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Northwest Ductless Heat Pump Initiative: Market Progress Evaluation Report #5

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Table of Contents

Table of Contents (continued)

Table of Figures

Table of Tables

Executive Summary

This report is the fifth Market Progress Evaluation Report (MPER) of the Northwest Energy Efficiency Alliance's (NEEA) NW Ductless Heat Pump Project (Initiative). NEEA launched the Initiative in 2008 as a pilot that set out to demonstrate that ductless heat pumps (DHPs) were a viable technology to displace electric resistance heat in existing homes. The full Initiative launched in 2010.

The Initiative is a market transformation effort that works to promote product availability and to build consumer and market awareness for DHPs. The Initiative places concerted effort on "pushing" equipment through the midstream (installer) and upstream (manufacturer and distributor) markets. The Initiative also includes a consumer-focused marketing strategy in an effort to create demand (or "pull") from the consumer primarily through its partners' channels.

The evaluation findings within this report are based on a) telephone surveys of households that received rebates through partner utilities in 2015; b) telephone and online surveys of households that purchased DHPs prior to 2015; c) a web-based panel survey of homeowners within the target markets that do not own DHPs; d) focus groups with DHP installers; e) surveys of participating installers; and f) in-depth interviews with program staff, partner utilities, Master Installers, and DHP supply chain partners.[1] The report also includes updated data on the DHP market in the Northwest.

Progress toward Market Saturation Goals

The goals of the Initiative are developed around the overall objective of accelerating DHP adoption in electrically-heated homes in three target markets: single family homes with zonal heating, single family homes with electric forced air furnaces and manufactured homes with electric forced air furnaces. ILLUME estimated the potential market size for DHPs in each of the target markets. These estimates are based on data collected in the 2010 Residential Building Stock Assessment (RBSA) (Ecotope 2012) that considers the incented installs of DHPs in the years prior to the completion of the RBSA.[2] Table 1 displays the market size, saturation goal and progress toward that goal for each of the three target markets. Approximately 83% (45,844/55,339) of DHPs installed in the target markets in Table 1 received a utility incentive.

[1] ILLUME was provided a list of key strategic supply side partners as of the date of this study. While that list included five retailers, individual contact information for interviews was available for only one of them.

[2] The total eligible homes identified in the RBSA, plus those homes that had received DHP incentives through the DHP pilot period that occurred prior to the completion of the RBSA, equaled a total of 222,981 electric forced air furnace homes and 505,066 zonal heat homes prior to the launch of the DHP pilot or full Initiative.

Table 1. Progress toward Market Saturation Goals (2008-2015)

Target Market	Market Size	Target Maximum Saturation	Total Tracked Units[3] (2008-2015)	Total Saturation (2008-2015)
Single Family Zonal	505,066	85%	49,239	9.7%
Single Family Electric Forced Air Furnace	222,981	20%	4,918	2.2%
Manufactured Homes Electric Forced Air Furnace	280,585	14%	1,182	0.4%
Total			55,339	

Notes: Source: NEEA ACE Model

The upward trend in the number of DHPs installed through the Initiative has continued for a fourth year; utilities that participated in the Initiative installed 5,289 units in 2012, 7,688 units in 2013, 8,701 units in 2014, and 10,176 units in 2015. The total number of non-incented units (including those outside of the initiative's target markets) has also increased annually, from 10,744 units in 2012 to 19,194 units in 2015.[4]

Market Progress

Overall, NEEA's Ductless Heat Pump Initiative is well-designed and continues to have a positive influence on the market. Awareness among the DHP target markets has stayed fairly steady since 2013 and households are continuing to learn about DHPs from a wide variety of sources. Word-of-mouth communication continues to be the primary way that respondents learn about DHPs.

Households that responded to the target market survey noted that information available on the Internet, seeing a DHP in use, and other customers' ratings and reviews (either online or elsewhere) would be important sources of influence in their decision to purchase a DHP.

Interest in DHPs continues to grow, with just over one-quarter (27%) of target market respondents stating they would be very interested in installing a DHP in their home if they needed to replace their current heating system. This is consistent with the feedback from installers, manufacturers, and distributors, who are predicting continued DHP market growth. The primary barriers to adoption are similar to those identified in the last MPER and include installation costs, public awareness and understanding of DHP technology, and to a lesser extent, aesthetic concerns. Following are some additional key findings from this evaluation:

[3] Total tracked units is the sum of utility-incented units and the estimate of the non-incented units in each market. NEEA collects data from distributors that allows the organization to estimate the total sales of DHPs in the Northwest. The percentage of non-incented units in each target market is based on the analysis of non-incented DHP sales included in MPER 4.

[4] Includes cooling-only and non-residential applications.

Acceptance and Adoption

1. **Customer interest in DHPs is increasing.** Seventy percent of surveyed installers reported that the percentage of customers specifically requesting DHPs was higher in 2015 than in previous years.
2. **The Initiative continues to drive market transformation among DHP suppliers and installers.** All of the interviewed Master Installers believe the Initiative has had a positive impact on their DHP sales, and all of the interviewed manufacturers and distributors believe it has had a large impact on their stocking practices.
3. **Lack of awareness and familiarity with the technology are obstacles to DHP sales.** Awareness among target market respondents has been holding around 40% since the previous MPER. Nearly half of installers cite customers not understanding the technology as a barrier to DHP sales and five of six of the interviewed suppliers considered a lack of customer awareness and familiarity with DHPs a barrier to increased residential DHP sales.

Purchase Drivers

4. **DHP owners rely on their own research rather than on installer recommendations in their purchase decisions.** Installers' influence on customers' decisions has held steady since the last MPER, with only 12% of DHP owners saying an installer was influential in their decision and 7% saying the idea to install a DHP came from an installer. The Internet is the most common information source; this was confirmed by installers who reported that more customers are researching their options in advance of shopping for new heating equipment. Utilities interviewed stated that installers are the most effective driver of participation in their programs; however, this should not be confused with installer influence on the decision to purchase a DHP.
5. **Word of mouth is a key source of initial information and continues to be a driving influence for those considering a DHP.** Learning of the technology through a friend or acquaintance is the most common way that both DHP owners and target market respondents learned about DHPs. Nearly half (46%) of DHP owners and 35% of target market respondents familiar with the technology learned of it this way. Further, 30% of DHP owners considered word of mouth information important in their purchase decision.
6. **Financial considerations play an important part in DHP sales, proving to be both a barrier and an opportunity.** Target market respondents cited opportunities to save on energy bills and operating costs as the most important factors when considering a new heating system. The cost of the heating system was the biggest concern and most frequently-mentioned piece of information needed before considering a DHP. Saving money on utility bills is also the most motivating message among general population respondents and is a highly-rated benefit among DHP owners. Installers and suppliers stressed the importance of rebates in driving DHP sales.
7. **Cooling is becoming an increasingly important driver of sales.** Multiple utilities and installers mentioned that a hot summer drives sales, noting that discomfort in one's home drives initial interest in DHPs for potential purchasers. Surveyed owners reported valuing the cooling feature of their DHPs, citing it as a major reason for choosing a DHP.

8. **Customer confidence in the DHP's ability to meet heating or cooling needs is not a substantial barrier to DHP sales.** Less than one-fifth of DHP owners indicated concern with the general capability of the DHP prior to their purchase and only 2% of target market respondents who had considered a DHP but did not purchase one cited a lack of confidence in the DHPs ability to meet their heating or cooling needs as the primary reason. Additionally, only one-fifth of the surveyed installers believe that it is and the interviewed utilities and suppliers do not see it as an issue at all. However, suppliers are concerned that Internet sales could erode customer confidence in the future if these sales result in inferior products and poor installation.
9. **There are few difference between forced air furnace and zonal heating households**. While forced air furnace owners are less likely to be familiar with DHPs, the two groups share similar demographic characteristics, tend to learn about DHPs through similar sources and are motivated to purchase by similar factors.

User Experience

10. **Appearance is not a major barrier among those who purchase DHPs and is not an issue post-installation.** Just 10% were concerned with the appearance prior to purchasing and none considered the appearance a concern after installing. There is some concern regarding the appearance among the target market, who are less familiar with the technology. However, it ranked only fifth out of nine potential concerns associated with DHPs. Suppliers, installers, utility partners, and members of the target market continue to cite it as a barrier to DHP sales.
11. **Households that installed DHPs continue to experience high satisfaction with the product and recommend the product to others.** Nearly all DHP owners said they were satisfied or very satisfied with their DHP. In addition, more than three-quarters of DHP owners who purchased in 2015 and 85% of those who purchased prior to 2015 say they have recommended a DHP to others.

Barriers

12. **Lack of awareness and familiarity with the technology are obstacles to DHP sales.** Awareness among target market respondents has been holding around 40% since the previous MPER. Nearly half of installers cite customers not understanding the technology as a barrier to DHP sales and five of six of the interviewed suppliers considered a lack of customer awareness and familiarity with DHPs a barrier to increased residential DHP sales.
13. **Utility budgets and priorities may affect long-term market transformation success.** Half of the utilities interviewed indicated they are not heavily promoting DHPs because they are satisfied with the success of the program already or are concerned about demand outpacing budget. Several others noted that the changes in savings assumptions for DHPs in the Regional Technical Forum (RTF) is a concern and could limit their focus on the technology.

Program Processes

14. **DHP installation numbers tracked by the Initiative and the program implementer differ.** Due to the number of data sources and estimations used, DHP installation numbers provided to the research team by Initiative staff and the program implementer differed.

Based on the findings noted above, NEEA should consider the following recommendations as it moves forward with the DHP Initiative in 2016 and beyond:

1. **Increase awareness of and interest about DHPs by leveraging the channels customers' access when seeking product information.** A high percentage of purchasers say they have recommended a DHP to others. Purchasers and the target market indicated that the recommendations of family, friends, or others have a significant influence on their purchasing or potential purchasing decisions. Finding ways to use recommendations via case studies, online avenues such as YouTube and testimonials as well as utilizing tools like Yelp, may be instrumental in further promoting the adoption of DHPs. In addition, because the Internet continues to be a primary resource for potential purchasers who are researching before installing, a focus on providing online and web-based content and information, and optimizing searches so that customers in the region searching online for heating or cooling equipment would find www.goingductless.com higher in the results.
2. **Enhance marketing resources with a focus on strategies that could better support partner utilities and installers.** While NEEA is taking active steps to enhance marketing resources available to utilities, several utility program managers and some installers noted that the Initiative's look does not relate to their customers. In light of this information, consider:
    a. Providing marketing language and usage information that is specific to each climate.
    b. Creating or offering materials with a more rural look for the rural utilities. Utilities mentioned that the NEEA materials look urban, which does not appeal to rural areas.
    c. Assisting utilities in advertising manufacturer promotions in ways that do not show preference to brands or installers. Many were unaware of resources that exist on the Initiative website such as up-to-date listings on www.goingductless.com to which utilities can refer customers. Maintaining a calendar of manufacturer promotions for utility reference would also aid utilities in planning to advertise promotions.
    d. Providing and publicizing to all market actors that there is social media support and content for utility programs, installers, and manufacturers to leverage in their own marketing efforts.
    e. Increase efforts to link installers with tools that can help them effectively market DHPs. Utilities say that installers are one of the most effective driver of participation, but a large percentage of non-master installers do no marketing.
    f. Assisting utilities and installers in targeting homeowners based on those characteristics that make a customer more likely to consider or install a DHP. This could include targeting based on demographics (Master Installers interviewed and DHP owner survey demographics describe DHP owners as primarily older and middle income), home type (e.g., seasonal and ranch homes), and potentially multifamily and low-income homes, which utilities also mentioned as areas of opportunity.
3. **Disseminate findings from this and other market research on the relative importance of barriers to DHP adoption.** Findings from DHP owner surveys, installer surveys, focus groups and interviews, and utility interviews show that the perceptions of the different groups are not in alignment. Differences occurred on a number of key issues, including:

a. Sources of information – Utilities believe that customers rely on installers for information about DHPs; installers note that most people come to them having already researched what they would like. Purchasers and the target market note that information from friends and family, as well as Internet resources, constitute their top "go-to" sources for information on heating technologies with only 12% saying the installer was influential in their decision.

b. Aesthetics as a barrier – Installers, suppliers and the utilities noted that aesthetics remains a barrier to the adoption of DHPs. DHP purchasers reported only minor concerns with aesthetics prior to installation and a non-issue after installation. Further, previous research (ILLUME Advising 2014) has shown that fewer than 21% of target market respondents consider heating equipment appearance significantly important. The Initiative should work to broadly share findings that counter the perception that aesthetics is a significant barrier to DHP sales.

c. Customer confidence – No consensus exists as to whether or not broad customer confidence is a significant issue. About one-fifth of installers believe that it is, and suppliers worry it could become an issue in the future but utilities do not. While there is a concern that inferior technologies and installation may lead to customer dissatisfaction that could erode future customer confidence, there is nothing to suggest that this is a substantial barrier that needs to be actively addressed. Focus is better paid to building awareness and familiarity which are larger barriers.

4. **Prepare to adapt market transformation strategies and/or put in place contingency plans that will allow a market with fewer utility program resources supporting it to continue to transform.** Installers and suppliers believe there is clear growth in the market indicating market transformation is progressing, but constraints faced by utility programs around budgets and reduction of RTF-allowed savings could undermine the forward progress being made by the market. Utilities noted they intentionally hold back on promotion for fear of over-subscribing. If utilities begin to limit promotional activities and/or reduce incentives on DHPs, the target of 85% market saturation by 2039 will be harder to attain.

5. **Increase efforts to leverage the current pool of successful installers and to support the broader supply-side market:**

a. Increasing sales training – Both utilities and participants in the installer focus groups indicated that more sales training, particularly in the context of energy efficiency, would be helpful. This may seem counter-intuitive given only 12% of DHP owners said the installer was influential in their decision to purchase, however, this could be a result of installers not being comfortable selling the technology and/or providing information about energy savings.

b. Retail Options – Establishing retail partnerships is one way to help build awareness by getting DHPs in places where they will be seen by large numbers of people and where a large percentage of target market respondents indicated they would prefer to shop for a DHP. The Initiative should continue to undertake strategic partnerships with retailers as a means for increasing sales but should be sure to work closely with retail partners to ensure quality products and quality installation. This may require helping retailers identify qualified installers to provide quality installation as DHPs

are not as "plug and play" as other retail products and only 12% of DHP owners would be comfortable doing some of the installation themselves.

6. **The installation of DHPs for cooling is increasing, and provides an interesting opportunity for NEEA.** While DHPs offer a more efficient alternative to central air conditioning, the addition of DHPs absent central air conditioning could cause load-building. NEEA should examine the impact of cooling as a driver on the Initiative, including looking at how cooling load is being offset by savings from heating systems. If the savings prove cost-effective, the Initiative should leverage the customers' interest and installers' abilities to sell the cooling benefits as a means for increasing awareness and market share for DHPs.
7. **Carefully consider the market for DHPs in homes with forced air furnaces.** Master Installers consider the presence of a forced air furnace (FAF) a barrier to DHP installation. However, FAF owners who have DHPs installed are highly satisfied. In addition, FAF owners in the target market surveys were open to, although less aware of, DHPs. Benefits such as the ability to heat or cool only certain areas of the house, adding cooling, and money savings were highly motivating to FAF owners, suggesting an opportunity to promote specific benefits that might speak to FAF owners. The Initiative will need to ensure that the DHPs in FAF homes are offsetting existing heating and/or cooling and are not increasing load in those homes.
8. **Work with the program implementer to document data sources and estimation methods to provide greater transparency and consistency in the DHP sales numbers used to track Initiative progress.** The Initiative relies heavily on data collected from distributors, utilities and the program implementer to track DHP sales and estimate its progress toward market saturation in its three target markets.

1. Introduction

1.1 Project Overview

This report presents the findings from the fifth Market Progress Evaluation Report (MPER) of the Northwest Energy Efficiency Alliance's (NEEA's) NW Ductless Heat Pump Project (Initiative). NEEA is supported by and works in collaboration with the Bonneville Power Administration, Energy Trust of Oregon, and more than 140 Northwest utilities on behalf of more than 13 million energy consumers. NEEA uses the market power of the region to accelerate the innovation and adoption of energy-efficient products, services, and practices.

NEEA launched the DHP Initiative in 2008 as a pilot that set out to demonstrate that DHPs were a viable technology to displace electric resistance heat in existing homes. The full Initiative launched in 2010. The Initiative installed 8,701 utility-incented DHPs in Northwest homes during 2014 and 10,176 during 2015, with over 45,000 installed since the launch in 2008. The number of DHP installations that do not receive utility rebates has also continued to climb since the Initiative launched to a total of nearly 80,000, although approximately half of these installations are in commercial space. CLEAResult[5] is the Program Management Contractor (PMC) delivering the Initiative under NEEA's direction. More information on the Initiative is available at www.goingductless.com.

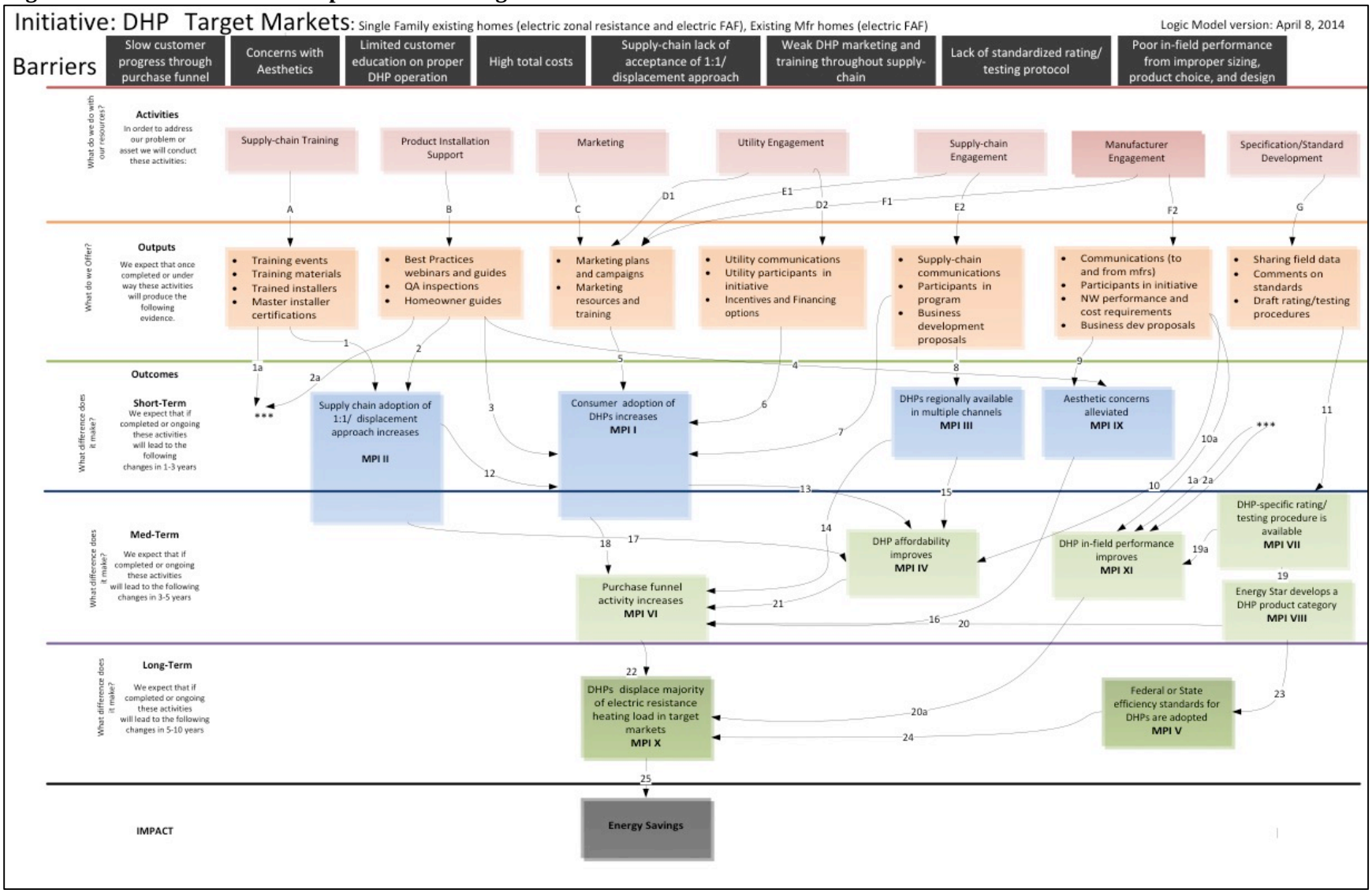
The Initiative is a market transformation effort that leverages upstream activity to promote product availability and to build consumer and market awareness. While primarily driven by the midstream and upstream market, the program includes a consumer-focused marketing strategy designed to create demand (or "pull") from the consumer by leveraging or supporting partners' outreach channels.

