent? How often are HPWHs the chosen technology in a non-emergency situation (planned replacement)? Your best estimate of a percentage is fine. What do you think are the main reasons a HPWH would be installed vs. an ERWH? Do you expect the rate at which HPWH are being used in non-emergency situations to change in the next few years? If so, how?]

# New Construction (10 minutes)

Next, I'd like to talk to you a little more about how heat pump water heaters are appearing in new construction.

- 11. Can you tell me about what you are seeing in your business with water heaters in new construction? [PROBES: Can you tell me a bit about the split between ERWH and HPWH in new construction? What trends are you seeing? Have these trends been changing in recent years? Thinking about your total sales for all residential ERWH in a typical year, about what portion are installed in new construction? Now, thinking about your total sales for all residential HPWH in a typical year, about what portion are installed in new construction? How have these levels changed over time? Are you seeing changes in the use of HPWHs in new construction?]
- 12. What other trends related HPWHs types are you seeing in new construction? [**PROBES**: Thinking about things like location, building type or size, pricing structure, etc., are there specific segments of the new construction market that seem to be using HPWH more or less? If so, why do you think that is?]
- 13. In your opinion, what do you think are the main influences on the decision to use HPWH in new construction? [**PROBE**: Building codes, available incentives]

# Relative Costs (10 minutes)

Finally, I'd like to understand what goes into the price of a water heater to the end user. Clearly, what a contractor charges the customer for the water heater and installation is more than the price the contractor pays to buy the water heater. We are trying to understand what goes into that price markup, and more importantly, what drives the difference in markup between electric resistance and heat pump water heaters.

- 14. Do you have any insight into contractor pricing strategies? [If no, move to Stocking]
  - a. Tell me a little bit about how contractors think about pricing the installation of water heaters? What goes into the price of a water heater? [PROBES: We've heard that contractors markup differently for equipment cost and labor cost, do you have insight into contractor markup practices? Are equipment cost and installation cost considered separately? Do contractors typically mark up the equipment itself? Do contractors typically charge explicitly for the installation? When a customer receives a quote are the installation and equipment costs broken out, or do they see one total number? How do contractors arrive at a markup amount (flat rate vs. percentage)? Is markup practice highly variable project to project or a consistent standard practice?)

b. Does pricing strategy differ for ERWHs versus HPWHs? If yes, how so? If no, why not? [**PROBES**: Is the equipment markup typically the same % or amount for HPWH and ER? What about installation cost and markup?]

# Stocking Strategy and Practices (10 minutes)

I would like to switch gears now to discuss your stocking strategies and practices.

- 15. Tell me about how you make stocking decisions. [**PROBES**: How do you decide which products to stock and in what proportions? How do you handle deciding how much of a new product to stock? How do you decide how much of your stock should be HPWH vs. ERWH? What percent of your total stock do you think is HPWH? Do you see that changing over time? If so, in what way? Why? How does your stock vary by tank size? Trends? Do you stock accessories specific to HPWH?]
- 16. **[If distributor doesn't mention the NAECA 2015 standard]** We have heard that changes in standards for water heaters has impacted how distributors are thinking about their stocking practices. What are your thoughts on this?
- 17. How often do you take it upon yourself to promote or try to encourage the sale of a specific product?
  - a. [If not often or never] Why not?
  - b. **[If some or frequently]** Can you tell me about a time that you promoted a product? [Probe: Why did you promote this product? How did promoting this product benefit you? What else might cause you to promote a product?]

# Closing (1-2 minutes)

- 18. Are you in the SMIT or (Hot water Solutions) program? What are your impressions of the program? **[PROBE:** Has it changed how you stock HPWHs? Has it changed how you sell or market HPWHs?)]
- 19. Is there anything else about the heat pump water heater market that we have not discussed that you feel should be mentioned?
- 20. Finally, do you know any installers that are involved in the new construction market specifically? If yes, could you put us in touch with them to learn more about their process?

Thank you again for taking the time to talk with me today. This has been a helpful and interesting conversation, and I appreciate your time and your input. (IF PROVIDED: Follow up on new construction installer contacts.)

# **Appendix B: HPWH Purchaser Survey Instrument**

#### **SCREEN:**

- A. Our records indicate that you purchased a heat pump water heater in the past few years. Is this correct?
  - 1. Yes
  - 2. No
  - 89. Don't know
- B. **EXPLANATION:** A heat pump water heater is similar to a standard water heater. It is a different technology, but it serves the same purpose: providing hot water for your household. Do you recall having a heat pump water heater installed?
  - 1. Yes
  - 2. No
  - 89. Don't know
- C. Was the heat pump water heater installed in your home?
  - 1. Yes
  - 2. No
  - 89. Don't know
- D. Was the heat pump water heater installed in an existing home or was it part of a new home construction?
  - 1. Existing home
  - 2. New home construction
  - 89. Don't know
- E. Where was the heat pump water heater installed?
  - 1. Family member's home
  - 2. Friend's home
  - 3. Rental property
  - 77. Other
  - 89. Don't know

- F. Who is your electric utility provider?
  - 1. Chelan PUD
  - 2. City of Forest Grove
  - 3. Emerald PUD
  - 4. Inland Power
  - 5. Kootenai Electric
  - 6. Pacific Power
  - 7. Puget Sound Energy (PSE)
  - 8. Snohomish PUD (SnoPUD)
  - 9. Other, please specify: [Record Response]
  - 89. Don't Know