1.2 Initiative Goals and Logic Model

The program logic model is a means to visually capture the program theory and activities, outputs, and outcomes that will lead to the achievement of Initiative objectives. In 2014, NEEA revised the program logic model. ILLUME completed a review of this updated Logic Model (dated April 8, 2014 and displayed in Figure 1) as part of the fourth Market Progress Evaluation Report and concluded that the revised logic model was well-thought-out and captures the range of actions NEEA can take within its program scope, as well as the key objectives of NEEA's DHP Initiative. Specifically, the current logic model sufficiently captures the barriers, includes current program activities, and concretely defines associated outcomes. NEEA made no further updates to the logic model in advance of this report.

[5] Fluid Market Strategies, the PMC in prior reporting, was acquired by CLEAResult in 2011.

Figure 1. Ductless Heat Pump Initiative Logic Model



2. Evaluation Methodology

This is the fifth MPER completed since the official Initiative launch in 2010. This section describes study activities and methods.

2.1 Market Progress

A primary objective of this study was to characterize and document the DHP market progress. This characterization focused on installer activities and supply-side infrastructure and reviewed: 1) number of DHP installations in the region; 2) level of installer participation, overall and by Master Installer; and 3) changes in the market for DHPs since the completion of the last MPER. ILLUME completed this analysis using program tracking data provided by CLEAResult and results of supply-side surveys and interviews. Note that this study did not update the residential housing stock characterization that was part of the third MPER (Evergreen Economics 2014), as housing stock is not likely to change significantly over the course of a few years and this activity was not included in the year's scope.

2.2 Telephone and Online Surveys

ILLUME conducted quantitative telephone surveys of DHP owners, online surveys of households that do not currently have a DHP (target market), and installers engaged in the Initiative. The primary goal of the surveys was to evaluate the current status of the DHP market in the Northwest. All surveys were sampled to achieve a minimum 90% confidence within ±10% precision. Any reported differences between groups are significant at the 90% confidence level within ±10% precision.

DHP owner surveys: ILLUME completed a survey of 203 households that installed DHPs between January 1, 2015 and December 11, 2015. The telephone survey, completed in January 2016, gathered insight into respondents' decision-making processes, DHP usage and maintenance, and satisfaction. The sample came from the rebate tracking data provided by CLEAResult and included both households that displaced a forced air furnace with a DHP (FAF owners) and households that displaced zonal heating with a DHP (zonal owners) to assess any differences between the two groups.

A subset of the DHP owner survey questions focusing on satisfaction and usage habits was also asked of an additional 54 households that purchased their DHPs prior to 2015 in order to investigate how satisfaction may change over time. ILLUME randomly sampled previous purchasers in the rebate tracking data provided by CLEAResult. Additionally, target market online survey respondents who reported they had purchased a DHP prior to 2015 were also asked this subset of questions.

Target market surveys: ILLUME completed an online survey of 297 households in Idaho, Montana, Oregon, and Washington using a consumer panel. This survey, completed in January 2016, gathered insight into awareness, barriers to technology adoption, and interest in purchasing DHPs. Quotas were designed to ensure the inclusion in the sample of both respondents from households that currently use an electric forced air furnace as their primary heat source (FAF respondents) and households that currently use zonal heating (zonal respondents).

Installer surveys: ILLUME conducted a survey with 125 installers registered with the initiative. The majority of respondents completed the survey online, and telephone follow-up was also used to reach the desired sample size. The installer survey, which was completed in February and March 2016, collected information on installer experiences with DHPs, marketing practices, consumer awareness and perceptions, and installer awareness of and interactions with the Initiative. Using the participating installer listing provided by CLEAResult, ILLUME surveyed a census of Master Installer and other installer[6] contacts with email addresses. Twenty-eight Master Installers and 97 other installers completed the survey.

Appendix C contains final survey dispositions and sample weights as well as detailed information about survey respondents and interview participants.

2.3 Focus Groups

ILLUME completed three focus groups with other installers in Spokane (n=5), Kirkland (n=9) and Portland (n=9), aimed at getting deep insights into the market from their perspectives and their perceived barriers to becoming Master Installers. Due to hazardous weather conditions, the focus group in Spokane was conducted online rather than in-person.

2.4 In-Depth Interviews

ILLUME conducted in-depth interviews with ten staff from Northwest utilities involved in the Initiative, three distributors, two manufacturers, and one retailer. The interviews focused on program design, messaging approach, challenges and barriers, the future of the DHP market, and suggestions for improving the Initiative. In-depth interviews were also conducted with eleven Master Installers; five in Washington, three in Oregon, two in Montana and one in Idaho.

2.5 ACE Model Review

NEEA's Alliance Cost Effectiveness (ACE) model tracks and reports energy savings achieved in the target markets the initiative is tracking. One key input to this model is an estimate of the install locations for non-incented DHPs. This analysis, which was completed for the prior three MPERs, characterizes the market for non-incented installations of DHPs using data gathered through the installer surveys. The non-incented savings analysis results from the 4th MPER were used for this review.

ILLUME reviewed the ACE model to assess the model's key assumptions and market size for the manufactured homes market. This effort also assessed the assumptions used to extend the baseline and maximum market saturations for existing single-family homes with electric forced air furnaces to the manufactured homes with forced air furnace market segment, and the timing of achieving maximum baseline (2050) and market saturation (2040) for manufactured homes. The review also assessed the reasonableness of the goal to reach 85% market saturation by 2039 within existing, single-family homes with zonal heating systems. Appendix B presents the findings of this review.

[6] Other installers have not completed the training required to meet the Master Installer criteria.

3. Market Characterization

3.1 Target Market and Initiative Achievements

As shown in Table 2, utilities participating in the Initiative installed 10,176 incented units in 2015. This number continues the trend of increases each year since 2012. Washington (47%) and Oregon (47%) continue to account for the majority of installations in the Northwest; however, Washington's percentage is lower than in the past with a decrease in incented units. The number of incented units in Oregon continues to increase and accounts for a larger proportion of total incented units in the region than in the past. The distribution of electrically-heated homes in the region roughly mirrors the population distribution of the region with the highest populations of single-family electrically-heated homes in Washington (58%) and Oregon (30%).[7]

Table 2. Incented DHP Installations by State and Year

	2012		2013		2014		2015	
State	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Idaho	177	4%	311	4%	291	3%	372	4%
Montana	225	4%	210	3%	164	2%	227	2%
Oregon	2,069	39%	2,626	34%	3,113	36%	4,815	47%
Washington	2,818	53%	4,541	59%	5,133	59%	4,762	47%
Total	5,289	100%	7,688	100%	8,701	100%	10,176	100%

Notes: Source: 2013-2015 - Incentive totals provided by CLEAResult (CLEAResult 2016a; CLEAResult 2015a); 2012 - Table 2 of Market Progress Evaluation Report #3 (Evergreen Economics 2014)

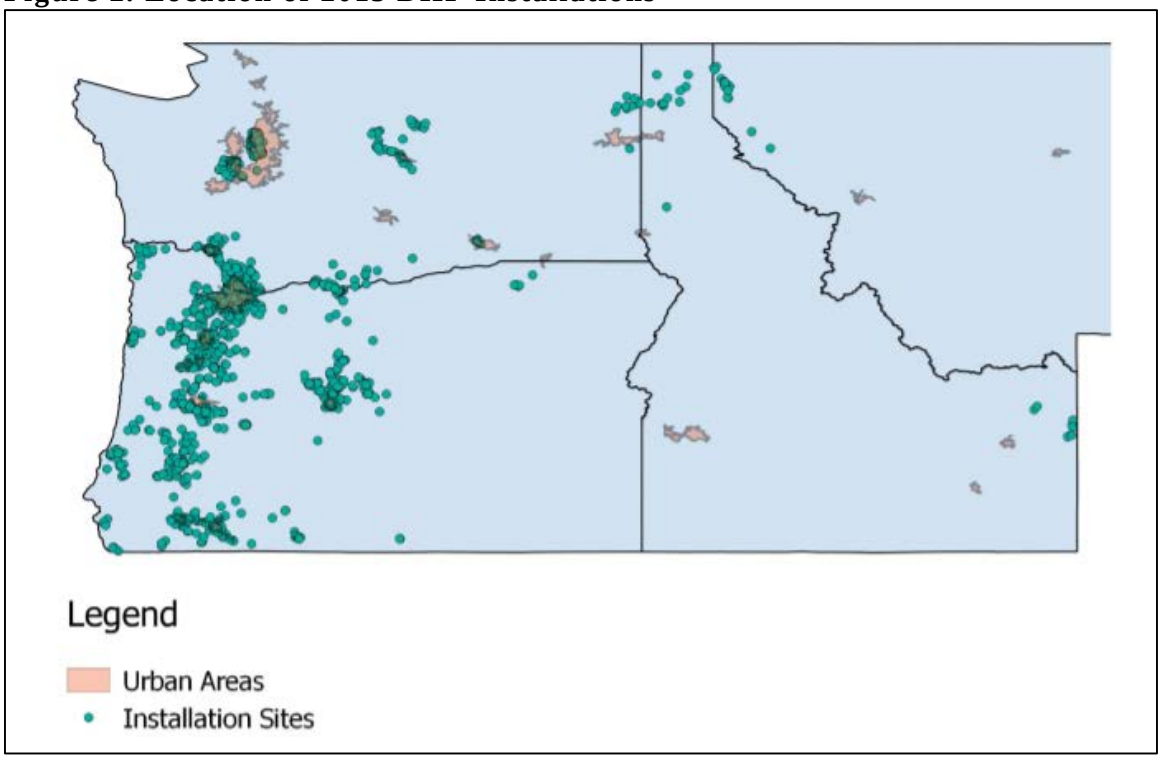
The annual installation and incentive counts displayed in the previous table are available at the state level; however, detailed data about the installation, including the location, is available only in the Initiative database[8] provided by CLEAResult in March 2016. As a result, it is only possible to calculate statistics on the location of installations for a subset of utilities, which is more representative of the locations of CLEAResult utility clients and not necessarily of all incented DHP installations. With that limitation, Table 24 in Appendix C provides a breakdown of participation by International Energy Conservation Code (IECC) climate zone[9] for the utilities included in the detailed installation data. Figure 2 below displays the locations of these installations in relation to urban and rural areas.

[7] ILLUME did not revise the distribution of existing, detached owner-occupied single-family homes in the Northwest by cooling zone and urban/rural classification, as this would not have changed significantly since the last evaluated in MPER 3 completed in 2013. Tables showing the distributions of electrically-heated homes are available in Appendix C.

[8] Initiative database contains data for twenty-five utilities: the twenty-three utilities for which CLEAResult processes rebate applications and two others that voluntarily submit their data.

[9] Available at http://reca-codes.org/about-iecc.php

Figure 2. Location of 2015 DHP Installations[10]



Note: Source: Initiative database (CLEAResult 2016b)

NEEA collects data from distributors that allows the organization to estimate the total sales of DHPs in the Northwest. Table 3 presents the results of this data collection and shows the total DHP sales in the Northwest, including residential and non-residential installations outside of the three target markets. These data indicate that an additional 70,000 DHPs have been installed in applications outside of the target markets since the initiative launched. As shown, DHP sales, especially non-incented sales, have continued to climb each year since 2011, that noted within the three NEEA target markets, approximately 83% of DHPS do receive a utility incentive.

Table 3. Incented and Non-Incented DHP Sales by Year

	2011	2012	2013	2014	2015	Total
Incented Heating and Cooling	4,893	5,289	7,688	8,701	10,176	36,747
Non-Incented Heating and Cooling	6,280	8,835	8,175	14,091	16,830	54,211
Non-Incented Cooling Only	1,367	1,909	2,089	2,098	2,364	9,827
Total Outdoor Unit Sales	12,540	16,033	17,952	24,890	29,370	100,785

Notes: Source: DHP sales totals provided by provided by CLEAResult (CLEAResult 2016a; CLEAResult 2015a)

[10]Locations of DHP installations tracked in the Initiative database which contains data for twenty-five utilities: the twenty-three utilities for which CLEAResult processes rebate applications and two others that voluntarily submit their data.

3.2 Supply Side Characteristics

While numerous manufacturers and distributors participate in the Initiative, the Initiative has established strategic relationships with six manufacturing companies and five distributor firms. The Initiative also is engaged with six retailers, working to develop retail as a sales channel. Table 4 lists the companies with which these strategic relationships have been established.

Table 4. DHP Manufacturing and Distribution Companies with Strategic Relationships

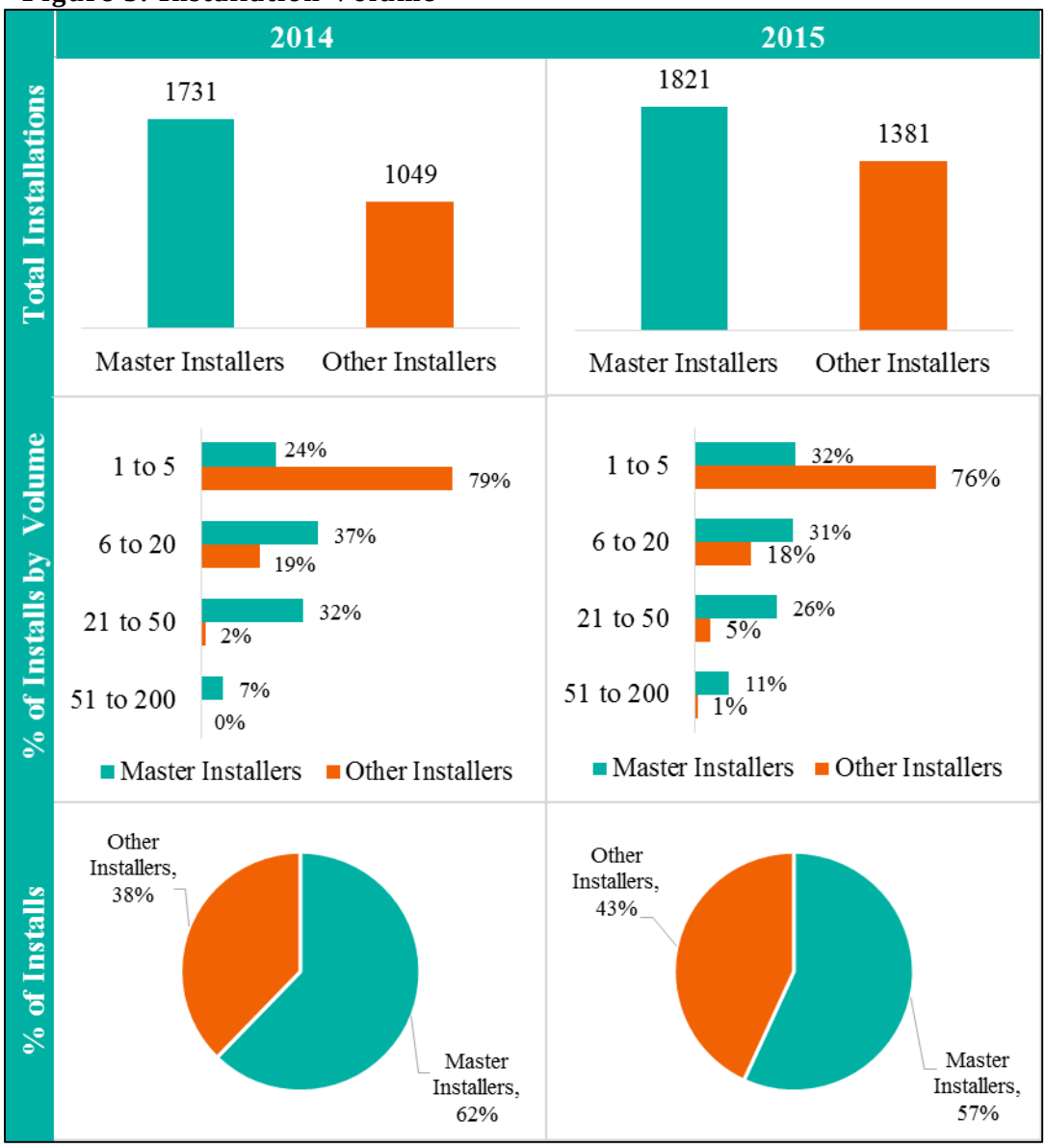
Manufacturing Companies	Distribution Companies
Daikin AC	Gensco
Fujitsu General America	Johnstone (Popma)
Lennox	Johnstone (Sadlier)
Mitsubishi Electric	Mar-Hy
Panasonic	Thermal Supply
Toshiba Carrier	
LG	

Notes: Source: (CLEAResult 2016a). This list includes only those manufacturers and distributors that have strategic relationships with the Initiative, not all of those involved.

Based on the detailed program data available in the Initiative database from CLEAResult[11], 321 different installers (81 Master Installers and 240 other installers) participated in the Initiative during 2015. Notably, not one installer made up more than five percent of total installations. The top 20% of installers, in terms of number of installations, account for about 70% of installations. As shown in Figure 3, 63% of Master Installers and most (93%) of other installers have performed between one and twenty DHP installations, with most of them (76%) installing five or fewer DHPs. In total, the program has trained 127 Master Installers, an increase of two since the previous MPER.

[11] Initiative database contains data for twenty-five utilities: the twenty-three utilities for which CLEAResult processes rebate applications and two others that voluntarily submit their data.

Figure 3. Installation Volume



Notes: Sources: 2015 and 2016 Initiative databases provided by CLEAResult (CLEAResult 2015b, CLEAResult 2016b)

One hundred and six utilities currently participate in the Initiative, and CLEAResult processes rebate applications for twenty-three of them. The average cost for a 1:1 installation in a single family home as reported in the Initiative database was $4,633. This is somewhat higher than the average of $3,913 self-reported in the installer survey. The incentives currently offered by the participating utilities range from $500 to $1,500 depending on the utility and the type of installation. Table 5 provides further detail on the types and amounts of incentives offered.

Table 5. DHP Rebates Offered by Participating Utilities

Incentive Amount	Single Family Zonal	Single Family Furnace	Manufactured Zonal	Manufactured Furnace	Multifamily Zonal
$1,200 - $1,500	6	41	2	40	0
$1,000 - $1,199	8	24	6	24	2
$800 - $999	45	12	6	13	0
$500 - $799	26	7	5	6	5
Variable	17	7	1	6	1
Total	**102**	**91**	**20**	**89**	**8**

Notes: Source: Incentive totals provided by CLEAResult (CLEAResult 2016a)

4. Findings

4.1 Ductless Heat Pump Owner Surveys

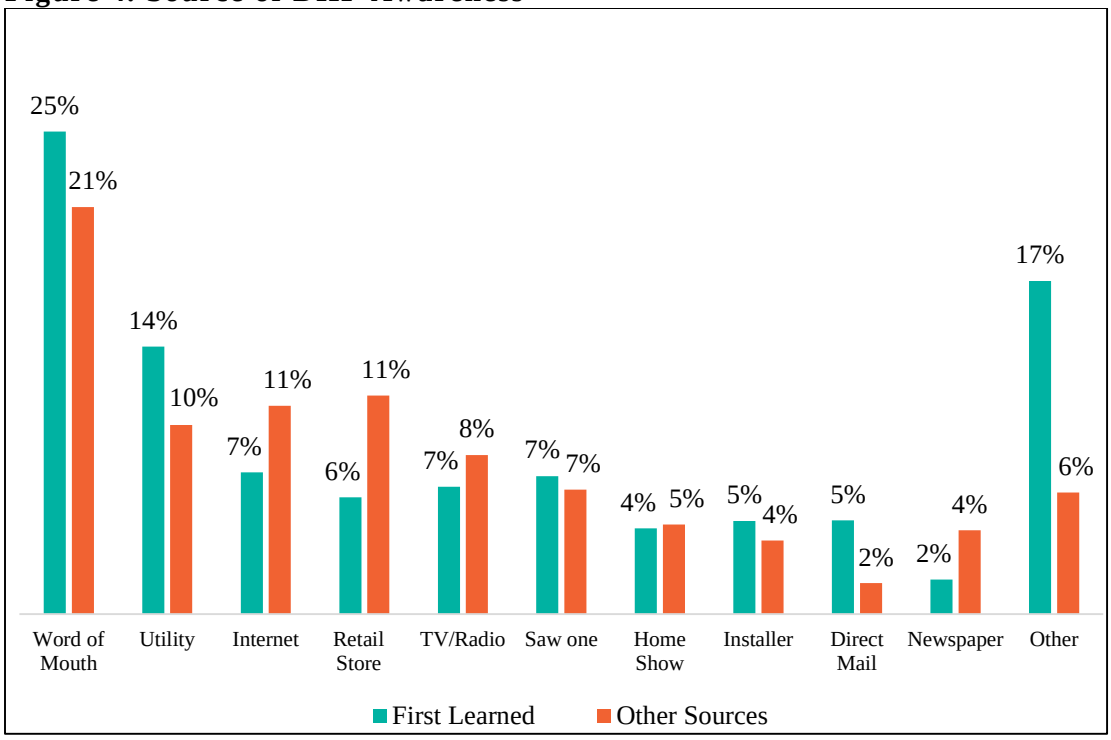
ILLUME surveyed 203 households that installed DHPs between January 1, 2015 and December 11, 2015. The survey responses provided insights into DHP owners' decision-making processes, DHP usage and maintenance, and satisfaction. This survey and subsequent analysis also explored differences between FAF owners (n = 58) and zonal owners (n = 145) to better understand the motivations of DHP purchasers who displaced or supplemented a forced air furnace. Findings of significance are reported in the sections below with further detail in Appendix D.

4.1.1 Awareness

Word of mouth was the most common method through which DHP owners learned about the technology; 46% learned about DHPs through a friend, family member, or colleague either in-person or through social media. Fourteen percent of DHP owners learned about the technology by seeing a unit in another home or business. The combined 60% for these methods is a considerable increase over the combined 46% from the 4th MPER.

Respondents also identified the most important sources in their purchase decisions. Overall, a plurality considered word of mouth most important (30%), followed by utility sources (18%) and Internet research (13%). Zonal owners identified Internet research as especially important to their decision at a significantly higher rate than did FAF owners. Figure 4 below provides additional detail on the sources that informed and influenced DHP owners.

Figure 4. Source of DHP Awareness



Notes: Awar1. How did you first hear about ductless heat pumps?
Awar2. Did you hear about it anywhere else? Multiple responses allowed.
Base: All respondents, n = 203.
Awar3. Which information sources, including the one(s) you just mentioned, were especially important in your decision to install the ductless heat pump? Multiple responses allowed.
Base: All respondents, n = 203.

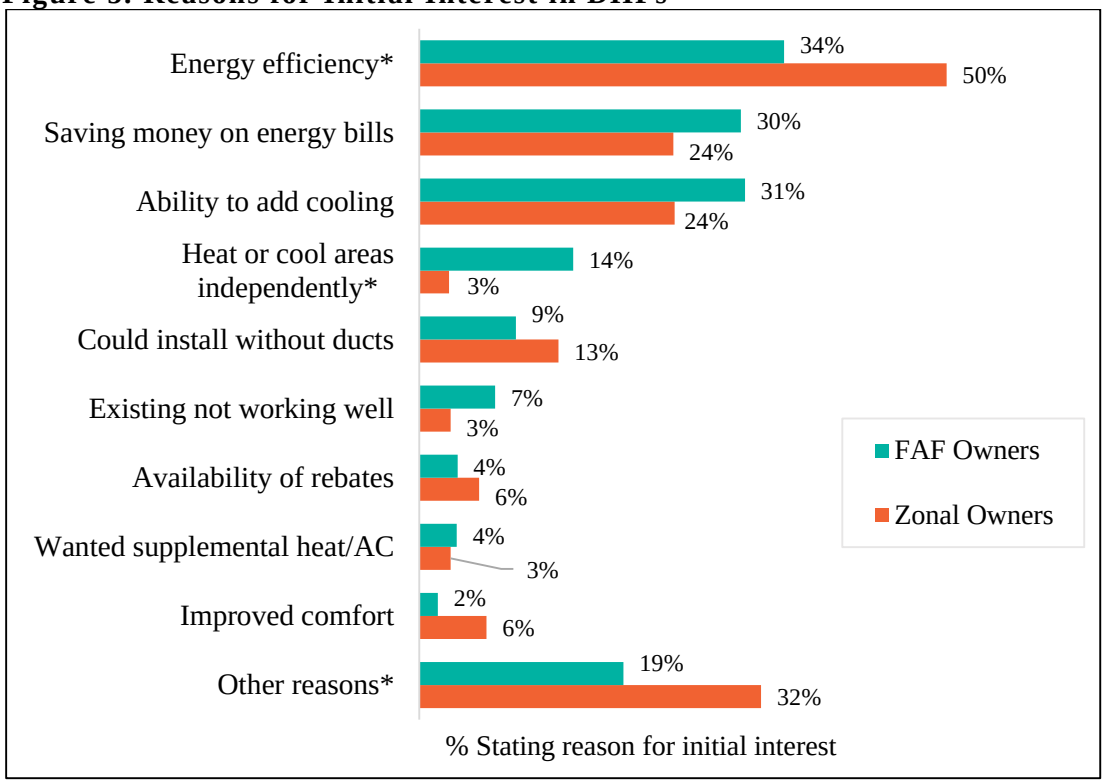
4.1.2 Motivation and Purchase Decision

The surveyed DHP owners identified their motivations to purchase DHPs, perceived DHP benefits, and reasons why they ultimately installed one.

DHP owners cited energy efficiency (45%), saving money (32%), and adding cooling (26%) as the top three reasons for installing a new primary heating system. These top three reasons were consistent for both FAF and zonal DHP owners, with no significant differences among them.

However, as shown in Figure 5, reasons for initial interest in DHPs differed significantly in some cases between FAF and zonal DHP owners. A significantly higher percentage of zonal owners were initially interested due to the energy efficiency of DHPs, while a significantly higher percentage of FAF owners were interested due to the ability of DHPs to heat or cool areas of homes independently.

Figure 5. Reasons for Initial Interest in DHPs

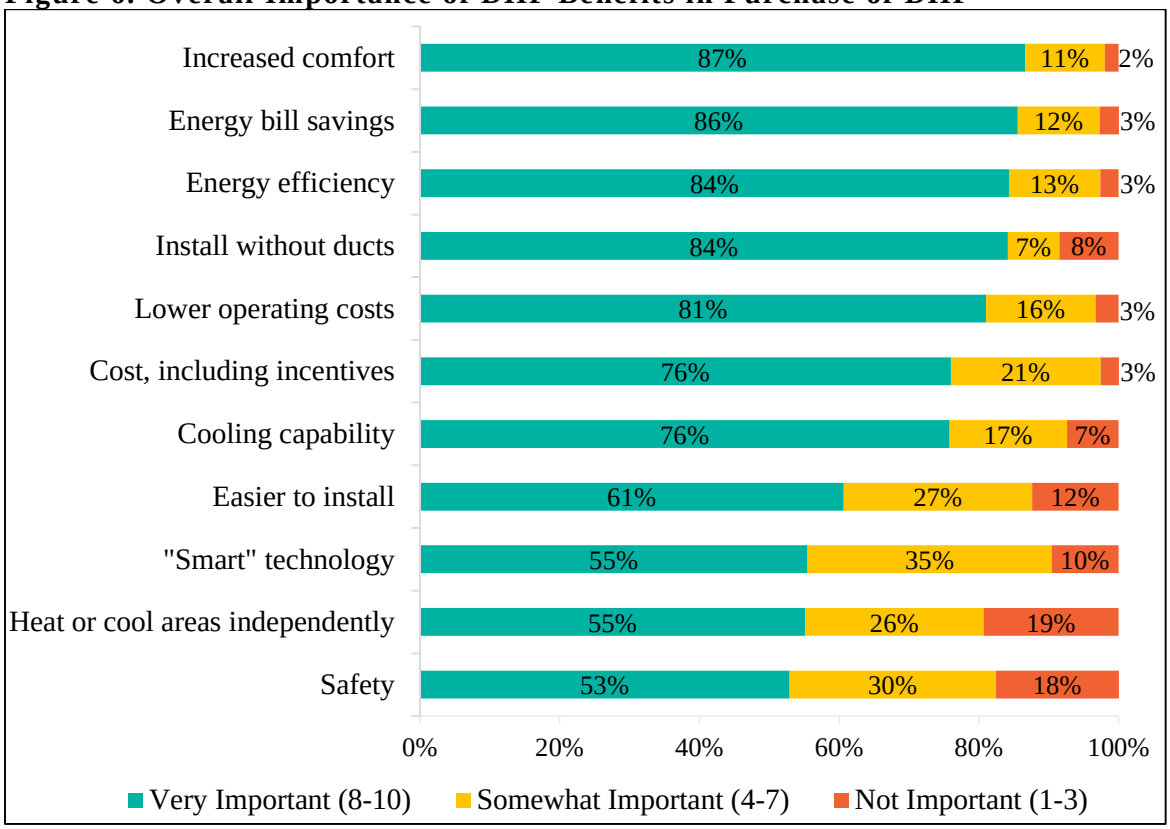


Notes: M4. What initially interested you in the ductless heat pump? Multiple responses allowed.
Base: All respondents. Zonal n = 145, FAF n = 58.
*Difference significant at the 90% confidence level.

Very few DHP owners indicated that the idea to install a DHP came from the installer. The majority (87%) of DHP owners indicated that the idea to install a DHP originated with themselves or someone else within the household. However, while the percentages in both cases are low, installers introduce the idea to FAF owners at a significantly higher rate than they do to zonal owners (13% and 5%, respectively). Table 28 in Appendix D provides detail on the other reasons DHP owners gave for their initial interest in the DHP.

Comfort and energy bill savings, followed closely by energy efficiency and the ability to install the equipment without ducts, were most commonly cited by DHP owners as very important factors in their decisions to purchase a DHP. Figure 6 depicts the overall importance rankings of the tested DHP benefits to those who purchased one.

Figure 6. Overall Importance of DHP Benefits in Purchase of DHP



Notes: M7. Please rate how important each of the following factors was in your decision to purchase a ductless heat pump, where 1 is not at all important, and 10 is very important. Base: All respondents, n = 203
"Very important" and "Not important" categories are based on top three and bottom three scale options. "Somewhat important" is based on the middle four scale options. Some categories do not sum to 100% due to rounding.

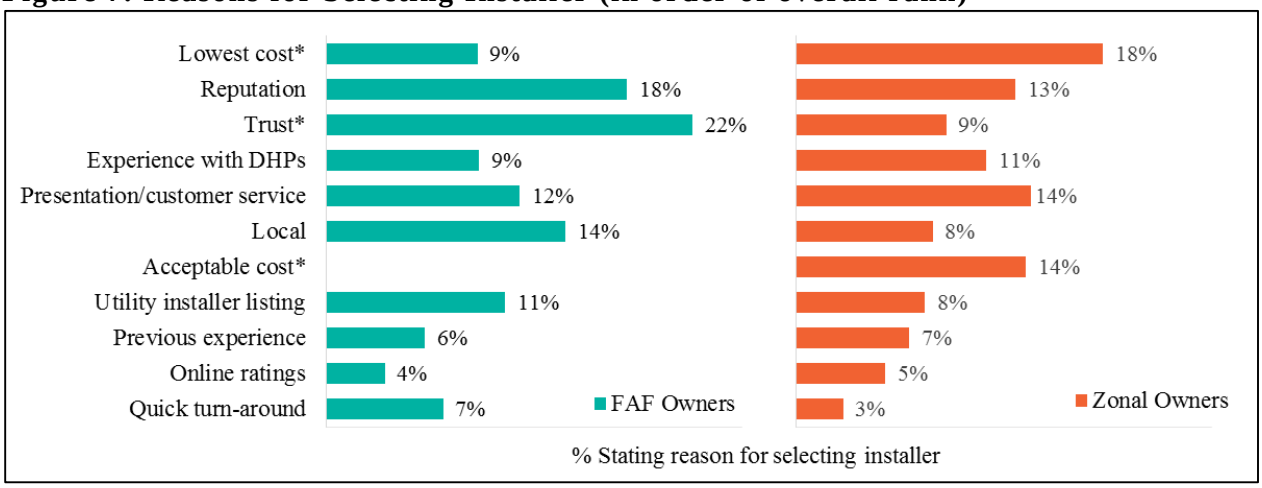
DHP owners also explained in response to a survey question, in their own words, why they ultimately decided to purchase the DHP. Efficiency (21%), cooling capability (15%) and saving money (14%) emerged as DHP owners' top three reasons. About 4% of DHP owners stated they purchased their DHP because their current system failed; significantly more FAF owners (15%) than zonal owners (1%) listed this reason.

DHP owners varied in the length of time they spent researching DHPs, and the sources they used for that research, taking anywhere from less than one week to three months. The Internet was the most common information source for owners' DHP research, used by half of the DHP owners. Speaking to an installer, or friends and neighbors were the next most frequently-cited information sources, at 24% and 22%, respectively.

After making the decision to move forward, about one-third (34%) of DHP owners obtained cost estimates from just one installer. This is down from 45% in the previous MPER, indicating that DHP owners are doing more comparison shopping prior to making their decisions. Almost half (49%) of DHP owners obtained estimates from two or three installers.

The reasons for selecting an installer varied by respondents' previous heating source. Figure 7 provides detail on reasons for installer selection.

Figure 7. Reasons for Selecting Installer (in order of overall rank)



Notes: M16. What were the main reasons you chose the installation contractor you did? (Do not read list) Multiple responses allowed.
Base: All respondents. Zonal n = 145, FAF n = 58.
*Difference significant at the 90% confidence level.

NEEA sought to understand whether DHP owners would have been comfortable doing some or all of the installation work themselves. In order to gauge the potential for a future do-it-yourself option, owners were asked a number of questions on this topic. Only one DHP owner surveyed had installed his/her DHP him/herself; only 12% of the others reported they'd be comfortable doing some or all of the installation work themselves. Of those who would be comfortable with the installation work, half claimed they could do the entire installation, and half said they could do all but the electrical, refrigerant, or second-floor work.

4.1.3 Concerns

The survey asked DHP owners about any concerns they had about DHPs prior to purchasing the equipment. Over half of DHP owners had concerns when they were considering the purchase (58%). The most commonly expressed pre-installation concerns mirrored the previous MPER and related to general capability and functionality (18%) and the cost (15%). Very few of these concerns remained after the installation. DHP owners shared the same top concerns regardless of their existing heating system.

Table 6. Concerns Regarding DHPs

	Concern Prior to Install	Concern After Install
No Concerns	**42%**	**n/a**
Capability/functionality - general	18%	3%
Cost/expense	15%	n/a
Appearance	10%	0%
Installation (size, location, # units, quality)	9%	2%
Capability/functionality - cold weather	6%	1%
Noise	2%	0%
Maintenance needs	1%	0%
Other	4%	2%

Notes: M10. Was there anything you were concerned about when you were considering a ductless heat pump?
M11. Now that you have it installed, is [M10 ANSWER] a problem?
Base: All respondents, n = 203. Multiple responses allowed for M10.