# **Sources of Awareness**

- **Q 1.** How did you first hear about heat pump water heaters?
  - 1. Previously owned one
  - 2. Friend or acquaintance
  - 3. Utility print advertising, bill stuffer
  - 4. Utility website, please specify:
  - 5. "Hot Water Solutions" website
  - 6. Retail store display / saw it in store
  - 7. Retail store salesperson
  - 8. Newspaper ad
  - 9. Newspaper story
  - 10. Television ad
  - 11. Social media
  - 12. From contractor/installer
  - 13. Internet research
  - 14. Internet advertising
  - 15. Installed prior to moving in to the home
  - 16. Utility newsletter
  - 77. Other, please specify:
  - 89. Don't Know

- **Q 2.** Did you hear about heat pump water heaters anywhere else or learn more about them from any other sources?
  - 1. Previously owned one
  - 2. Friend or acquaintance
  - 3. Utility print advertising, bill stuffer
  - 4. Utility website, please specify:
  - 5. "Hot Water Solutions" website
  - 6. Retail store display / saw it in store
  - 7. Retail store salesperson
  - 8. Newspaper ad
  - 9. Newspaper story
  - 10. Television ad
  - 11. Social media
  - 12. From contractor/installer
  - 13. Internet research
  - 14. Internet advertising
  - 15. Installed prior to moving in to the home
  - 16. Utility newsletter
  - 77. Other, please specify:
  - 89. Don't Know
  - 99. None, I did not hear or learn about heat pump water heaters from any other source
- **Q 3.** Have you replaced the heat pump water heater that was installed prior to moving into the home, or is that unit still in place?
  - 1. Replaced with a new heat pump water heater I purchased
  - 2. Existing unit from move in still in place
  - 89. Don't Know

# **Purchase Decision / Importance of Incentives**

- **Q 6.** How many gallons was your previous water heater tank?
  - 1. Less than 55 gallons
  - 2. 55 gallons or more
  - 3. Tankless / On demand / Instantaneous
  - 89. Don't Know
- **Q 7.** How many gallons is your current water heater tank?
  - 1. Less than 55 gallons
  - 2. 55 gallons or more
  - 89. Don't Know

**Q 8.** The question below includes the term "emergency replacement", which we are defining as the need to replace your previous water heater because it completely failed and was incapable of providing hot water for your home. If your water heater was in working condition – even if it wasn't working very well or you didn't like it for one reason or another – we want to consider that a planned replacement.

Did you replace your previous water heater as part of a planned replacement, for example as part of a home renovation, or was it an emergency replacement.?

- 1. Emergency replacement
- 2. Planned replacement
- 89. Don't Know
- **Q 10.** Besides heat pump water heaters, what other water heating options did you consider? Did you consider...
  - 1. Standard electric storage water heaters
  - 2. Tankless water heaters
  - 3. Gas storage water heaters, which would require natural gas service
  - 4. Solar water heating
  - 5. No other types
  - 89. Don't Know
- **Q 11.** Why did you decide to install a heat pump water heater instead of the other water heating options you considered?
  - 1. Other options not available
  - 2. Other options more expensive to purchase
  - 3. Other options more expensive to operate
  - 4. Other options less efficient
  - 5. Other options require unacceptable renovation
  - 6. Heat pump water heaters were recommended
  - 7. Other, please specify:
  - 89. Don't Know

#### **Q 12.** What initially interested you in a heat pump water heater, as opposed to other types of water heaters?

- 1. The rebate from your utility
- 2. The payback period
- 3. The lower monthly operating cost
- 4. Saving energy
- 5. Concern of carbon footprint / greenhouse gases
- 6. Appearance
- 7. The availability of federal or state rebates
- 8. Past participation in similar program
- 9. The recommendation by contractor / plumber
- 10. The water heater's programmability
- 11. A bad experience with previous water heater
- 12. The product warranty
- 13. Interest in new technologies
- 14. It was "on sale" / markdown
- 15. Other, please specify:
- 89. Don't Know

## **Q 13.** Where did you buy your heat pump water heater?

- 1. Home Depot (including online)
- 2. Sears (including online)
- 3. Lowe's (including online)
- 4. ACE Hardware (including online)
- HVAC Installer
- 6. Plumber
- 7. Water heater installer
- 8. Utility marketplace (e.g. Enervee)
- 9. Online / Internet / Website (e.g. Amazon)
- 10. Other, please specify:
- 89. Don't Know

#### **Q 14.** [IF **Q 13** = 9] What website?

1.

Now I am going to ask you to rate how important each of the following factors was in your decision to purchase a heat pump water heater, where 1 is "not at all important", 2 is "minimally important", 3 is "somewhat important", 4 is "important", and 5 is "Extremely important".

How important was	[Rating of Importance] [Use written options for answers rather than numerical ratings]			vers	[If = 1 or 2] Why do you say that? Optional		
Q 15 the ENERGY STAR® label?	1	2	3	4	5	N/A	Q 16.
Q 17. [If <b>Q 1</b> or <b>Q 2</b> = 5] the information on the Hot Water Solutions website?	1	2	3	4	5	N/A	Q 18.
Q 19. [if Q 1 or Q 2 = 12 your contractor's recommendation?	1	2	3	4	5	N/A	Q 20.
Q 21the availability of a utility rebate for heat pump water heaters?	1	2	3	4	5	N/A	Q 22.