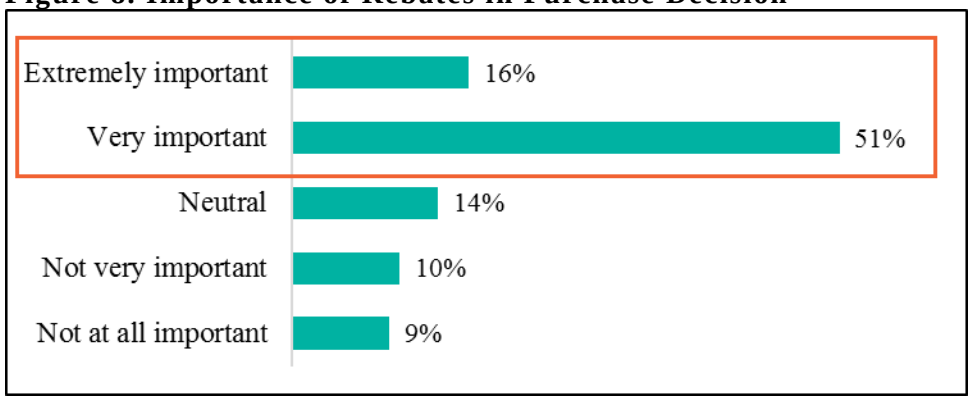
As displayed in the previous table, 10% of the DHP owners surveyed had concerns about the appearance of the unit prior to installation, but none considered the appearance a problem after it was installed. The potential issue of aesthetics was further investigated by asking DHP owners if they stopped noticing the unit on their wall after a period of time. Sixty-three percent responded that they had stopped noticing it, most frequently within the first two months of installation. These findings are consistent with those of the previous MPER.

A small percentage (3%) of DHP owners had been advised by an installer not to install a DHP. Installers' reasons included advising that DHPs wouldn't work in the owner's climate, aren't as efficient as expected, are unsightly, or that the homeowner would be better off utilizing their current duct system.

4.1.4 Rebates and Financing

The availability of a rebate was important in DHP owners' decisions to purchase a DHP. As shown in Figure 8, 51% stated that the rebate was "Very important" and another 12% considered it "Extremely important." A little over half (55%) of the respondents who knew their rebate amounts received rebates between $500 and $1,000, about one-quarter received rebates of over $1,000, 13% received rebates under $500, and the remaining participants could not recall or refused to share the amount of their rebate.

Figure 8. Importance of Rebates in Purchase Decision



Notes: M13. How important was the rebate you received to your decision to purchase the ductless heat pump? Would you say it was: Extremely important, very important, neither important or unimportant, not very important or not at all important.
Base: Respondents that knew rebate amount, n = 173.

Fifteen percent of DHP owners stated that they did not receive a rebate from their utility. This is an indication that some people were unaware or had forgotten that they had received a rebate or were confused about the source of the rebate they received, as the sample was drawn from a database of rebate recipients. FAF owners indicated a lower level of awareness of their utility rebates; seventy-five percent of FAF owners and 89% of zonal owners responded that they received a rebate from their utility. One possible explanation for this is that some utilities allow installers to apply for and receive the rebate directly which they then discount off of the customer's invoice.

Half of the DHP owners financed their purchase, with credit cards being the most commonly-used form of financing (41% of those that financed). Another 22% used utility financing, 18% used a loan through a bank or credit union, 13% had their DHP paid for by another program, and the remaining DHP owners used financing through their installer or another source.

4.1.5 Usage Habits

Zonal owners' primary source of heat shifted with the purchase of the DHP. Wall heaters (31%), baseboards (28%), and ceiling heat (15%) were the most common primary heating sources used by zonal DHP owners prior to installing a DHP. Ninety-seven percent of zonal owners now use their DHP as their primary heating source.

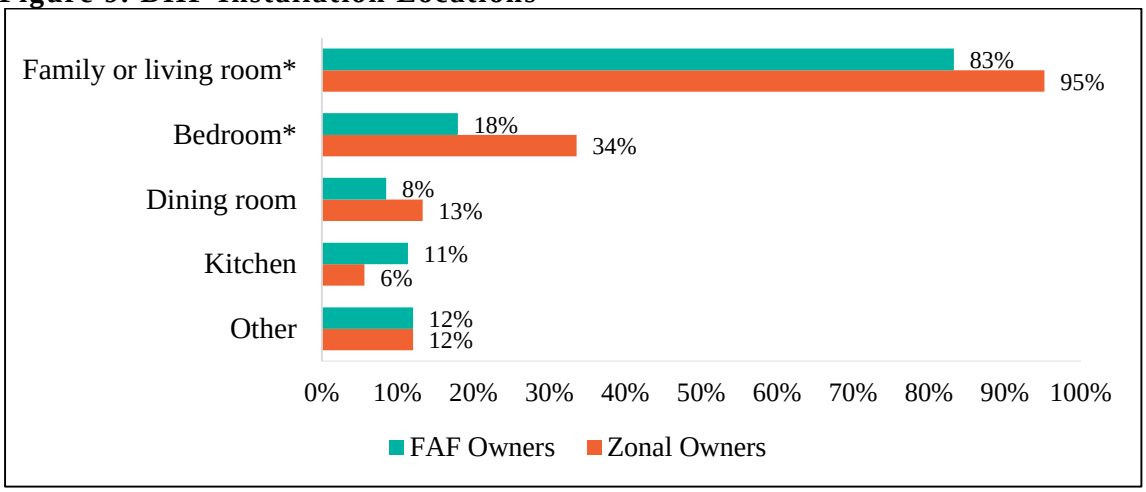
The majority of FAF owners (85%) now use their DHP as their primary heating source, a significantly lower percentage than the percentage of zonal owners who use their DHP as the primary heating source. The remaining 15% of FAF owners use their DHP for heating certain rooms or as a backup heating source. All FAF owners used their electric forced air furnaces as the primary source of heat prior to their DHP purchase.

Ninety-five percent of all DHP owners now use their DHP as their primary cooling system. Prior to the DHP installation, approximately one-quarter of zonal owners and one-third of FAF owners

had cooling equipment in their homes. Window air conditioners were the most common form of cooling used prior to installing the DHP.

As depicted in Figure 9, the majority of DHP owners (95% of zonal and 83% of FAF) installed a DHP in their living room or family room. Bedrooms were the second-most popular installation location. Zonal owners were significantly more likely to have installed multiple indoor units. Regardless of previous heating type, about half of DHP owners described their home configurations as having an open floor plan.

Figure 9. DHP Installation Locations



Notes: E1. In which room in your house is that/each of those unit(s) installed? (Check all that apply)
Base: All respondents. Zonal n = 145, Forced Air Furnace n = 58.
*Difference is significant at the 90% confidence level.

Eighty-one percent of DHP owners are using their DHPs for both heating and cooling, which is up slightly from 75% in the previous MPER. All but one of the remaining owners are using their DHPs for heating only. Overall, 75% of owners responded that the DHP has always been able to meet their heating needs. Cases in which heating needs were not met were most often attributed to cold weather or to problems heating certain rooms. This did not vary by previous heating source.

Differences existed between the two groups with respect to meeting cooling needs. While a substantial percentage of respondents' cooling needs have been met, a significantly higher percentage of FAF owners (11%) than zonal owners (1%) say their cooling needs have not been met. Similar to the issues with meeting heating needs, this was most often attributed to problems cooling certain rooms.

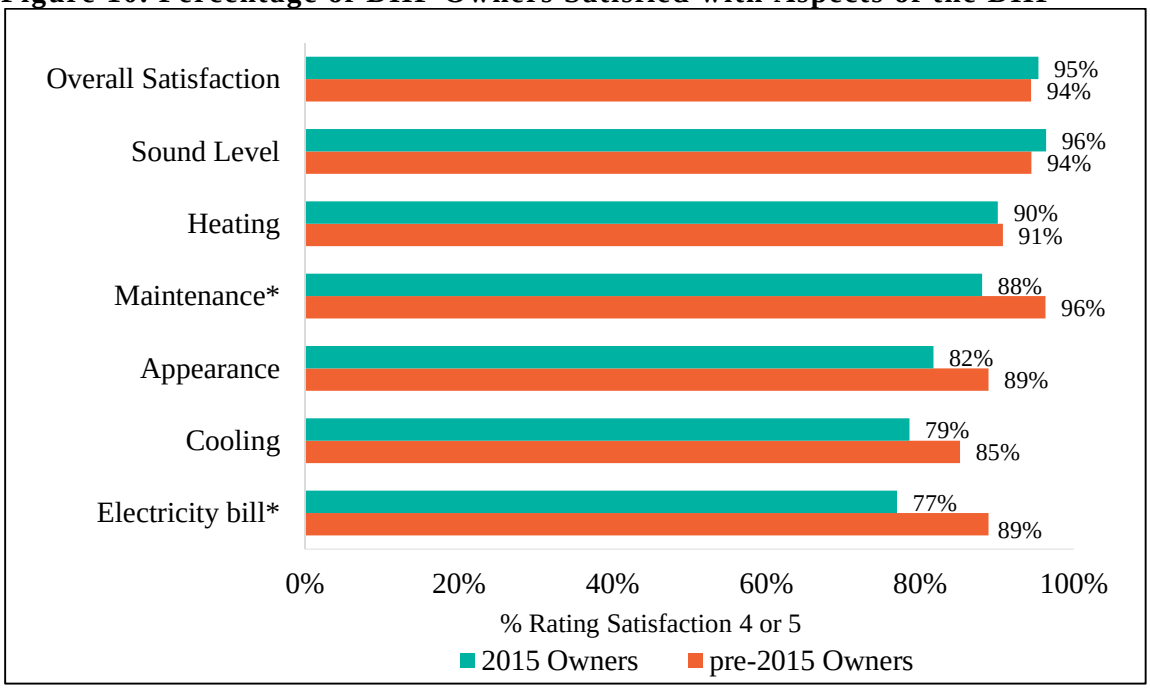
Nearly 80% of DHP owners rated operating their DHP system an 8 or higher on a 10-point scale, where 1 is "extremely difficult" and 10 is "extremely easy". Among DHP owners who experienced challenges operating their equipment, programming the system (39%) and the remote control (33%) caused the most difficulties.

4.1.6 Satisfaction

DHP owners are overall very satisfied with the entire process of having a DHP installed, the installer, and the DHP itself. Nearly three-quarters (74%) of DHP owners rated the installation process an 8 or higher (on a 10-point scale where 10 is "Very easy"). DHP owners were even more satisfied with their installers. Ninety-one percent were highly satisfied, based on ratings of 8 through 10 on a 10-point scale, where 1 is "Not at all satisfied" and 10 is "Very satisfied". None were dissatisfied with their installer.

A sample of DHP owners who purchased their DHPs prior to 2015 answered the same set of satisfaction questions as those who purchased during 2015 to identify any changes over time. As shown in Figure 10, participants are very happy with their DHPs. Ninety-five percent of DHP owners who installed their DHP during 2015 rated their overall satisfaction a 4 or 5 and only 1% rated it a 1 or 2 on a 5-point scale where 1 is "Very dissatisfied" and 5 is "Very satisfied." DHP owners who have had their DHPs for a longer period of time rated their satisfaction with the maintenance requirements and electricity bill savings significantly higher than those who had more recently purchased. Those who had purchased prior to 2015 were also asked if their satisfaction with their DHP has changed over time and if so, whether it has increased or decreased. Fifteen percent said that their satisfaction has changed, with five respondents indicating it has increased.

Figure 10. Percentage of DHP Owners Satisfied with Aspects of the DHP

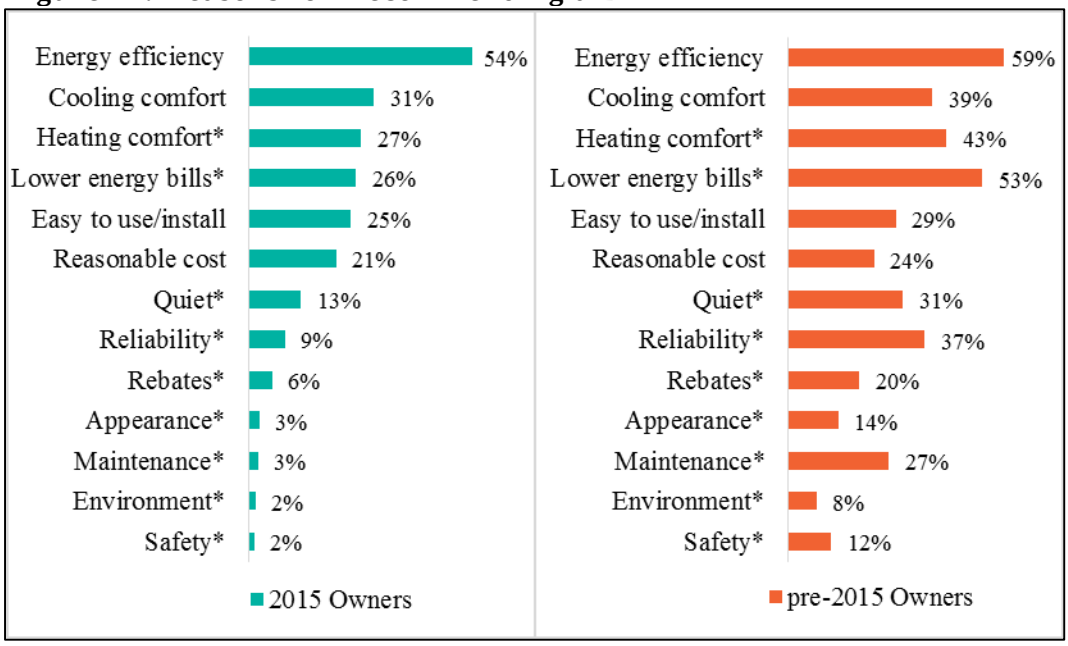


Notes: Sat1. Please rate your satisfaction with the following aspects on a 5-point scale, where 1 means "Very dissatisfied" and 5 means "Very satisfied": A. the sound level of the indoor unit, B. your electricity bill since installing the ductless heat pump, C. the heating, D. the cooling, E. the maintenance required, F. the appearance of the indoor unit, G. And what is your overall satisfaction rating?
Base: All respondents, 2015 DHP Owners, n = 203 2005-2014 DHP Owners, n = 54.
*Difference significant at the 90% confidence level.

The percentage of DHP owners that recommended a DHP to friends or family members provides further evidence of satisfaction with the technology. Seventy-eight percent of recent DHP owners have already recommended it and another 19% say they would recommend one. Those who have had a DHP for a longer period of time are also inclined to recommend one to friends or family; eighty-five percent of DHP owners who purchased prior to 2015 have recommended a DHP to someone and another 9% say they would recommend one.

More seasoned DHP owners, those who purchased prior to 2015, are more likely than newer users to recognize some of the benefits of the technology. Figure 11 displays the reasons DHP owners have or would recommend a DHP to someone they know. As shown, significantly higher percentages of pre-2015 DHP owners than 2015 DHP owners recommend DHPs for almost every reason listed, with the biggest differences between the two groups' recommendations in reliability, energy bill savings, and maintenance requirements.

Figure 11. Reasons for Recommending a DHP



Notes: Sat8. What are some of the reasons you recommended it? Multiple responses allowed.
Base: Respondents that have or would recommend, 2015 owners, n = 199, 2005-2014 owners, n = 51.
*Difference significant at the 90% confidence level.

DHP owners were also asked as a final measure of satisfaction if they would change anything about their entire buying process. Approximately one-quarter of both the DHP owners who purchased in 2015 and those who purchased before 2015 said they would change something, most frequently installing additional heads, or a larger size, or installing a DHP sooner.

4.2 Target Market Surveys

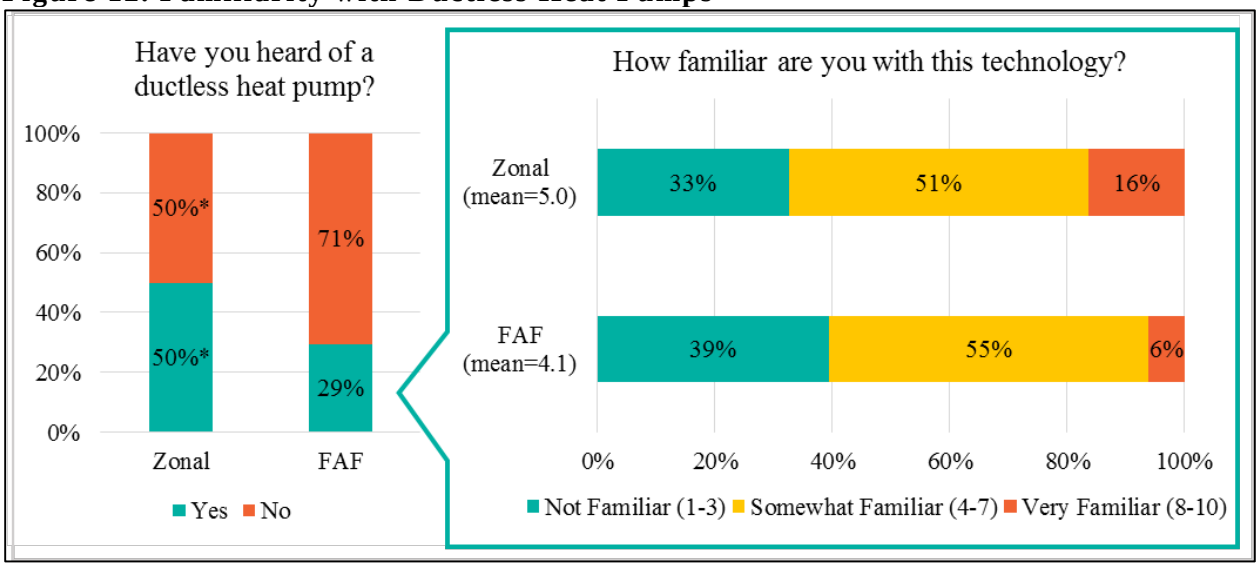
ILLUME also surveyed members of an online panel in Idaho, Montana, Oregon, and Washington to provide additional insights into the perspectives of homeowners who do not currently have a DHP (target market). A total of 297 single-family homeowners, 185 with an electric zonal heating system and 112 with an electric forced air furnace, completed surveys during January

2016. The income distribution of the target market survey respondents very closely aligned with that of the DHP owner survey respondents.

4.2.1 Awareness

Overall awareness of DHP technology remained about the same as in the previous MPER, with just over 40% of respondents aware of the technology by name (ductless heat pump or mini split). As shown in Figure 12, a significantly higher percentage of zonal respondents (50%) than FAF respondents (29%) have heard of the technology. In both groups, these DHP aware respondents are moderately familiar with it, with the largest percentages rating their familiarity between a 4 and 7 on a 10-point scale where 1 is "Not at all familiar" and 10 is "Very familiar."