- **Q 23.** Were there any other factors that were important in your decision to install a heat pump water heater?
  - 1. Yes, please specify:
  - 2. No
  - 89. Don't Know

# **Installation, Experience and Satisfaction**

Now I would like to ask a few questions about the installation itself.

- **Q 28.** Did you install the new water heater yourself, or did you hire an installer to do it?
  - 1. Installed myself
  - 2. Hired an installer
  - 3. Other, please specify:
  - 89. Don't Know
- **Q 29.** Did you install the new water heater yourself, did you hire an installer to do it separate from your home build, or did the general contractor building your home manage the installation?
  - 1. Installed myself
  - 2. Hired an installer separate from home build
  - 3. General contractor managed installation
  - 4. Other, please specify:
  - 89. Don't Know

- **Q 30.** How did you find the person or company that installed your new water heater?
  - 1. Smart Water Heat website / Hot Water Solutions website / contractor finder
  - 2. Angie's List
  - 3. Craigslist
  - 4. Personal recommendation
  - 5. Retailer recommendation
  - 6. Retailer home services (e.g. Home Depot or Lowe's Home Services department)
  - 7. Manufacturer recommendation
  - 8. Previous relationship with contractor
  - 9. Utility contractor list
  - 10. Yelp
  - 11. Nextdoor
  - 12. Thumbtack
  - 13. Other, please specify:
  - 89. Don't Know
- **Q 31.** Did the installer/contractor tell you which water heater settings to use?
  - 1. Yes
  - 2. No
  - 3. Other, please specify:
  - 89. Don't Know

Since installing your water heater, please rate your satisfaction with the following items on our 5-point scale (where 1 means "Very dissatisfied" and 5 means "Very satisfied") How about ...?

	[Rating of Satisfaction] [Use written options for answers rather than numerical ratings]		inswers	[If = 1 or 2] Why do you say that? [Optional]			
Q 32 the sound level of the heat pump water heater?	1	2	3	4	5	N/A	Q 33.
Q 34 the change in your electricity bill?	1	2	3	4	5	N/A	Q 35.
Q 36 your hot water supply?	1	2	3	4	5	N/A	Q 37.
Q 38 the maintenance requirements of the heat pump water heater?	1	2	3	4	5	N/A	Q 49.
Q 40the relative value of the heat pump water heater?	1	2	3	4	5	N/A	Q 41.
Q 42the sales process for buying a heat pump water heater?	1	2	3	4	5	N/A	Q 43.
Q 44 the heat pump water heater overall?	1	2	3	4	5	N/A	Q 45.

**Q 46.** Overall, has the heat pump water heater met your expectations?

- 1. Yes
- 2. No
- 89. Don't Know
- **Q 47.** Where did the heat pump water heater fall short of meeting your expectations?

1.

**Q 48.** Have you, or would you, recommend a heat pump water heater to a friend, colleague or family member?

- 1. Yes, have
- 2. Yes, would
- 3. No
- 4. Other, please specify:
- 89. Don't Know

# **Household Demographics**

These final questions about you and your household are for classification purposes only. All your answers will be kept confidential.

- **Q 51.** What type of home do you live in?
  - 1. Single-family detached home
  - 2. Single-family attached home
  - 3. Manufactured home
  - 4. Apartment
  - 5. Condo
  - 6. Other, please specify:
- **Q 52.** Do you own or rent your home?
  - 1. Own
  - 2. Rent
  - 3. Other, please specify:
- **Q 53.** How many people live in your household, including yourself?
  - 1. [DROP-DOWN BOX WITH 1-8, 9 OR MORE]

### Thank you VERY MUCH for your time.

<sup>&</sup>quot; Those are all my questions. Thank you for your time"

# **Appendix C: HPWH Purchaser Survey Results**

This appendix provides frequency tables for the purchaser survey results.

QA	Percent	N
Yes	100 %	242
Total	100 %	242

QC	Percent	N
No	2 %	5
Yes	98 %	237
Total	100 %	242

QD	Percent	N
Existing home	96 %	227
New home construction	4 %	10
Total	100 %	237

QE	Percent	N
Family member's home	40 %	2
Other, please specify:	20 %	1
Rental property	40 %	2
Total	100 %	5

QF	Percent	N
Chelan PUD	4 %	10
City of Forest Grove	1 %	2
Emerald PUD	4 %	10
Inland Power	4 %	9
Kootenai Electric	4 %	10
Pacific Power	4 %	9
Puget Sound Energy (PSE)	68 %	165
Snohomish PUD (SnoPUD)	11 %	27
Total	100 %	242

Q1	Percent	N
"Hot Water Solutions" website	2 %	4
Don't know	3 %	7
Friend or acquaintance	11 %	27
From contractor/installer	6 %	15
Internet advertising	0 %	1
Internet research	24 %	59
Newspaper ad	0 %	1
Newspaper story	0 %	1
Other, please specify:	8 %	20
Previously owned one	2 %	6
Retail store display / saw it in store	15 %	37
Retail store salesperson	2 %	6
Social media	1 %	2
Utility newsletter	5 %	11
Utility print advertising, bill stuffer	8 %	19
Utility website, please specify:	11 %	26
Total	100 %	242