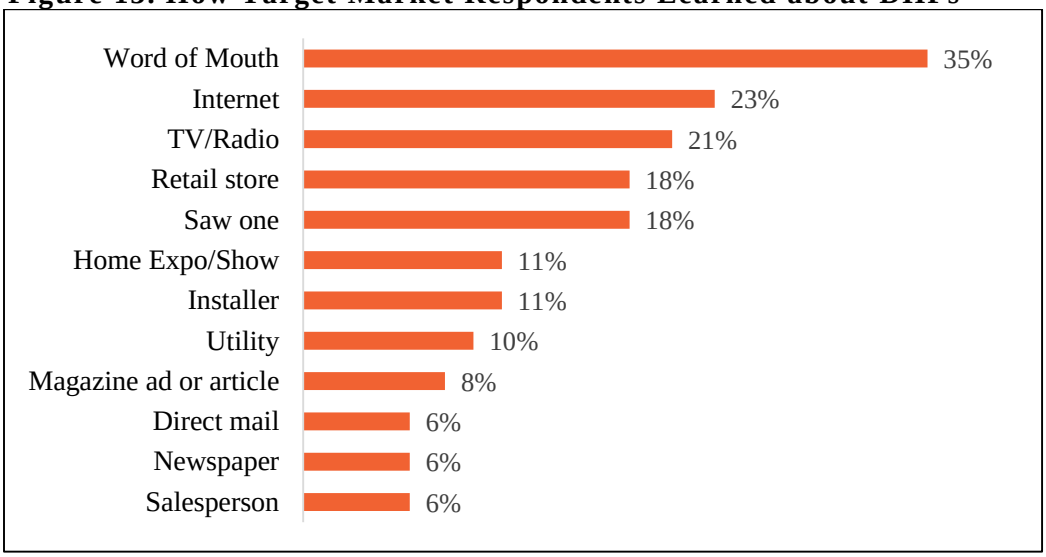
Figure 12. Familiarity with Ductless Heat Pumps



Notes: AWAR1. Have you heard of a ductless heat pump or mini split? Base: All respondents, Zonal n = 185, Forced Air Furnace n = 112
AWAR2. On a scale of 1 to 10, where 1 is "Not at all familiar" and 10 is "Very familiar," how familiar are you with this technology? Base: Respondents who have heard of a DHP, Zonal n = 92, Forced Air Furnace n = 33.
*Difference significant at the 90% confidence level.

Word of mouth is the most common way (35%) that general-population respondents learned about DHPs, followed by the Internet (23%) and TV or radio (21%). Compared to the previous MPER, a higher percentage of respondents learned about the technology through a retailer and a lower percentage learned through their utility. Figure 13 provides more detail on the ways in which members of the target market learned of DHPs.

Figure 13. How Target Market Respondents Learned about DHPs



Notes: AWAR3. How did you learn about ductless heat pumps? (Please check all that apply)
Base: Respondents who have heard of a DHP, Zonal n = 92, Forced Air Furnace n = 33

Respondents who had not heard of a ductless heat pump or mini split were shown a description and a picture of a DHP to aid in their recognition of the technology. An additional 31% of respondents were familiar with the technology when aided. When combining unaided and aided awareness, 71% of the target market respondents have heard of or seen a DHP. This overall awareness did not differ by the type of heating system the respondent currently has.

In general, respondents do not know where to purchase a DHP and were unaware that most utilities in the Northwest offer rebates. About one-fifth of respondents agree that they know where to purchase a DHP. Slightly fewer, 18%, were familiar with the availability of utility incentives for DHPs.

Almost half (44%) of DHP-aware households had considered installing one in their homes. The cost of the equipment was the most commonly-cited reason for not installing a DHP, followed existing equipment that was working fine, which was mentioned by a significantly higher percentage of forced air furnace respondents than zonal respondents. Table 7 provides more detail on the primary and other reasons respondents did not purchase a DHP.

Table 7. Reasons for not Purchasing a DHP

	Primary Reason	Other Reasons
Cost	40%	22%
Existing equipment works fine	24%	24%
No local installer	9%	7%
Maintenance	4%	10%
Appearance	2%	11%
Don't believe savings claims	2%	8%
Prefer a ducted system	2%	7%
Not confident DHP could meet heating/cooling needs	2%	12%
Doesn't work in my climate	0%	1%
Other	13%	2%
No Other reasons	-	22%

Notes: AWAR8. What was the primary reason you chose not to install one?
AWAR9. Were there other reasons why you chose not to install a ductless heat pump? (Multiple responses accepted)
Base: Respondents who had considered purchasing a DHP, n=92

4.2.2 Sources of Information and Influence

The majority of target market respondents (69%) said they would go to the Internet for more information, and just over half (51%) would begin that Internet research with Google. Professional contractors (54%) and retail store salespersons (44%) follow as the next most frequently-cited sources of DHP information for target market respondents.

Target market respondents reported how they would prefer to shop for a DHP and their preferred way to gather information. The largest percentages would generally prefer to shop for DHPs through a retail store (38%) or installers (32%) but less than one-fifth would prefer to shop online. In contrast, the largest percentage (43%) consider the Internet the best way to research DHPs. This indicates that while customers rely heavily on the Internet for research, few anticipate making this purchase online. Table 56 in Appendix E provides more detail.

Respondents also rated how influential various sources of information would be in their decision to purchase a new primary heating system on a 10-point scale where 1 is "Not influential at all" and 10 is "Very influential." The most influential sources – Internet information, seeing a DHP in use, and other customers' ratings and reviews – all received mean ratings of 7.8.

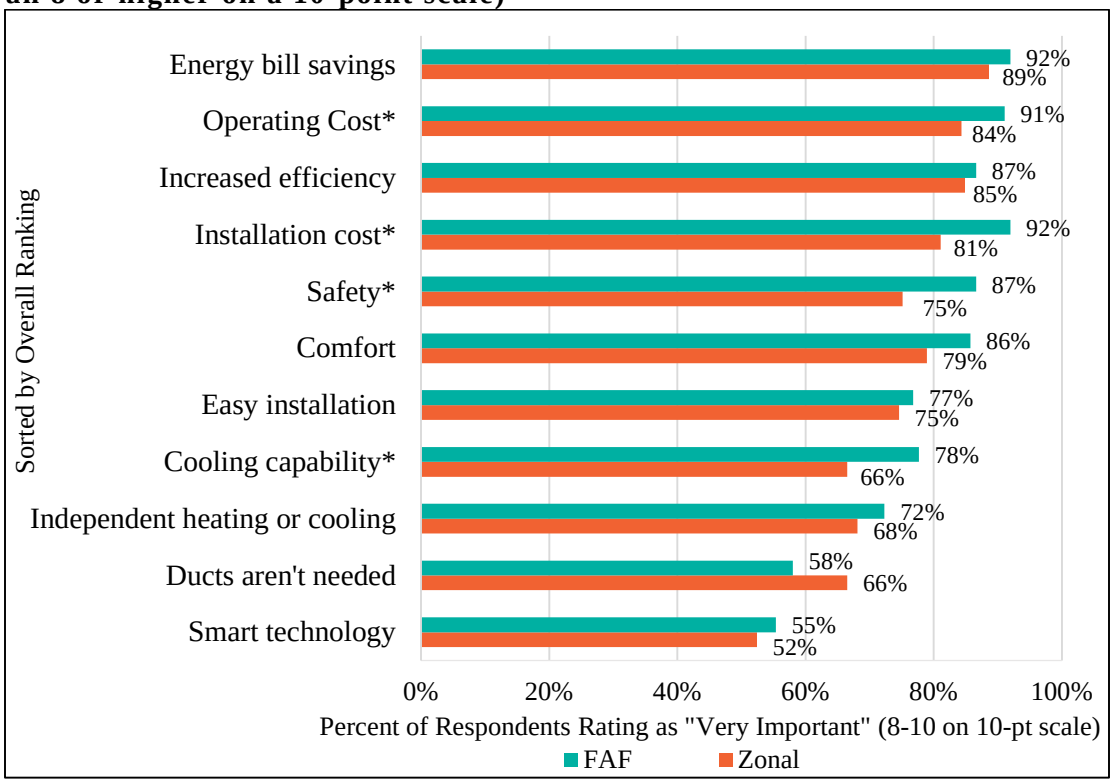
4.2.3 Benefits and Barriers to Installing a Ductless Heat Pump

Benefits related to saving money earned the highest importance ratings from target market respondents among factors when considering a new primary heating system. Energy bill savings was followed closely by operating cost[12] in importance. The former earned a mean rating of 9.2

[12]Operating cost refers to the expenses to operate and maintain the DHP unit over time.

and was rated an 8 or higher on a 10-point scale by 90% of respondents. Efficiency compared to other primary heating systems and the installation cost of the heating system were the next-most important benefits when considering a new primary heating system. Figure 14 provides more detail on target market respondents' perceived importance of different features when considering a new heating system.

Figure 14. Importance of Heating System Considerations (Portion rating an 8 or higher on a 10-point scale)



Notes: BENE1. There are a number of things people look for in a new primary heating system. For each item listed below, on a scale of 1 to 10, where 1 is not important at all and 10 is very important, please indicate how important this item is to you when considering a new primary heating system.
Base: All respondents, Zonal n = 185, Forced Air Furnace n = 112.
*Difference significant at the 90% confidence level.

Respondents also rated their levels of concern about various aspects of DHPs if they were to consider installing one. Cost again emerged as the greatest concern; almost 70% of respondents rated this an 8 or higher on a 10-point scale, where 1 is "Not a concern at all" and 10 is "A major concern") when considering a DHP. Respondents were also concerned that improperly-installed equipment may waste energy; fifty-nine percent rated this an 8 or higher on the same scale.

Findings around the appearance of the DHP differed slightly from previous research. Forty percent of respondents rated their concern with a potentially less visually appealing heating system an 8 or higher on a 10-point scale where 1 is "Not a concern at all" and 10 is "A major concern" compared to 26% of respondents in previous message testing research (ILLUME 2014). Respondents were also asked to rate the importance of the appearance of their heating

equipment. Again, more respondents in this study than in the previous message testing research rated the importance of their heating systems appearance an 8 or higher, 35% compared to 21%.

Despite the difference in results, appearance still does not appear to be a substantial barrier to DHP sales. The majority of respondents are not concerned with a potentially less visually appealing heating system, the appearance of their heating system or how the DHP would look in their living room.

4.2.4 Ductless Heat Pump Interest and Messaging

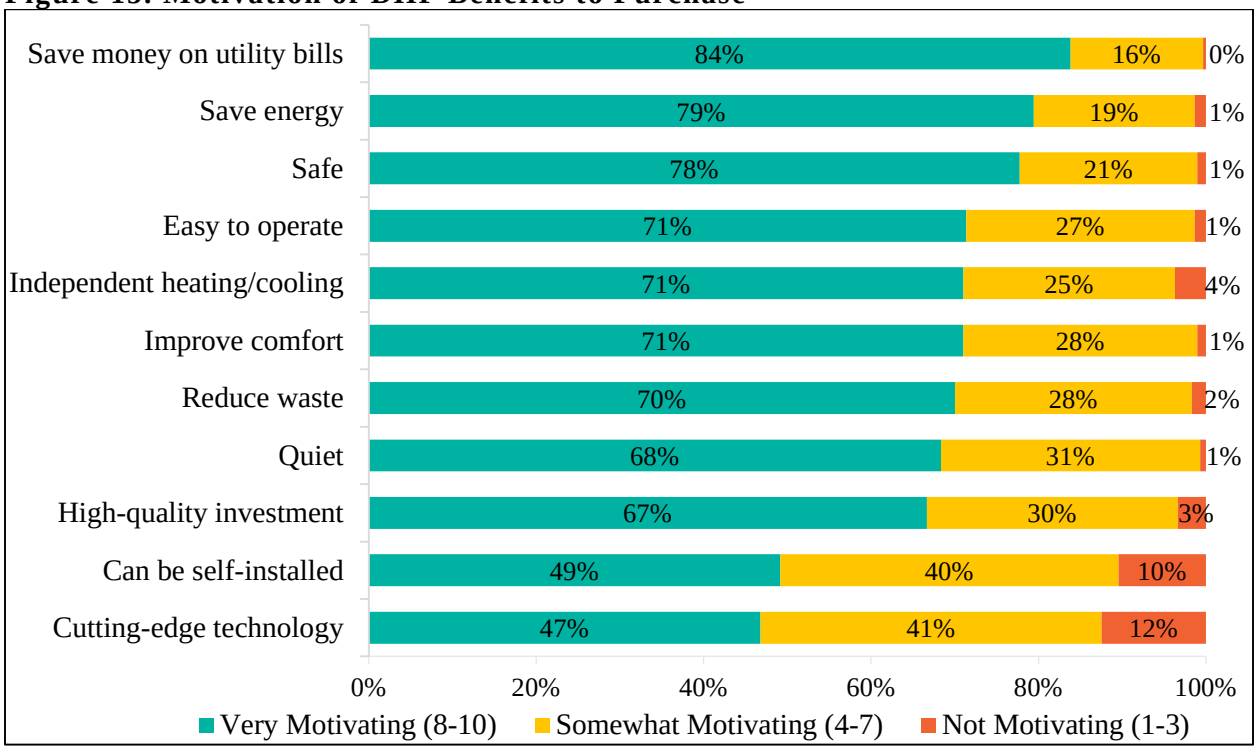
Just over one-quarter (27%) of target market respondents stated that they would be "Very interested" in installing a DHP in their home if they needed to replace their current heating system. Saving money and energy efficiency were the two most frequently-cited reasons for interest in a DHP among these respondents, while not explored in this study, previous message testing research (ILLUME Advising 2014) found these terms tend to be used interchangeably. Another 58% stated they would be "Somewhat interested" in installing a DHP in their home. Respondents who indicated lower levels of interest in installing a DHP were asked what additional information they would need before considering one. Cost information emerged as the most frequent response, cited by 49% of those less-interested respondents.

Target market respondents' intentions regarding replacement of their current heating systems varied widely. The largest percentage (39%) is not planning to replace their current heating system until it fails. Of the 30% who are planning to replace their current primary heating system before it breaks, over half expect to do so in the next one to three years. The remaining 30% are unsure when they will replace their current primary heating system.

Respondents who indicated they were "Very interested" in a DHP were significantly more likely to intend to replace their current system before it breaks. Additionally, respondents planning to replace in the next three years (52%) were more likely to indicate they are "Very interested" in installing a DHP, compared to those who anticipate replacing in more than three years or aren't yet sure when they will replace (27%).

Respondents rated saving money on utility bills as the most motivating reason to purchase a ductless heat pump (84% rating this an 8 or higher on a 10-point scale), followed by saving energy and safety. Figure 15 further illustrates the degree to which different DHP benefits would motivate households in the targeted markets to purchase a DHP.

Figure 15. Motivation of DHP Benefits to Purchase



Notes: M1. Below are statements that may be motivating to customers. Please score how motivating each statement is to you, where 1 would not motivate you to purchase a ductless heat pump at all, and 10 would be highly motivating to you in making your purchase decision.
Base: All respondents, n = 297.

4.3 Supply Side Assessments

4.3.1 Installer Focus Groups, Interviews, and Surveys

The research team used three different approaches to collect installers' insights into the DHP market (Table 8). This section summarizes installer survey results and provides additional insights with findings from the focus groups and interviews where relevant.

Table 8. Installer Research Approaches

Research Method	Master Installers	Other Installers
Focus groups	-	20
In-depth interviews	11	-
Online and phone surveys	28	97

Ninety-six percent of the surveyed installers, who are all listed as participating installers with the Initiative, say they are familiar with it. Seventy-nine percent of Master Installers and 52% of other installers have been installing DHPs since 2010 or earlier. Installers in the focus groups reported similar years of experience.

Mitsubishi and Daikin are the most common DHP brands offered by surveyed installers. Fifteen percent of installers planned to offer a new or different brand in the next twelve months; four percent each are planning to offer Daikin and Toshiba-Carrier, and 3% are planning to offer Mitsubishi.

The previous MPER began monitoring the percentage of revenue and working hours dedicated to DHPs as a way to provide evidence of market transformation. Overall, 12% of installers say at least half their revenue comes from DHPs, which is not a significant change from last year. Figure 21 in Appendix G provides further detail in distribution of revenue and work hours.

Almost every firm contacted has had at least one employee attend a DHP manufacturer training, and 86% of surveyed installers have attended the Initiative-sponsored installer orientation session. About 60% of surveyed installers plan to send staff to manufacturer training in the next year. Installers in the focus groups expressed interest in DHP technology training from an objective third party rather than from the manufacturer so they are better able to compare data on different DHP units and learn about various applications of DHP units.

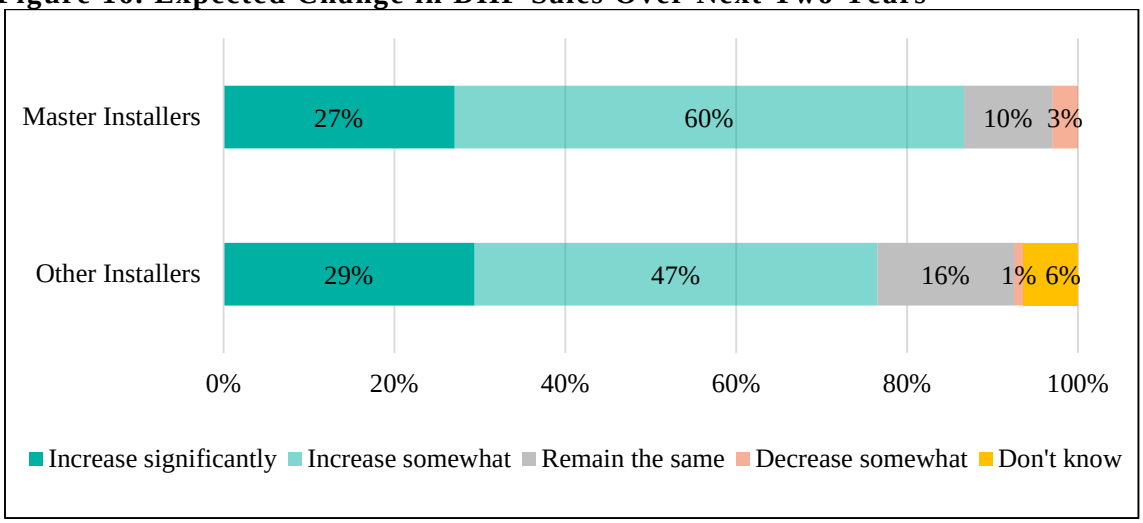
4.3.2 Installation and Sales

Average installation costs reported by Master Installers for a single-headed DHP installation have increased slightly since the previous MPER, while the costs for other installers have remained steady. Average installation costs for Master Installers ranged from $3,200 to $5,500 with an overall average of $4,208, compared to $4,076 previously. Average installation costs reported by other installers ranged from $1,700 to $6,000 with an overall average of $3,828, compared to $3,864 previously. All of the interviewed Master Installers said the Initiative has had a positive impact on their sales of residential DHPs.

The number of cooling-only installations continues to increase. Forty percent of installers reported that they installed at least one cooling-only DHP in 2015, compared to 19% in the previous MPER. Interviewed Master Installers also mentioned a growing subset of customers who wanted air conditioning and who were interested in DHPs.

Installers indicate that the DHP market will continue to grow. All Master Installers interviewed believed sales will continue to increase at least somewhat and, as illustrated in Figure 16, 87% of surveyed Master Installers and 67% of other installers say they expect DHP sales to increase significantly or somewhat in the next two years.