Q2	Percent	N
"Hot Water Solutions" website	0 %	1
Don't know	4 %	11
Friend or acquaintance	5 %	15
From contractor/installer	3 %	8
Internet advertising	3 %	9
Internet research	26 %	73
Newspaper ad	0 %	1
Newspaper story	1 %	3
None, I did not hear or learn about heat pump water heaters from any other source	25 %	71
Retail store display / saw it in store	12 %	34
Retail store salesperson	4 %	12
Social media	1 %	3

Q2	Percent	N
Television ad	1 %	2
Utility newsletter	10 %	29
Utility print advertising, bill stuffer	5 %	13
Total	100 %	285

Q6	Percent	N
55 gallons or more	43 %	97
Don't know	5 %	11
Less than 55 gallons	51 %	116
Tankless / On demand /	1 %	3
Instantaneous	100.07	227
Total	100 %	227

Q7	Percent	N
55 gallons or more	49 %	119
Don't know	3 %	8
Less than 55 gallons	48 %	115
Total	100 %	242

Q6	Percent	N
Don't know	0 %	1
Emergency replacement	22 %	51
Planned replacement	77 %	175
Total	100 %	227

Q10	Percent	N
Don't know	0 %	1
Gas storage water heaters, which would require natural gas service	7 %	23
No other types	15 %	53
Solar water heating	6 %	20
Standard electric storage water heaters	34 %	119

Q10	Percent	N
Tankless water heaters	37 %	129
Total	100 %	345

Q11	Percent	N
Heat pump water heaters were recommended	13 %	24
Other options less efficient	27 %	51
Other options more expensive to operate	20 %	37
Other options more expensive to purchase	12 %	23
Other options not available	3 %	5
Other options require unacceptable renovation	10 %	18
Other, please specify:	16 %	29
Total	100 %	187

Q12	Percent	N
A bad experience with previous water heater	1 %	6
Appearance	0 %	2
Concern of carbon footprint / greenhouse gases	7 %	61
Don't know	0 %	1
Interest in new technologies	10 %	89
It was "on sale" / markdown	4 %	33
Past participation in similar	1 %	7
program		
Saving energy	20 %	186
The availability of federal or state rebates	7 %	61
The lower monthly operating cost	19 %	177
The payback period	5 %	48
The product warranty	2 %	18
The rebate from your utility	20 %	191
The recommendation by contractor / plumber	2 %	18

Q12	Percent	N
The water heater's	4 %	34
programmability Total	100 %	932

Q13	Percent	N
Don't know	1 %	3
Home Depot (including online)	40 %	98
HVAC Installer	2 %	6
Lowe's (including online)	33 %	81
Online / Internet / Website	1 %	3
(e.g. Amazon)		
Other, please specify:	8 %	20
Plumber	6 %	14
Sears (including online)	1 %	2
Utility marketplace (e.g. Enervee)	2 %	4
Water heater installer	5 %	11
Total	100 %	242

Q14	Percent	N
GE Website	33 %	1
Goedekers Appliances	33 %	1
supplyhouse.com	33 %	1
Total	100 %	3

Q15	Percent	N
Extremely important	40 %	96
Important	30 %	72
Minimally important	7 %	18
Not applicable	2 %	5
Not at all important	6 %	15
Somewhat important	15 %	36
Total	100 %	242

Q17	Percent	N
Extremely important	20 %	1
Important	20 %	1
Not applicable	20 %	1
Somewhat important	40 %	2
Total	100 %	5

Q19	Percent	N
Extremely important	17 %	4
Important	65 %	15
Minimally important	4 %	1
Not applicable	4 %	1
Not at all important	4 %	1
Somewhat important	4 %	1
Total	100 %	23

Q21	Percent	N
Extremely important	66 %	159
Important	26 %	63
Minimally important	2 %	4
Not at all important	0 %	1
Somewhat important	6 %	15
Total	100 %	242

Q23	Percent	N
Don't know	5 %	11
No	69 %	167
Yes	26 %	64
Total	100 %	242

Q28	Percent	N
Hired an installer	37 %	83
Installed myself	63 %	143
Other, please specify:	0 %	1

Q28	Percent	N
Total	100 %	227

Q29	Percent	N
General contractor managed	60 %	6
installation		
Hired an installer separate from	20 %	2
home build		
Installed myself	10 %	1
Other, please specify:	10 %	1
Total	100 %	10

Q30	Percent	N
Angie's List	2 %	2
Don't know	1 %	1
Manufacturer recommendation	1 %	1
Nextdoor	1 %	1
Personal recommendation	19 %	16
Previous relationship with contractor	33 %	28
Retailer home services (e.g. Home Depot or Lowe's Home Services department)	15 %	13
Retailer recommendation	6 %	5
Smart Water Heat website / Hot Water Solutions website / contractor finder	5 %	4
Utility contractor list	12 %	10
Yelp	4 %	3
Total	100 %	84

Q31	Percent	N
Don't know	2 %	2
No	37 %	34
Other, please specify:	3 %	3
Yes	57 %	52
Total	100 %	91