Figure 16. Expected Change in DHP Sales Over Next Two Years



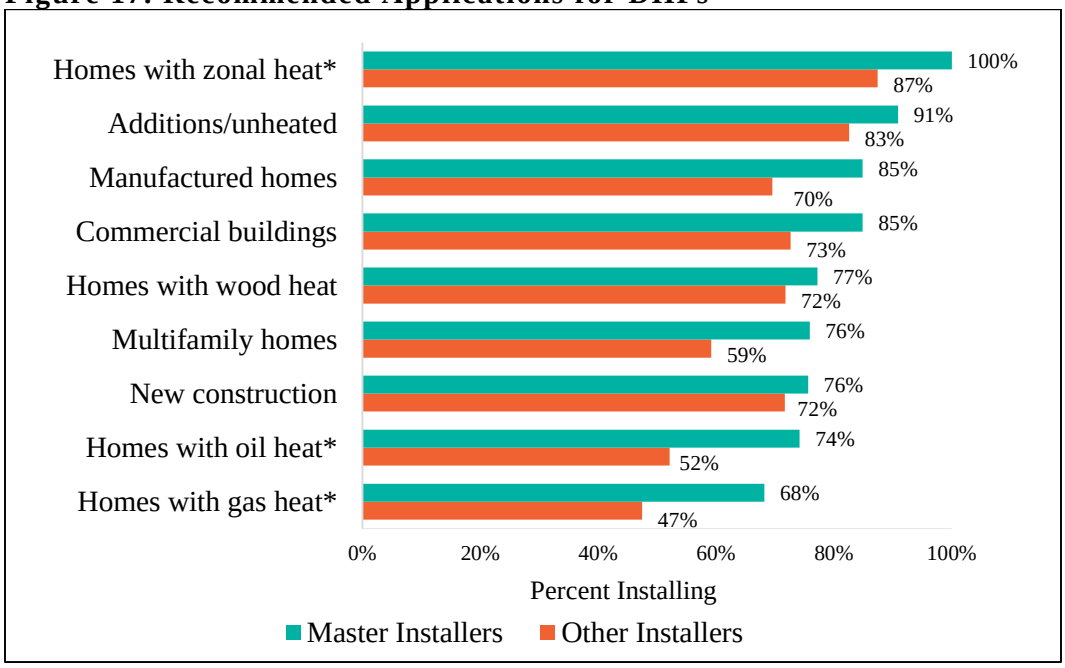
Notes: Q23. Compared to your total 2015 sales of residential DHPs, do you think your sales in the next 2 years will: Increase significantly? Increase somewhat? Remain about the same as 2014? Decrease somewhat? Decrease significantly?
Base: All respondents, Master Installers, n = 28, other installers, n = 97.

Installers who expected sales to increase were also asked if they expected an increase in residential sales for 1:1 systems, multi-headed systems or both. The majority of installers responded that they expect the increases in sales will occur in both 1:1 and multi-headed systems. Those who believe sales will continue to increase cited the increased customer knowledge and awareness, increased acceptance and popularity of DHPs, and increased marketing as reasons for their projections.

In in-depth interviews, six out of eleven Master Installers attributed projected growth to a greater range of product options for more flexible heating solutions and increased customer awareness. Two installers thought the market might grow, but were less certain in their predictions. The remaining three installers predicted that DHP uptake would continue, but that the rate of uptake might decrease as DHPs move beyond early adopters.

In order to assess the opportunity for DHPs in different types of applications and to characterize a typical customer, installers were asked about the types of applications for which they would and would not recommend DHPs. Most surveyed installers indicated they have recommended a DHP in most of the applications asked about (Figure 17). These results are confirmed by comments in the focus groups and in-depth interviews. Installers in focus groups tend not to target DHP recommendations to specific customer segments; rather, they usually present all customers with a DHP option. According to a Kirkland installer, *"I'm going to pitch it (DHP) 100% of the time."* In in-depth interviews, Master Installers identified specific common characteristics among customers that purchase DHPs such as being of middle-income, older homeowners living with ceiling, resistance, or baseboard heat.

Figure 17. Recommended Applications for DHPs



Notes: Q 30. In which of the following applications have you recommended a DHP? (select all that apply)
Base: All respondents, Master Installer, n = 28, other installer, n = 97.
*Difference significant at the 90% confidence level.

Installers that participated in focus groups also acknowledge that open-layout floor plans are most suitable for DHPs; however, they do not actively discourage homeowners from installing DHPs based on layout alone. They generally believed they could overcome any home layout issues by installing multiple heads. Interviewed Master Installers reported that customers with forced air furnaces who do move forward with a DHP typically do so due to lower operating costs, increased comfort, achieve greater efficiency, and the ability to obtain air conditioning.

Seventy-one percent of Master Installers and 64% of other installers stated that situations existed for which they would not recommend DHPs. Most commonly, they would typically not recommend DHPs for homes that are currently ducted or that can be ducted, homes that are very compartmentalized or don't have a suitable location, and homes with existing natural gas, heat pump, or radiant heat. Installers who participated in focus groups reported similarly, expressing hesitancy to recommend DHPs in homes with existing ducts or forced air furnaces as doing so may not make economic sense.

4.3.3 Installer Marketing

As in the previous MPER, Master Installers are far more likely than other installers to promote DHPs (94% compared to 60%). Company web pages, social media, newspaper ads, and home shows are the most frequently-used marketing approaches, and Master Installers are significantly more likely than other installers to use each of them.

Installers that reported promoting DHPs in 2015 most typically targeted single-family homes, followed by homes with electric resistance heating. Table 9 displays the types of audiences installers sought to reach.

Table 9. Target Audience for 2015 Installer Marketing

	Master Installers	Other Installers
Single-family homes	100%	95%
Homes with electric resistance heating	83%	76%
Homes with electric forced air furnaces	60%	69%
Manufactured homes	67%	67%
Homes with other heating systems	50%	58%
Commercial facilities	30%	45%
Multifamily buildings	42%	36%

Notes: Q37: Which of the following audiences were you trying to market to in 2015? (select all that apply)
Base: Installers who did marketing during 2015, Master Installer, n = 26, other installer, n = 57.

Installers typically relied on conversations and materials created by the supplier or manufacturer when introducing the technology to customers. About one-third of installers used materials distributed by the Initiative to introduce customers to the DHP technology.

Seventy percent of surveyed installers believed that the percentage of customers specifically asking for DHPs was higher in 2015 compared to previous years. On average, installers reported that 56% of customers specifically asked for a DHP, a slight increase from 52% in the previous report. The interviewed Master Installers shared similar opinions, with five stating that over half of their customers had requested a DHP. Installers in the focus groups noted that more customers are researching options prior to shopping for DHPs.

Customers are initially interested in DHPs because of the energy and cost savings associated with the increased energy efficiency. Eighty-three percent of surveyed installers and many focus group participants stated this as a reason for customers' interest. Surveyed installers also believed that the availability of rebates (mentioned by 71%) and the ability to add heating or cooling to a previously unconditioned space (mentioned by 67%) attract customers to the technology. Discomfort (too cold or too hot) in one's home and extreme outside temperatures also drive initial interest, as noted by installers in the focus groups.

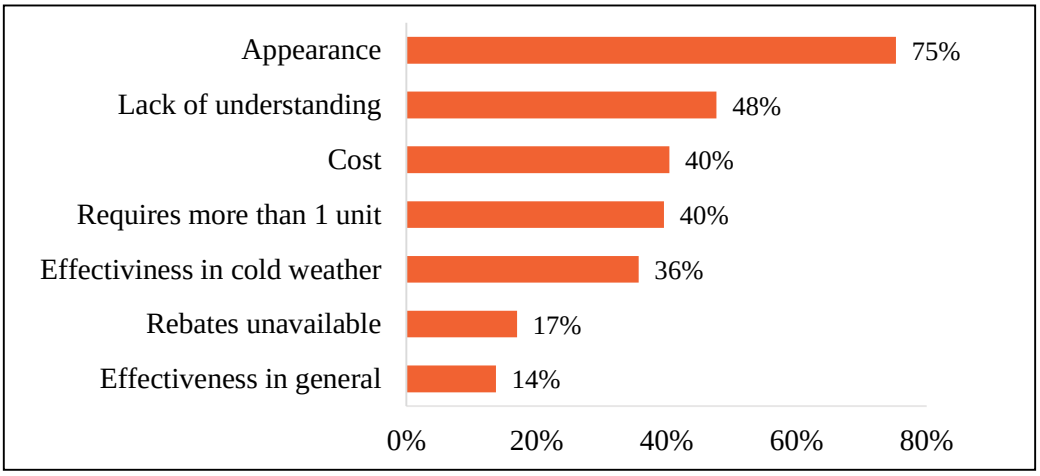
Installers believe that additional support from distributors, manufacturers, utilities, and additional marketing materials or training would be beneficial to their businesses. About 85% of surveyed installers would find this support beneficial; specifically, additional marketing materials or resources was cited as potentially beneficial by 57% of installers. Focus group participants confirmed this potential benefit. Suggestions for the type of marketing support the Initiative could provide included social media training, testimonials, and strategies to improve awareness, among others. Focus group participants also suggested that sales training would be beneficial.

However, while they would find such information beneficial, surveyed installers generally did not believe that the Initiative could provide any marketing or technical support that would increase sales. Only about one-quarter of surveyed installers thought that Initiative-provided marketing or technical support would increase DHP sales.

4.3.4 Installer Perceptions of Barriers to DHP Adoption

In contrast to the opinions of DHP owners, most installers surveyed believe that the appearance of DHPs is the greatest barrier to increased customer installations (Figure 18). Seven out of eleven installers interviewed also mentioned appearance as the greatest customer barrier to DHP installation, as did the installers who participated in the focus groups. Eight percent of surveyed installers believe there are no barriers to DHP sales.

Figure 18. Barriers to DHP Sales Cited by Over 10% of Installers



Notes: Q 42. Among the customers that are aware of DHPs before they meet with you, what are the primary perceived barriers to DHP sales? (select all that apply)
Base: All respondents, n=125.

Notably, only 12% of Master Installers and 25% of other installers surveyed thought customer confidence in DHP technology was an issue. Of these installers, all of the Master Installers and 68% of other installers think this lack of confidence is attributable to customers' lack of familiarity with DHPs and hesitancy to trust a new technology. During focus groups, installers said that customers may be particularly skeptical about the ability of DHP technology to heat the entire home. This could indicate that installers are not promoting the 1:1 displacement approach, whereby the DHP would supplement or displace some of the heating from the current primary heating system.

Installers participating in the focus groups thought that marketing and contractor certification would be effective tools to improve customer confidence in DHP technology. Likewise, when surveyed installers were asked what the Initiative could do to help promote the adoption of DHPs, their most common response was to do more marketing, particularly informational advertising, in order to increase customer awareness and knowledge of the technology.

Just under forty percent of surveyed installers consider the existing forced air furnace market a more difficult market to serve. This is primarily because customers often want to make use of existing ductwork when they already have it in place (41% Master Installers, 37% other installers) and customers are concerned that DHPs may not deliver the same level of comfort as their existing furnace system (mentioned by 16% Master Installers, 24% other installers). Non-master installers also perceived that installing a DHP in a home with existing ductwork would be more expensive than replacing the existing system (23%). In addition, surveyed Master Installers mentioned the lack of incentives for customers with gas heating was a barrier (21%).

4.3.5 Master Installer Program

Installers were questioned about their awareness, motivations and perceptions about the Master Installer designation in order to gain insights into the benefits and drawbacks of the program. Fifty-one percent of Master Installers surveyed had joined the program more than five years ago, and an additional 28% had joined in the last three to five years. Six of the eleven Master Installers interviewed said they had joined the Master Installer program shortly after it started.

Just under half of the Master Installers (47%) surveyed gave the Master Installer program an 8 or higher rating for how beneficial it is (on a 1 to 10 scale, where 1 = "Not at all beneficial" and 10 = "Extremely beneficial"). The installers who rated the program highly listed increased credibility with customers (32%), a competitive edge (25%), and increased exposure for their business (14%) as the main benefits. Nine of eleven interviewed Master Installers echoed the benefits of increased credibility and a competitive edge. Several emphasized their desire to be leaders in the industry, saying that the Master Installer title indicates that *"Our installations are superior"* and that it helps *"…Prove to customers that we are the best."*

None of the Master Installers interviewed said they would change their engagement with the project if the Master Installer designation were to end, but four installers were concerned that removing this title would allow other installers to complete lower-quality installations, harming the overall credibility of DHP technology with customers.

Awareness of the Master Installer program is moderate among installers not participating in the program, with 64% of other installers saying that they had heard of the Master Installer program. Among those who were aware of the program, a little over half (33 installers) have considered becoming a Master Installer, but have not done so because they don't meet the minimum installation requirements (10 installers), they haven't gotten around to or haven't had time to apply (5 installers), or they don't see the benefit (5 installers).

About one-quarter (15) of surveyed installers aware of the Master Installer program have not considered participating. The main reasons these installers have not participated are because they do not see the benefit (7 installers) or they are simply not interested (5 installers). During a focus group in Kirkland, other installers cited the increased time to do required paperwork as their primary reason for not participating. Participants from smaller installation companies in a Spokane focus group said that meeting minimum installation requirements was particularly difficult for them.

Installer focus group findings indicated that previous experiences with other contractor networks

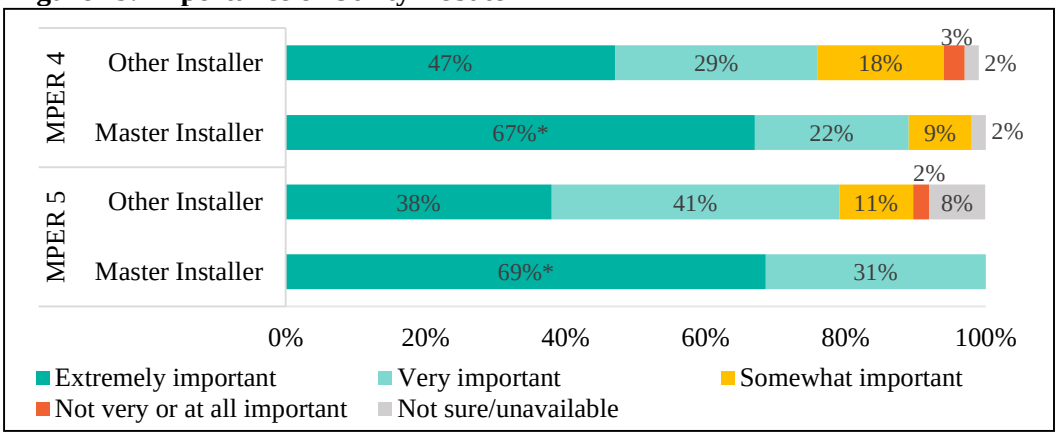
may have influenced installer interest in participating in the Master Installer program. In particular, Kirkland installers had participated in utility contractor networks that had generated several leads and referrals, and provided them with badges to show to customers. These installers felt strongly that having a Master Installer badge from the Initiative to show to customers would enable them to sell more units. In contrast, installers in Portland expressed dissatisfaction with local utility contractor networks, and this appears to have negatively influenced their perceptions of the DHP Master Installer program. Portland installers reported not participating in local utility contractor networks because of costs associated with participating in these networks and a lack of exclusivity. The Portland installers also perceived a lack of benefits in participating in the DHP Master Installer program. As stated by one Portland installer, *"it's a lot of time for nothing extra."*

4.3.6 Financing

All Master Installers and three-quarters of other installers surveyed offered their customers different payment options. After credit cards, loans through a bank or credit union or the utility were the most commonly-offered types of financing. Installers also rated the importance of different financing options to residential DHP sales. Manufacturer financing was the most highly rated type of financing, with 28% of Master Installers and 26% of other installers rating it a 5 on a 5-point scale.

Installers believe rebates play an important role in residential DHP sales, with 45% indicating utility rebates are "extremely important" and an additional 39% rating them as "very important." As shown in Figure 19, a significantly higher percentage of Master Installers than other installers rated the rebate as extremely important. This difference of opinion regarding the importance of the rebate is likely explained by the percentage of installations that receive rebates among the installer groups. Seventy-one percent of Master Installers indicated that 75% or more of their DHP installs receive rebates, whereas 45% of other installers indicated the same.

Figure 19. Importance of Utility Rebate



Notes: MPER 4: Q66. How important would you say the utility rebates are to residential DHP sales?
Base: All installers, Master Installers, n = 46, other installers, n = 157.
MPER 5: Q44 How important would you say the utility rebates are to residential DHP sales?
Base: All installers, Master Installers, n = 28, other installers, n = 97.
*Difference significant at 95% confidence level.

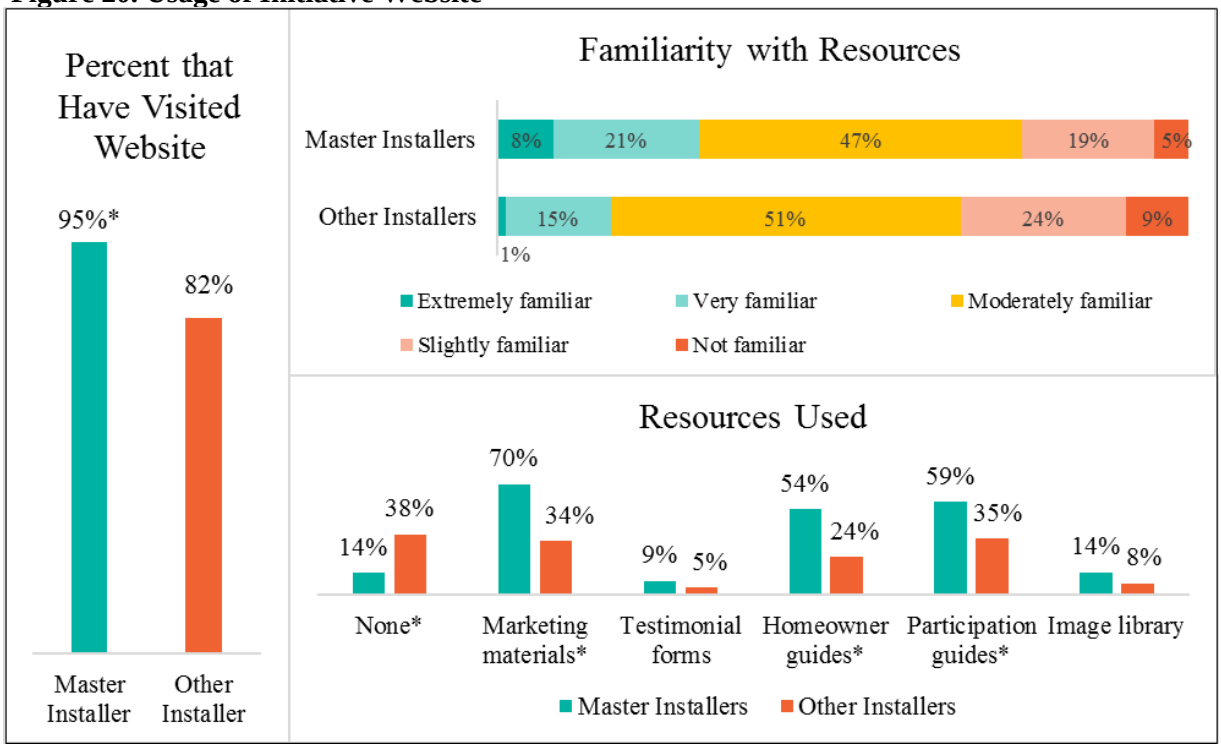
DHP installations that did not receive utility rebates typically failed to do so because the primary heating fuel did not qualify for the incentive (mentioned by 70% of surveyed installers). Seventy percent of Master Installers and 45% of other installers with customers that did not qualify for a utility rebate were able to offer them some other type of incentive. Most offered manufacturer discounts, pointed out available tax credits, referred customers to financing, or provided an in-house discount.