Q32	Percent	N
2	9 %	22
3	17 %	41
4	26 %	62
Not applicable	1 %	2
Very dissatisfied	3 %	7
Very satisfied	43 %	103
Total	100 %	237

Q34	Percent	N
2	3 %	8
3	14 %	33
4	29 %	69
Not applicable	4 %	10
Very dissatisfied	1 %	3
Very satisfied	48 %	114
Total	100 %	237

Q36	Percent	N
2	3 %	6
3	16 %	37
4	29 %	68
Not applicable	1 %	3
Very dissatisfied	1 %	2
Very satisfied	51 %	121
Total	100 %	237

Q38	Percent	N
2	1 %	3
3	11 %	27
4	28 %	66
Not applicable	6 %	15
Very dissatisfied	1 %	3

Q38	Percent	N
Very satisfied	52 %	123
Total	100 %	237

Q40	Percent	N
2	1 %	2
3	9 %	22
4	30 %	72
Not applicable	3 %	6
Very dissatisfied	2 %	4
Very satisfied	55 %	131
Total	100 %	237

Q42	Percent	N
2	3 %	6
3	15 %	35
4	23 %	55
Not applicable	6 %	15
Very dissatisfied	1 %	3
Very satisfied	52 %	123
Total	100 %	237

Q44	Percent	N
2	1 %	2
3	6 %	15
4	30 %	72
Not applicable	0 %	1
Very dissatisfied	2 %	4
Very satisfied	60 %	143
Total	100 %	237

Q46	Percent	N
Don't know	3 %	6
No	5 %	12

Q46	Percent	N
Yes	92 %	219
Total	100 %	237

Q48	Percent	N
Don't know	2 %	4
No	3 %	7
Other, please specify:	2 %	5
Yes, have	63 %	149
Yes, would	30 %	72
Total	100 %	237

Q51	Percent	N
Condo	2 %	4
Manufactured home	2 %	4
Other, please specify:	0 %	1
Single-family attached home	14 %	33
Single-family detached home	83 %	200
Total	100 %	242

Q52	Percent	N
Other, please specify:	1 %	2
Own	99 %	240
Total	100 %	242

Q53	Percent	N
1	9 %	22
2	45 %	108
3	17 %	40
4	20 %	49
5	7 %	17
6	0 %	1
7	1 %	2
8	1 %	2

Q53	Percent	N
9 or more	0 %	1
Total	100 %	242

# **Appendix D: HPWH Installer Discussion Guide**

# Instrument Information

**Table 2: Overview of Data Collection Activity** 

Descriptor	This Instrument
Instrument Type	In-depth Interview
Estimated Time to Complete	30 minutes
Population Description	Water Heater Installers
Completion Goal	Fifteen
Contact List Source	Cadeo contact list sourced online with NEEA contact additions
Type of Sampling	Purposive: Target specific contacts who can provide proper context with which to evaluate the HPWH market. Interviewed a mix of installers from the new construction and retrofit markets and stratified between a variety of geographies and installation company sizes.
Fielding Firm	Cadeo

# Objectives and Target Individuals for Discussions

Cadeo will conduct interviews with fifteen water heater installers. Objectives for this task are to gather qualitative information about how installers position water heater options, the share of HPWHs that are flowing to the new construction market, pricing approaches for electric resistance (ER) and heat pump water heaters (HPWH), the barriers to greater HPWH installation, if those barriers vary between emergency and planned replacements, and any lessons about how water heating technologies break into the market through the case study of tankless water heaters.

# In-Depth Interview Guide

### Introduction

Hello, my name is [NAME] with Cadeo. I would first like to thank you for taking the time to speak with us today. My organization is an independent research company. Other companies hire us when they want to objectively understand opinions and perspectives about a topic. We keep responses anonymous, so none of your statements will be associated with your name or your company.

Our interview today will last around 30 minutes. With your permission, I'd like to record our call today. The purpose of recording is to allow me not to take notes while we're talking – my team and I will use the recording to check our notes and then delete the recording.

Do you have any questions before we get started?

## Introductory (5 minutes)

- To get started, please describe your role at [INSTALLER COMPANY].
- Does your company install water heaters in both new construction and existing homes?
  - a. Has this changed over time? What happens if/when the NC market slows down? How common is it for companies do both NC and retrofit?

## Water Heater Market Trends (10 minutes)

I'm interested in learning more about your view of the water heater market and whether you have seen it change over the last several years. What are the major trends currently in the marketplace?

- Do you see these trends changing in the future?
  - o Probe: Where do you typically hear about product or market news? Describe your interactions with other market actors like distributors, builders, or "influencers". If you wanted to keep your finger on the pulse of the market, who would you go to?

[ONLY NEW CONSTRUCTION INSTALLERS] Now I want to focus on the new construction market

• Take me through the specification or selection process for choosing which water heater is installed in a new home.

- a. Builder and manufacturer relationships/agreements
  - i. Possible probes: How common is this practice, what percentage of the installed water heaters/products are affected by these deals?
- b. How common is it that contractors would bundle their services and install sets of equipment designed to ensure a home will meet code? Can you describe how this works?
- Of all the electric water heaters you install in new construction now, roughly what share would you say are heat pump water heaters? Conversely, what share of all HPWH that you install are going into new construction? In other words, what share of all HPWH that you install are in New Construction versus existing homes?
- What drives the choice to install a heat pump water heater in a new home? Is that different from the replacement market?

### Sales process (15 minutes)

Now I want to focus just on the replacement market, tell me about the typical sales process [DISTINGUISH AS APPLICABLE – FOR THEM OR THEIR COMPANY].

- What's the first point of contact?
- Then what happens? What questions do you typically ask?
- How do you get all the information you need from the customer?
- How do you decide what to recommend to your customers? (Possibly probe for: site visits, phone calls, what level of information do you need before you make a recommendation?)
- How often would you say you recommend a "like-for-like" replacement?
  - o When do you NOT recommend replacing with the same/similar model?
- Probe for how many different technologies the installer is comfortable recommending

### [IF INSTALLER HAS NOT MENTIONED DIFFERENT SCENARIOS]

- How does this process differ for someone who has no hot water versus someone who is making more of
  a planned replacement say, for instance, their unit is just getting old and they want to replace it before
  it completely fails.
- What would you say is the split between customers who have an emergency on their hands? (i.e., no hot water, flooding, etc.) and those that are doing more of preventive maintenance type replacement?
  - o Is there a third category for actual planned replacements, like for a home renovation or expansion, or something similar?

- What percentage of your calls fall into each category? planned/impending failure/emergency instances
- So, if the customer is calling you in a non-emergency situation, how does the customer interaction look in these instances? Is it different than when the customer needs to replace their water heater immediately?
- I have some questions about how these jobs are priced
  - Are Installation and labor a flat rate per job or a % of the equipment cost?
  - Standard practice or highly variable between projects? Probe for "why?"
  - o When you prepare bids or invoices, do you itemize these costs, or just provide an "all in" price?
  - o Pricing differences between HPWH and ER
- [If not already mentioned] Do you provide quotes for and install tankless water heaters?
  - o When did you start installing tankless? Why?

# Heat Pump Water Heaters (5 Minutes if necessary)

Ok, so we've talked about trends in the market, the typical sales process, particularly in a "like-for-like" replacement scenario. I want to finish up our conversation today with a few questions about installations that are not "like-for-like". I'm thinking specifically about tankless water heaters or HPWHs, but you may have other technologies that come to mind. Describe scenarios where you might make a recommendation for one of these as opposed to just replacing an ER tank.

- Probe for heat pump water heater sales trends
- How often do you recommend HPWH? Why? If you recommend a HPWH, how likely is it that the customer chooses it?
- Are there any barriers keeping you from recommending/quoting HPWH? Complicated install? What would make you bid/quote more often?
- How has this changed over the past 5 years?

Do you ever receive customer complaints related to hot water delivery for HPWH tanks? How does this compare with similar complaints you get for standard electric units?

Is there anything else we haven't touched on that you think I should know about the water heating market and equipment options?

Thank you again for taking the time to talk with me today. This has been a helpful and interesting conversation, and I appreciate your time and your input.

### **Appendix**

Companies that do NC and retrofit

- Has your mix of new construction and replacement installations changed over the past (X?) years?
- Do you expect this to change over the next few years?
- How common is it for installers to work in both markets? (Is it the companies you care about or the installer it's possible that company X does installs in both, but that 95% of their installs are in one market or another.)

### **Construction Bundles**

• I've heard that there is a trend in new construction where one specific contractor will make a deal with a builder to install multiple different systems within the home. For example, an insulation contractor will install the insulation, water heating, and HVAC system all for one price in order to meet certain energy requirements. Have you had any experience with this practice? Do you interact with other trades, like builders, general contractors, sheet rock installers, etc.?

Special pricing deals between builders and manufacturers

• Of the heat pump water heaters going to NC how many do you think are impacted by these deals?

### Typical Sale

 Describe to me the sales process from start to finish. Starting from when a call comes in from a potential customer.

Different scenarios of customers (Emergency/Planned/Impending failure)

Now let's assume that a call comes in from a customer who isn't in the midst of an emergency. Let's say
they have hot water, but it's becoming less reliable, or they've noticed some rust or other signs of
impending failure of their water heater. Describe how that interaction differs.

Pricing differences for HPWH installation

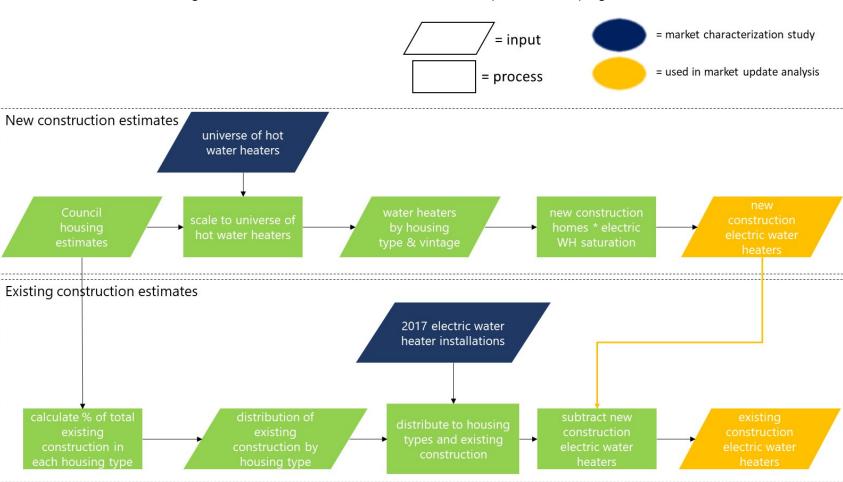
• Say you have a job with \$500 ER tank and a \$1000 HPWH with about the same installation difficult. Do you charge a standard, say \$100 per hour of labor. or would you charge a % of the equipment cost for the installation?