4.3.7 Installer Interactions with Initiative

As expected, significantly greater proportions of Master Installers have used the Initiative website (95%, vs. 82% for other installers) and contacted Initiative staff (75%, vs. 48% for other installers). Most installers were satisfied with the responsiveness of Initiative staff and, to a lesser extent, the Initiative website. Fifty-three percent of installers indicated the Initiative staff was "very responsive" and another 27% indicated staff are "extremely responsive." The website received mostly ratings of "Somewhat useful" (48%) and "Very useful" (46%).

Overall, installers who have used the Initiative website are moderately familiar with the resources available to them there. As illustrated in Figure 20, while Master Installers and other installers reported similar levels of familiarity with available resources, Master Installers were significantly more likely to use the resources.

Figure 20. Usage of Initiative Website



Notes: Q 53. Have you visited the Northwest Ductless Heat Pump Project website, goingductless.com?
Base: All installers, Master Installers, n = 28, other installers, n = 97.
Q 55. On a scale of one to five, where one is not at all familiar and 5 is extremely familiar, how familiar are you with the resources available to installers through the Northwest Ductless Heat Pump Project website?
Q 56. Which of the following resources available on goingductless.com has your company used?
Base: Installers who have used website, Master Installers, n = 27, other installers, n = 80.
*Difference significant at 95% confidence level

Installers who contacted Initiative staff did so for the same reasons. Issues or questions about utility rebates drove the most contact, with 57% of installers stating they contacted the Initiative staff for this reason. Questions regarding DHP equipment eligibility (31%), Master Installer eligibility (25%), and technical installation or best practices (25%) were also frequent reasons for contacting Initiative staff.

Installers provided mostly positive feedback about the Initiative and technology when given the opportunity to provide additional comments. When asked to identify areas for improvement, surveyed installers most frequently mentioned issues around communication and challenges faced by small installers. Comments that illustrate satisfaction and areas for improvement are included in Appendix F

4.3.8 DHP Supplier Interviews

The ILLUME team interviewed six supply chain partners in February and March 2016. The interviews included three DHP distributors and two DHP manufacturers (collectively referred to as suppliers), and one DHP retailer. Contact information was provided by the program implementer and represents those with whom they work most closely.

Sales

All of the suppliers viewed DHPs as a strong and fast-growing market segment. Compared to other heating and cooling products, DHPs comprised 30%-60% of sales for distributors, and 10% of sales for one of the manufacturers. The other manufacturer did not make any heating and cooling products other than DHPs. Two distributors had increased the number of DHPs they ordered in the last year to meet increased customer demand. All suppliers indicated that they sold more heating/cooling models than cooling-only products.

Suppliers all agreed that the Initiative has increased the number and type of DHPs available in the Northwest. Three out of five of them stated that the Initiative's positive impact increased in 2015, while the other two either didn't know or thought the impact remained the same. Suppliers attributed the Initiative's impact to the Initiative's role in driving customer awareness, contractor knowledge, and lowering the cost of equipment through rebates. Manufacturers reported that 10%-15% of the DHPs they make went to the Northwest market. Of the models that distributors carried, 50%-90% of DHPs qualified for utility incentives in this region. Two of the distributors reported their most popular models are the 19 and 20 SEER models, because those models qualify for utility incentives.

Four out of five suppliers said they experienced some challenges in meeting market demand. Two distributors said these challenges were driven by difficulties in finding trained staff and contractors to meet the continued demand for DHPs. The other distributor had problems in forecasting the number of units needed and getting them shipped in time, although this had recently improved now that DHPs are being manufactured domestically.

Suppliers were asked what proportion of their residential DHP sales in the Northwest are multi-headed systems and if they expect that to change in the future. They estimated that most of their sales were one-to-one configurations and that around 15%-30% of sales are for multi-head

systems. The two supplier respondents who offered predictions about future installations said they expected the portion of multi-head installations to increase.

Retail Partnerships

Only one manufacturer was working with retailers to sell DHPs. This contact said that this approach has been successful because of the opportunity to market the rebates through the retailer.

The suppliers not working with retailers expressed some hesitations to form such partnerships. They thought retail partnerships might have some advantages, such as reaching a greater number of customers and generating increased awareness of DHPs. However, they were concerned that retail partnerships might alienate contractors by cutting into their profit margins. They were also worried that retail partnerships could increase the number of installations by customers or less-qualified contractors, which could hurt the reputation of DHPs. Three suppliers thought that implementing a model in which sales included the cost of installation through a network of professional contracts would help address some barriers to selling through retailers. None of the manufacturers interviewed is currently supporting do-it-yourself (DIY) installations.

Supplier Perceptions of Barriers to DHP Adoption

Five of six of the interviewed manufacturers, distributors, and retailers considered a lack of customer awareness and familiarity with DHPs a barrier to increased residential DHP sales. Other barriers included limited contractor knowledge of and training around DHPs, and the appearance of the equipment. None of the respondents identified customer confidence in the technology as an issue, since customers who have had DHPs installed are highly satisfied. Two distributors and two manufacturers had worked to overcome the issue of customer awareness through advertising at home shows, on the radio, and through various television channels including advertising, home and garden shows, and news networks. Four manufacturers and distributors also held regular contractor trainings to ensure the quality of installations.

Two suppliers thought that first cost of DHP technology was still an issue for customers, while another two thought that the issue was largely being addressed by utility rebates. One of the suppliers who considered it a significant issue noted that first cost was less of an issue for customers replacing electric and propane systems. This respondent talked about emphasizing secondary benefits, such as comfort and energy savings, as a method to overcome the issue of first cost.

Supplier Marketing and Interaction with Initiative

The suppliers interviewed, with the exception of the retailer, said they advertised DHPs to residential customers. All the distributors stated that they worked with manufacturers to co-sponsor marketing materials. One distributor also reported doing cooperative marketing with utilities, and another reported working with his/her organization’s contractor network. Three out of five manufacturers and distributors said they targeted their marketing at residential customers with electrically-heated homes. Four respondents were able to provide detail on key marketing messages. Energy savings and comfort were common themes, with one respondent advertising both comfort and energy savings, another respondent just advertising comfort, and another

respondent just advertising energy savings. Other marketing messages included reliability and rebate availability.

Manufacturers worked closely with the Initiative to develop marketing resources. One of two manufacturers said they worked directly with NEEA to develop marketing materials. In addition, two of three distributors said that the manufacturer they partnered with worked with NEEA to develop marketing materials. These three suppliers indicated they used some NEEA marketing support, including imagery and information from filed reports. When asked if the Initiative could offer any additional marketing resources, two of three respondents receiving marketing support emphasized the increased importance of using online and social media channels to reach customers. The other respondent noted the importance of targeted messaging by fuel type.

Supplier Future Expectations

Suppliers mentioned several technological innovations and new markets for DHPs. When asked about emerging DHP technology trends, three of five suppliers said that DHPs are being engineered to function better in colder climates, and two respondents mentioned improvements in controls, allowing integration with smart thermostats and Wi-Fi technology. Two respondents also expected efficiency to continue to increase. When asked about emerging market segments, three of five suppliers stated that manufactured homes and new construction were significantly-growing market segments. One distributor also mentioned multi-family units as an emerging market segment.

All suppliers interviewed thought that the DHP market would continue to grow. While they identified incentives as a substantial driver of sales, respondents agreed that DHPs would continue to sell, but at a slower pace without incentives. Four out of five suppliers thought installation costs might decline slightly in the next two years as competition in the DHP market increases. All respondents expected to be able to keep up with market demand for DHPs.

Three out of five manufacturers and distributors did not think the Initiative's goal of having DHPs installed in 85% of single-family, zonal heat homes by 2039 was achievable. One respondent said the project would need both more incentives and a "radical and innovative approach" to achieve this goal. Respondents offered mixed comments on the feasibility of goals in other target markets. One respondent said he did not think systems using ductwork, such as air-source heat pumps, would be completely replaced, although he could envision situations where DHP and this technology could be used together in a home. Three out of five suppliers thought that market penetration of DHPs in homes with electric forced air furnaces could be increased. These suppliers thought that new technologies such as air handlers, contractor training, and financial incentives would help drive market penetration for these homes.

4.4 Partner Utility Interviews

ILLUME completed interviews with representatives from ten partner utilities currently running DHP programs. Half of those utilities were also interviewed for the previous MPER.

4.4.1 Program Design and Delivery

None of the representatives interviewed as part of the previous MPER reported any changes to their programs in the past year. All of the utilities are targeting single-family homes with zonal

heating; nine of the ten are currently offering rebates to homes with electric forced air furnaces, and the remaining program plans to allow them soon. Four of the utility representatives also mentioned targeting low-income customers through pilot or grant programs.

Rebate amounts have been holding steady since a reported decrease two years ago. Amounts range from $750 to $1,200 for electrically heated homes, with one utility also offering an incentive of $500 for homes with existing heating systems that are not 100% electric. Table 5 in Section 3.2 provides a complete summary of incentives offered by partner utilities.

All utility respondents interviewed said that their programs strive for 1:1 installations; however, customer preferences upselling by installers results in a number of installations with multiple indoor units. Most programs also educate customers to leave the existing heating system in place to serve as a backup.

Of the eight utility respondents that discussed their inspection process, five performed random inspections, two performed inspections on all DHP installations, and one relied on the Initiative's inspection process. Contacts reported inspections have been going well with only minor issues that are quickly corrected. Three of the representatives noted that they allow self-installs and do not find any additional issues in those cases.

4.4.2 Marketing and Goals

Utility representatives use a variety of traditional marketing methods to promote their DHP programs, including direct mail, newspaper ads, and radio; most are also using social media. Almost all said, however, that their installers and customer word-of-mouth are responsible for driving the most customer participation in their programs. Most of the utility representatives stated that their promotional efforts have held fairly steady over the past year; only two mentioned a decline.

Most of the DHP programs do not have measure-level goals, but utility representatives generally reported that their DHP programs are meeting or exceeding utility expectations for them. In fact, some might be doing too well; half of the utility contacts mentioned they are not currently heavily promoting their programs because they are already successful, have budget limitations, or do not need to claim the energy savings.

4.4.3 Financing

Four of the interviewed utilities are currently offering financing for DHPs; another had been unable to secure a finance partner. Customer uptake on the loans ranged from about 10% to 40% of customers. Most of the utility representatives whose programs offer loans reported they were operating smoothly.

With the exception of the one utility that was unable to secure a finance partner, the remaining utilities that do not already offer financing are not interested in doing so. Reasons for not offering financing include the difficulty in doing so as a public utility, former loan programs that were not successful, and the availability of loans through other sources such as installers and local lenders.

4.4.4 Anticipated Program Changes

The majority of utility representatives interviewed were not expecting any changes to their promotion efforts or program budgets in the next twelve months. Those that were planning changes were increasing advertising, expanding a pilot, and considering changes that could result from the Regional Technical Forum changing savings assumptions for DHPs. None of the utilities is anticipating a change to its rebate amounts in the next two years, but six noted that a downward adjustment of savings assumptions could affect the Bonneville Power Administration (BPA) reimbursement amount which would in turn affect their rebate amounts.

None of the utility representatives reported having planned end dates for DHP rebates at this time. However, one respondent mentioned that their utility is carefully monitoring the saturation of the DHP program and the impacts of savings changes on cost effectiveness and rebates to assess the viability of the program.

4.4.5 Installer Networks and Recognition

Relationships with installers are managed in different ways. Six of the ten utilities rely on the installer listing maintained by the Initiative. Some of these utilities referred customers directly to the Initiative website and some included the listing on their own websites. Three of the utilities maintained their own installer listings and did not refer customers to the Initiative website because of additional program requirements for installers or systems in place for randomly recommending installers. The remaining utility required that installers be in the Initiative listing and referred customers to the Initiative website, but also maintained its own installer listing with additional requirements. For this utility, a utility-approved installer is necessary only when customers use the utility's financing.

Utility representatives' opinions on the value of the Initiative's Master Installer program were also mixed. None of those interviewed had a dedicated system or process for recognizing active installers, though two mentioned they would like come up with a way to differentiate installers. Nor did they recognize or otherwise highlight the Initiative's Master Installers in any of their installer listings. However, over half said they did still see value in the Master Installer program because it provides some level of reassurance to the customer and provides a way for installers to promote themselves.

Half of the utility representatives reported that their programs offered some type of support or service to DHP installers. This typically took the form of training, which is sometimes utility-sponsored and sometimes offered through the Initiative.

4.4.6 Utility Perceptions of Barriers to DHP Adoption

Affordability, particularly among low-income customers, is the largest barrier to selling DHPs (mentioned by four of the utility representatives interviewed). Targeting eligible members or well-suited houses is another barrier, mentioned by three of the utility representatives.

Utility program staff were also specifically asked about concerns regarding utility cost-effectiveness or customer confidence in the technology, or if certain housing types or heating systems present additional challenges for selling DHPs. Most expressed concerns about the

potential for the Regional Technical Forum to reduce savings assumptions and the effect that would have on rebate levels and cost effectiveness.

Notably, when asked if they believed that a lack of customer confidence in the technology presented a barrier to DHP sales, only one utility representative responded that it did. Five contacts noted that the appearance of the DHP is a bigger issue, noting that a segment of the population is still reluctant to have something on their walls.

For the most part, utility representatives did not think significant additional barriers exist when selling DHPs to customers with electric forced air furnaces or certain home configurations. Two noted that a DHP can be a slightly harder sell to customers who are used to having heat in every room, but knowing they still have that as a backup often alleviates that concern. Three others noted that occasionally they find issues with electrical capacity or where to place the compressor. Four of the utility representatives pointed out that DHPs are not going to be the best option for every home and it is important for both installers and the Initiative to recognize that.

4.4.7 Opportunities for Ductless Heat Pumps

One of the biggest perceived barriers for DHPs was also seen as an area of opportunity. The most frequently-cited opportunity for DHPs was among low-income customers. Half of the utility representatives mentioned this when asked what they see as the biggest opportunity for DHPs. The other responses were centered on targeting specific types of people or houses, such as ranch or seasonal homes, connected townhouses, and new owners of existing homes. To build on this opportunity, one utility representative suggested working with realtors to help buyers understand that an outdated resistance heating system can easily be retrofitted with a DHP.

4.4.8 Support from the Initiative

Utility staff are satisfied with the Initiative's marketing and technical support. Six of the representatives stated their utility currently uses the marketing support and two more have used it in the past; six utilities have used the Initiative's technical support.

Interviewees provided a variety of suggestions for ways that the Initiative can further support its DHP programs, most of which centered on additional support in marketing. Potential activities suggested by more than one utility representative included creating marketing materials focused on cooling comfort for the summer; developing additional resources such as infographics, YouTube videos and maintenance reminders to help DHP owners operate their systems efficiently; creating materials with a more rural or real-world look than the typically urban-looking materials; and encouraging more marketing from manufacturers to create more top-of-mind awareness.

Concerns over showing preference for a particular brand or installer prevent most of the utilities from publicizing manufacturer promotions; even those that have advertised manufacturer promotions at times cited this as a concern. Additional challenges associated with manufacturer promotions include being able to react quickly enough to promote them in time, and avoiding customer confusion over who is providing the rebate or discount. The Initiative may be able to

assist utilities in advertising these promotions by maintaining a listing on the Initiative website to which utilities can refer customers.

Other suggestions for ways the Initiative can assist programs included: providing additional resources for baseline savings calculations, conducting installation inspections and developing sales training, specifically energy efficiency sales training for installers.

Regarding the most favorable features of the Initiative, utility representatives most commonly cited the variety of resources available to installers, utilities, and homeowners, and the Initiative's installer listing. They also appreciated the connectivity between the regional Initiative, participating utilities, manufacturers, and installers.

5. Key Findings and Recommendations

Overall, the Initiative is continuing to perform well and make progress toward market transformation. In this section, we present some of the key findings from the evaluation activities, and recommendations for the Initiative:

Acceptance and Adoption

1. **Customer interest in DHPs is increasing.** Seventy percent of surveyed installers reported that the percentage of customers specifically requesting DHPs was higher in 2015 than in previous years.
2. **The Initiative continues to drive market transformation among DHP suppliers and installers.** All of the interviewed Master Installers believe the Initiative has had a positive impact on their DHP sales, and all of the interviewed manufacturers and distributors believe it has had a large impact on their stocking practices.
3. **Lack of awareness and familiarity with the technology are obstacles to DHP sales.** Awareness among target market respondents has been holding around 40% since the previous MPER. Nearly half of installers cite customers not understanding the technology as a barrier to DHP sales and five of six of the interviewed suppliers considered a lack of customer awareness and familiarity with DHPs a barrier to increased residential DHP sales.

Purchase Drivers

4. **DHP owners rely on their own research rather than on installer recommendations in their purchase decisions.** Installers' influence on customers' decisions has held steady since the last MPER, with only 12% of DHP owners saying an installer was influential in their decision and 7% saying the idea to install a DHP came from an installer. The Internet is the most common information source; this was confirmed by installers who reported that more customers are researching their options in advance of shopping for new heating equipment. Utilities interviewed stated that installers are the most effective driver of participation in their programs; however, this should not be confused with installer influence on the decision to purchase a DHP.
5. **Word of mouth is a key source of initial information and continues to be a driving influence for those considering a DHP.** Learning of the technology through a friend or

acquaintance is the most common way that both DHP owners and target market respondents learned about DHPs. Nearly half (46%) of DHP owners and 35% of target market respondents familiar with the technology learned of it this way. Further, 30% of DHP owners considered word of mouth information important in their purchase decision.