#### **Tankless**

• [Questions from Synthesis session 2 notes] "What is going on with tankless manufacturers? What is making it profitable? Why is it higher margin? How did tankless become successful, acceptable in this market? Do we need to talk to installers about tankless? Why are installers not selling them (tankless)? Perception? Is HPWH or tankless a more complicated install? What is the value proposition (for tankless) when tankless is replacing a tank?"

# **Appendix E: Market Sizing Process**

The two primary inputs for this process are NEEA's Water Heater Market Characterization Report published April 3, 2018, and the Council housing stock forecast, which the team calibrated to Residential Building Stock Assessment (RBSA) housing counts for 2011. The new construction electric water heating saturation is estimated at 40% based on Next Step New Homes program information.



# Appendix F: Online Ad Campaign Lessons Learned

NEEA launched a digital advertising campaign in the summer of 2017. The campaign ran from mid-August to mid-November and included multiple paid media channels. Pre-roll videos in YouTube, search ads in Google AdWords, and banner ads in Google Display network directed traffic back to the newly developed emergency replacement landing page at <a href="https://docs.ncb/html/>
HotWaterSolutionsNW.org/emergency-replacement">HotWaterSolutionsNW.org/emergency-replacement</a>. From there, the call to action for consumers was to contact an installer via HotWaterSolutionsNW.org, to visit a retailer and ask about a HPWH, or to contact their utility about a rebate.

The objectives of the campaign were to:

- 1. Help drive sales of qualified HPWHs
- 2. Increase consumer familiarity with HPWHs
- 3. Motivate consumers to choose HPWHs in emergency replacement scenarios

### The Campaign Was Successful in Terms of Its Key Performance Indicators (KPIs)

Measured against media and website analytics KPIs, the campaign was successful. The project tracked the following metrics in order to evaluate performance:

- Impressions, or the number of times the ad was served to a viewer
- *Click-through-rate*, or the number of users who click on a specific link compared to the number of impressions
- Video views

Table 3 compares the project goals for these metrics against actual performance. For two of the three performance indicators, the project exceeded its goals. Table 4 compares the goals for website traffic against actual performance. The project also exceeded its goals with respect to website pageviews. The conversion rate to the find an installer page indicates that an impressive 7% of users that followed the link to the initiative website heeded the call to action to "find an installer" by navigating to the Find an Installer page.

Table 3: Digital Advertising Campaign Paid Media Goals to Actual Performance

Goal	Actual
3.8 million impressions	13.7 million impressions
0.08% click-through-rate	0.46% click-through-rate
500,000 video views	228,000 video views

**Table 4: Digital Advertising Campaign Website Goals to Actual Performance** 

Goal	Actual
15% increase in pageviews to Find an Installer page	52% increase in pageviews (7.2% conversion rate)
20% increase in pageviews to promotions page	93% increase in pageviews
20% increase in pageviews to retailer page	293% increase in pageviews

The NEEA team derived several important learnings from their experience with the digital ad campaign<sup>23</sup>.

### Remarketing ads can generate a good return on investment of market dollars.

Remarketing ads had the lowest average cost-per-click: \$0.66 per click and a click-through-rate of 0.44%.

### Display banners may increase awareness, but are less effective at driving engagement.

Display banners drove seventy percent of impressions, indicating that they are more effective at generating awareness than other channels. However, the click-through-rate for display banners was low compared to other channels, meaning it is not an effective way to drive engagement with the website as a stand-alone-tactic.

### Google AdWords Search Ads were the most effective at driving users to the HWS site.

Google search ads had an average conversion rate of 5.80%, nearly 20 times higher than video ads in YouTube.

# Google AdWords were both the most expensive and the most effective channel, but use of this channel inadvertently resulted in competition with our partners.

At \$44.75 average cost per thousand impressions, Google search was the most expensive channel, but it had the highest click-through-rate of all paid channels.

Google search is purchased based on a keyword auction system. The more popular a keyword or search term is, the more expensive it is for advertisers to purchase. For instance, the search term "best new car" is a highly popular search term, and therefore, advertisers are willing to bid more to garner a click on their ad that uses that search term. The following sections provide more detail on this effect and the lessons NEEA learned from the experience with this type of digital advertising campaign.

### The Online Ad Campaign: A Powerful Marketing Tool but Not Without Challenges for NEEA

<sup>&</sup>lt;sup>23</sup> See Appendix G: Hot Water Solutions Consumer Campaign Overview, January 3, 2018.

The objective of the online paid media campaign was to reach customers in an emergency replacement scenario, when research indicates<sup>24</sup> many end-users conduct online research as an initial step. By driving consumers searching online for information about water heaters to the Hot Water Solutions website, the campaign leveraged the initiative's investments in the website – an additional project benefit. Plus, Google Analytics offered the opportunity to track performance of the campaign on several key indicators, such as click-through-rate to the program website and impressions. Given a relatively small budget of about \$50,000, the project was considered a low risk, potentially high return investment of marketing dollars. Furthermore, as detailed above, the campaign met its project goals. By most measures, the project was a success.

Prior to launching the campaign, the marketing team acknowledged the potential risk with the competitive bidding structure of Google AdWords in that it could create competition among NEEA's partners in the market concurrently for keywords related to water heating. Given the short duration of the project and limited geographic targeting to the northwest (excluding parts of Idaho), the team considered the risks to be manageable and moved forward with the campaign.

Google Analytics on the Hot Water Solutions website enabled the Team to track several useful metrics, such as website sessions, page views and conversions. However, actual sales in market cannot be attributed to these indicators – except in the case of e-commerce sales. Because NEEA does not sell a product, programs typically evaluate the performance of marketing efforts by looking at the effectiveness of the call to action and conversions performed on program-related websites. While the Google AdWords campaign proved highly effective in terms of tracking users' rate of heeding the call to action (of clicking out to the "find an installer" webpage), the lack of sales attribution did not balance the high cost of the Google Search channel.

### Two Key Lessons Learned from the Online Marketing Campaign

The online marketing campaign provided two important learnings:

- 1. Investing in competitive, bid structured media channels, such as Google AdWords, puts NEEA in competition with its market partners who are running Google AdWords campaigns at the same time. This competition drives up the cost of keywords for everyone.
- 2. Digital marketing campaigns that direct users to initiative websites can be effective at increasing consumer awareness of new product technologies. However, for paid media channels with very high cost per impressions, such as Google AdWords, the potentially low cost-effectiveness is a disadvantage. Because NEEA does not engage in e-commerce, it is difficult to link incremental sales to NEEA's marketing investments.

These lessons learned from the Google AdWords campaign, coupled with a continued need to raise consumer awareness about HPWHs, informed the strategy and media channel plan for the 2018 consumer campaign.

From July to September 2018, the HPWH initiative marketing team is leveraging media channels that have a greater reach among a target audience receptive to home improvement and efficiency-related messaging. The campaign includes a thirty-second ad that runs on HGTV and the DIY Network on cable in select markets throughout the northwest. The commercial is also running as pre-roll video in YouTube and on premium websites, such as Better Homes and Gardens and The DIY Network, using keyword and contextually relevant

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<sup>&</sup>lt;sup>24</sup> Russell Research. Water Heater Market Characterization Report, for the Northwest Energy Efficiency Alliance. March 2018.

targeting strategies. The campaign also includes a long form article touting the benefits of HPWHs, which is running on, and being promoted by, the website for the PBS Television show "This Old House".

# **Appendix G: Hot Water Solutions Consumer Campaign Overview, January 3, 2018**



# **Hot Water Solutions Consumer Campaign Overview**

1/3/2018

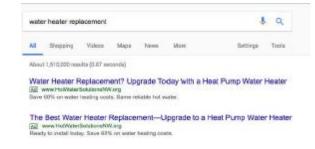




# **Creative Examples**

HOT WATER SOLUTIONS



























# **Overall Campaign Results**



### Paid media highlights

Goal	Actual
3.8 million impressions	13.7 million impressions
.08% click-through rate	.46% click through rate
500,000 video views	<b>228,000</b> + video views

## Website highlights\*\*

Goal	Actual
15% increase in pageviews to Find an Installer page	<b>52% increase</b> in pageviews (7.2% conversion rate)
20% increase in pageviews to Promotions page	93% increase in pageviews
20% increase in pageviews to Retailer page	<b>293% increase</b> in pageviews

19,700 clicks back to the site 26% average view rate\*

601% increase in total site sessions 673% increase in new visitors

<sup>\*</sup>Average view rate is the number of video views divided by the total impressions. For example, of all the people that were served the video ad, 26% watched the video.

<sup>\*\*</sup>Website data compared analytics from the campaign period of August 14-November 17 to the 3-month period prior to the campaign launch.

- Remarketing ads had the lowest average CPC\* at \$0.66 and a respectable CTR\*\* at 0.44% making remarketing an efficient and effective conversion channel.
- Display banners drove the 70% of the total impressions, yet had the lowest CTR. As such, display banners are great at getting impressions (awareness) but are not as effective as other channels in driving direct engagement.
- Google search and remarketing banner ads attracted the most engaged users to the Hot Water Solutions site based on goal conversion rate by channel in Google Analytics. Google search ads had an average conversion rate of 5.80% vs. a conversion rate of about 0.30% for video ads in YouTube.
- Google search was the most expensive channel at \$44.75 average CPM\*\*\* and had the highest CTR of all paid channels. The Hot Water Solutions program may consider excluding Google search in future campaigns to avoid competing for relevant keywords with our partners.

#### **DEFINITIONS**

Impressions = Quantity of times the ad was served

\*CPC = Cost per click. Average cost to generate one click.

\*\*CTR = Click through rate. Percentage of impressions that were clicked on

\*\*\*CPM = Cost per thousand. Cost to reach one thousand impressions.

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