6. **Financial considerations play an important part in DHP sales, proving to be both a barrier and an opportunity.** Target market respondents cited opportunities to save on energy bills and operating costs as the most important factors when considering a new heating system. The cost of the heating system was the biggest concern and most frequently-mentioned piece of information needed before considering a DHP. Saving money on utility bills is also the most motivating message among general population respondents and is a highly-rated benefit among DHP owners. Installers and suppliers stressed the importance of rebates in driving DHP sales.
7. **Cooling is becoming an increasingly important driver of sales.** Multiple utilities and installers mentioned that a hot summer drives sales, noting that discomfort in one's home drives initial interest in DHPs for potential purchasers. Surveyed owners reported valuing the cooling feature of their DHPs, citing it as a major reason for choosing a DHP.
8. **Customer confidence in the DHP's ability to meet heating or cooling needs is not a substantial barrier to DHP sales.** Less than one-fifth of DHP owners indicated concern with the general capability of the DHP prior to their purchase and only 2% of target market respondents who had considered a DHP but did not purchase one cited a lack of confidence in the DHPs ability to meet their heating or cooling needs as the primary reason. Additionally, only one-fifth of the surveyed installers believe that it is and the interviewed utilities and suppliers do not see it as an issue at all. However, suppliers are concerned that Internet sales could erode customer confidence in the future if these sales result in inferior products and poor installation.
9. **There are few difference between forced air furnace and zonal heating households**. While forced air furnace owners are less likely to be familiar with DHPs, the two groups share similar demographic characteristics, tend to learn about DHPs through similar sources and are motivated to purchase by similar factors.

User Experience

10. **Appearance is not a major barrier among those who purchase DHPs and is not an issue post-installation.** Just 10% were concerned with the appearance prior to purchasing and none considered the appearance a concern after installing. There is some concern regarding the appearance among the target market, who are less familiar with the technology. However, it ranked only fifth out of nine potential concerns associated with DHPs. Suppliers, installers, utility partners, and members of the target market continue to cite it as a barrier to DHP sales.
11. **Households that installed DHPs continue to experience high satisfaction with the product and recommend the product to others.** Nearly all DHP owners said they were satisfied or very satisfied with their DHP. In addition, more than three-quarters of DHP owners who purchased in 2015 and 85% of those who purchased prior to 2015 say they have recommended a DHP to others.

Barriers

12. **Lack of awareness and familiarity with the technology are obstacles to DHP sales.** Awareness among target market respondents has been holding around 40% since the previous MPER. Nearly half of installers cite customers not understanding the technology as a barrier to DHP sales and five of six of the interviewed suppliers considered a lack of customer awareness and familiarity with DHPs a barrier to increased residential DHP sales.
13. **Utility budgets and priorities may affect long-term market transformation success.** Half of the utilities interviewed indicated they are not heavily promoting DHPs because they are satisfied with the success of the program already or are concerned about demand outpacing budget. Several others noted that the changes in savings assumptions for DHPs in the Regional Technical Forum (RTF) is a concern and could limit their focus on the technology.

Program Processes

14. **DHP installation numbers tracked by the Initiative and the program implementer differ.** Due to the number of data sources and estimations used, DHP installation numbers provided to the research team by Initiative staff and the program implementer differed.

Based on the findings noted above, NEEA should consider the following recommendations as it moves forward with the DHP Initiative in 2016 and beyond:

1. **Increase awareness of and interest about DHPs by leveraging the channels customers' access when seeking product information.** A high percentage of purchasers say they have recommended a DHP to others. Purchasers and the target market indicated that the recommendations of family, friends, or others have a significant influence on their purchasing or potential purchasing decisions. Finding ways to use recommendations via case studies, online avenues such as YouTube and testimonials as well as utilizing tools like Yelp, may be instrumental in further promoting the adoption of DHPs. In addition, because the Internet continues to be a primary resource for potential purchasers who are researching before installing, a focus on providing online and web-based content and information, and optimizing searches so that customers in the region searching online for heating or cooling equipment would find www.goingductless.com higher in the results.
2. **Enhance marketing resources with a focus on strategies that could better support partner utilities and installers.** While NEEA is taking active steps to enhance marketing resources available to utilities, several utility program managers and some installers noted that the Initiative's look does not relate to their customers. In light of this information, consider:
    a. Providing marketing language and usage information that is specific to each climate.
    b. Creating or offering materials with a more rural look for the rural utilities. Utilities mentioned that the NEEA materials look urban, which does not appeal to rural areas.
    c. Assisting utilities in advertising manufacturer promotions in ways that do not show preference to brands or installers. Many were unaware of resources that exist on the Initiative website such as up-to-date listings on www.goingductless.com to which

utilities can refer customers. Maintaining a calendar of manufacturer promotions for utility reference would also aid utilities in planning to advertise promotions.

d. Providing and publicizing to all market actors that there is social media support and content for utility programs, installers, and manufacturers to leverage in their own marketing efforts.

e. Increase efforts to link installers with tools that can help them effectively market DHPs. Utilities say that installers are one of the most effective driver of participation, but a large percentage of non-master installers do no marketing.

f. Assisting utilities and installers in targeting homeowners based on those characteristics that make a customer more likely to consider or install a DHP. This could include targeting based on demographics (Master Installers interviewed and DHP owner survey demographics describe DHP owners as primarily older and middle income), home type (e.g., seasonal and ranch homes), and potentially multifamily and low-income homes, which utilities also mentioned as areas of opportunity.

3. **Disseminate findings from this and other market research on the relative importance of barriers to DHP adoption.** Findings from DHP owner surveys, installer surveys, focus groups and interviews, and utility interviews show that the perceptions of the different groups are not in alignment. Differences occurred on a number of key issues, including:

   a. Sources of information – Utilities believe that customers rely on installers for information about DHPs; installers note that most people come to them having already researched what they would like. Purchasers and the target market note that information from friends and family, as well as Internet resources, constitute their top "go-to" sources for information on heating technologies with only 12% saying the installer was influential in their decision.

   b. Aesthetics as a barrier – Installers, suppliers and the utilities noted that aesthetics remains a barrier to the adoption of DHPs. DHP purchasers reported only minor concerns with aesthetics prior to installation and a non-issue after installation. Further, previous research (ILLUME Advising 2014) has shown that fewer than 21% of target market respondents consider heating equipment appearance significantly important. The Initiative should work to broadly share findings that counter the perception that aesthetics is a significant barrier to DHP sales.

   c. Customer confidence – No consensus exists as to whether or not broad customer confidence is a significant issue. About one-fifth of installers believe that it is, and suppliers worry it could become an issue in the future but utilities do not. While there is a concern that inferior technologies and installation may lead to customer dissatisfaction that could erode future customer confidence, there is nothing to suggest that this is a substantial barrier that needs to be actively addressed. Focus is better paid to building awareness and familiarity which are larger barriers.

4. **Prepare to adapt market transformation strategies and/or put in place contingency plans that will allow a market with fewer utility program resources supporting it to continue to transform.** Installers and suppliers believe there is clear growth in the market indicating market transformation is progressing, but constraints faced by utility programs

around budgets and reduction of RTF-allowed savings could undermine the forward progress being made by the market. Utilities noted they intentionally hold back on promotion for fear of over-subscribing. If utilities begin to limit promotional activities and/or reduce incentives on DHPs, the target of 85% market saturation by 2039 will be harder to attain.

5. **Increase efforts to leverage the current pool of successful installers and to support the broader supply-side market:**
    a. Increasing sales training – Both utilities and participants in the installer focus groups indicated that more sales training, particularly in the context of energy efficiency, would be helpful. This may seem counter-intuitive given only 12% of DHP owners said the installer was influential in their decision to purchase, however, this could be a result of installers not being comfortable selling the technology and/or providing information about energy savings.
    b. Retail Options – Establishing retail partnerships is one way to help build awareness by getting DHPs in places where they will be seen by large numbers of people and where a large percentage of target market respondents indicated they would prefer to shop for a DHP. The Initiative should continue to undertake strategic partnerships with retailers as a means for increasing sales but should be sure to work closely with retail partners to ensure quality products and quality installation. This may require helping retailers identify qualified installers to provide quality installation as DHPs are not as "plug and play" as other retail products and only 12% of DHP owners would be comfortable doing some of the installation themselves.
6. **The installation of DHPs for cooling is increasing, and provides an interesting opportunity for NEEA.** While DHPs offer a more efficient alternative to central air conditioning, the addition of DHPs absent central air conditioning could cause load-building. NEEA should examine the impact of cooling as a driver on the Initiative, including looking at how cooling load is being offset by savings from heating systems. If the savings prove cost-effective, the Initiative should leverage the customers' interest and installers' abilities to sell the cooling benefits as a means for increasing awareness and market share for DHPs.
7. **Carefully consider the market for DHPs in homes with forced air furnaces.** Master Installers consider the presence of a forced air furnace (FAF) a barrier to DHP installation. However, FAF owners who have DHPs installed are highly satisfied. In addition, FAF owners in the target market surveys were open to, although less aware of, DHPs. Benefits such as the ability to heat or cool only certain areas of the house, adding cooling, and money savings were highly motivating to FAF owners, suggesting an opportunity to promote specific benefits that might speak to FAF owners. The Initiative will need to ensure that the DHPs in FAF homes are offsetting existing heating and/or cooling and are not increasing load in those homes.
8. **Work with the program implementer to document data sources and estimation methods to provide greater transparency and consistency in the DHP sales numbers used to track Initiative progress.** The Initiative relies heavily on data collected from distributors, utilities and the program implementer to track DHP sales and estimate its progress toward market saturation in its three target markets.

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Appendix A – Glossary

1:1 Installation. A 1:1, or single head installation consists of one outdoor unit, or condenser, and one indoor unit.

British Thermal Unit (BTU). A unit of heat energy. One Btu is the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit. British Thermal Units per Hour (BTU/H). A measure of cooling or heating capacity.

Central Air Conditioning System. System in which air is cooled at a central location and distributed to and from rooms by one or more fans and a series of ducts.

Compressor. A component of the refrigeration cycle, which draws low pressure/temperature refrigerant gas from the evaporator (indoor unit) and delivers in high pressure/temperature form to the condenser (outdoor unit).

Displace or Displacement. The DHP acts as the primary heating equipment and the original equipment remains in place to provide backup or supplemental heat. The Initiative focuses on displacing existing heating sources rather than replacing them.

Ductwork or Ducts. Hollow metal pipes used to transfer air throughout a house.

Heat Pump. Cooling/Heating system that can reverse the direction of refrigerant flow to provide heating or cooling to the indoor space as needed.

Indoor Unit. The evaporator unit, which contains a heat exchanger coil, fan, air filters and remote signal receiver. Sometimes also referred to as “heads.”

Initiative. NEEA’s NW Ductless Heat Pump Project.

Installer. A business that installs DHPs. Can also be referred to as a contractor or installation contractor.

Inverter Technology. Heat pumps draw heat energy from outdoor air using refrigerant to keep your home warm during the winter. In the summer, the cycle is reversed to expel heat from the home and cool the air. Unlike a standard furnace or air conditioner, heat pumps offer a high level of energy efficiency to keep utility costs low. An inverter, or variable-speed, heat pump maximizes efficiency and reduces energy lost during the refrigerant cycle

Master Installers. Installers who attend Orientation and Best Practices training and have completed a minimum of 25 total installations (15 or more utility-incented installations), in the last three years. In order to qualify, installers must also submit installation activity, at least one homeowner testimonial and photo-documentation of two utility-incented installations in addition to completing the Master Installer agreement to the Initiative. Information and instructions are available on the Initiative website, goingductless.com.

Multi Zone or Multi Head Ductless System. A system that features a single outdoor unit (condenser) connected to multiple indoor units or heads, providing zoning capability through individual remote thermostats that control temperature and air flow for each room or zone.

Other Installers. Installers who install DHPs and participate in the Initiative but have not become Master Installers.

Outdoor Unit. A condensing unit that contains compressor, condenser coil, propeller fan and circuit board. Programmable Thermostat. A thermostat with the ability to preset different temperature/time settings for heating and cooling equipment.

Refrigerant. A gas/liquid substance used on refrigeration cycle to provide cooling by absorbing and dispersing heat.

Refrigerant Lines. Two copper lines that connect the outdoor air conditioner or heat pump to the indoor evaporator coil.

Short-run system. Also called a concealed duct unit. These units are mounted in the ceiling of rooms where minimal visibility of the heating and cooling system is desired or wall space is limited. A small vent opening in the ceiling is all that is visible.

Split System. Refers to an air conditioner or heat pump that is combined with indoor components, such as an evaporator coil inside and a condenser coil outside the home.

Thermostat. A device that monitors and controls the temperature inside a home. The remote control is most commonly used as a thermostat on ductless split systems.

Ton. Measurement of system cooling capacity. 1 Ton is equivalent to 12,000 BTU/H.

Zoning. Ductless systems manage environments individually with remote thermostats that control the temperature and airflow for each room or zone. In multi-split ductless systems, households can set different temperatures for different rooms or areas according to individual preference

Appendix B – ACE Model Review Memo

This memo summarizes the preliminary findings from the Ductless Heat Pump (DHP) Alliance Cost Effectiveness (ACE) model review conducted by ILLUME Advising LLC (ILLUME) on behalf of the Northwest Energy Efficiency Alliance (NEEA). NEEA is a non-profit organization that uses the "market power of the region to accelerate the innovation and adoption of energy-efficient products, services and practices." NEEA is an alliance of more than 100 Northwest utilities and energy efficiency organizations working on behalf of more than 13 million energy customers.

NEEA launched the Northwest Ductless Heat Pump Initiative in 2008 as a pilot program to demonstrate DHPs as a viable technology to displace electric resistance heat in existing homes. This study will help inform NEEA on Initiative cost effectiveness for the market, and in setting and adjusting long term market transformation goals. This review focuses on six assumptions for DHPs and a review of supporting documentation provided by NEEA.

Below is a summary of the key findings.

1. **Finding 1.** ILLUME suggests updating the non-electric benefit for DHP installations to $29/DHP-yr, based on information from the Regional Technical Forum and the Residential Building Stock Assessment. Future investigation into consumer O&M costs and non-electric benefits will provide additional information for estimating DHP costs and benefits, as well as for calculating life cycle costs.
2. **Finding 2.** Information gleaned in the 2015 MPER indicates a target date of 2039 for achieving 85% market saturation for DHPs in single-family homes with zonal heating is an ambitious, although not unrealistic, goal. Saturation goals should be revisited and revised as necessary when market data is updated.
3. **Finding 3.** The Residential Building Stock Assessment (RBSA) for manufactured homes provides quality data for estimating the market size for manufactured homes with electric forced air furnaces.
4. **Finding 4.** Extending the baseline and maximum market saturation values for single-family homes to the manufactured homes market is reasonable at this time and can be adjusted in the future to reflect market trends.
5. **Finding 5.** Achieving maximum baseline saturation (7%) by 2040 and market saturation (14%) by 2050 in the manufactured homes market is reasonable at this time. These goals should be reviewed and revised over time to reflect market trends.
6. **Finding 6.** Regional Technical Forum's recommendation for DHP savings rates have been updated, and using a weighted average by zone to estimate savings is reasonable. The weighted average approach results in savings estimates of 3,774 kWh/yr for single family homes with electric forced air furnaces; and 5,714 kWh/yr for manufactured homes with electric forced air furnaces. RTF decisions should be monitored over time and DHP program impact estimates should be updated accordingly.

Evaluation Questions

This section presents preliminary findings for each of the six ACE review questions that NEEA provided to ILLUME for review. NEEA has a continued interest in expanding the ductless heat pump (DHP) market installations.

The following items were identified by NEEA for review:

1. Review the 2015 ACE model key assumptions for the manufactured homes market
2. Review whether a market saturation of 85% by 2039 is reasonable for existing, single-family homes with zonal heating systems
3. Review the market size for manufactured homes with electric forced air furnaces
4. Review the assumptions used to extend the baseline and maximum market saturation for existing single-family homes with electric forced air furnaces to the manufactured homes with forced air furnace market segment
5. Review the timing of achieving maximum baseline (2050) and market (2040) saturations for manufactured homes, based on the adjustment factor in Item 4
6. Review the impact of a potential RTF Rate decrease (in 2016 or 2017)

This memo primarily focuses on assumptions for the DHP market for manufactured homes. Findings relating to each of the six researchable issues are discussed in detail in the following sections.

1.1 2015 ACE Model Key Assumptions – Manufactured Homes

Question: Are the 2015 ACE model key assumptions for the manufactured homes market reasonable?

Overview

To date, manufactured homes have predominately been supplied with electric forced air furnaces, and this sector is targeted as an emerging market for DHP intervention. NEEA has developed a series of key assumptions specific to the manufactured homes market to identify components important to DHP marketing and intervention.[13] These assumptions, provided by NEEA, address the following parameters:

1. Market Size
2. Tracked Units
3. Local Program Units

[13] 2015 MPER ACE Model Review Qs spreadsheet, Key Assumptions tab

4. Baseline Units
5. Savings Rate
6. Consumer First Cost
7. Measure Life
8. Consumer O&M Costs
9. Non-Energy Benefit
10. Non-Electric Energy Benefit

Recommendation

Table 1 provides the current assumptions and a summary of any recommended changes for the DHP manufactured homes market. Further discussion about specific recommendations follow below.

Table 1: 2015 DHP Manufactured Homes Key Assumptions Summary

	DHP MH	Recommendation
Market Size	280,858	No change
Tracked Units	226	No change
Local Program Units	100	No change
Baseline Units	68	No change
Savings Rate	5,714 kWh/DHP-yr	No change
Consumer First Cost	$3,374/DHP	No change
Measure Life	15	No change
Consumer O&M Costs	TBD	Recommended for future investigation
Non-Energy Benefit	TBD	Recommended for future investigation
Non-Electric Benefit	TBD	$29/DHP-yr

Source: 2015 MPER ACE Model Review Qs spreadsheet.

DHP Manufactured Homes Market:

1. Market Size – The majority of new manufactured homes include an electric forced air furnace. NEEA's estimated DHP market size for manufactured homes is based on RBSA data. Querying the data set returned a value of 280,858 homes, and this value serves as the estimate for the manufactured homes market potential and appears to be a reasonable assumption.[14] Further discussion is presented in Section 2.3.
2. Tracked Units – Provided by NEEA, the percentage of installations tracked through the Initiative.
3. Local Program Units – Provided by NEEA, the number of units tracked by NEEA.
4. Baseline Units – Assumes that less than 1% would install DHP without market intervention. A 1% estimate might be too conservative though, based on information collected in the 2015 MPER. This study found that of the installers surveyed, the estimated number of non-incented DHP installations in the manufactured homes market during 2014 was 3.8%, as shown in Table 2. NEEA could consider increasing the Baseline Units value to 3%, based on recent survey results, while maintaining a conservative estimate for non-incented installations.

Table 2: 2014 Non-Incented DHP Installations

Installation Application	2014 Percentage (n = 4,681 installs)	2013[15] Percentage (n = 1,455 installs)
Total Non-Incented Installations	100%	100%
Commercial	42.3%	48%
Residential	57.7%	52%
Manufactured Homes - In primary living space	3.8%	2%
Displaced electric zonal	11.4%	46%
Displaced gas heat	17.7%	0%
Displaced electric furnace	59.5%	54%
Displaced wood or pellet	10.1%	0%
Displaced oil or kerosene	0.0%	0%
Displaced other heat	1.3%	0%

Q22 & Q22a. How many of DHP installations in 2014 did NOT receive a utility incentive?

[14] The RBSA is currently being updated. Housing market size should be compared to the updated number when information is available.

[15] Evergreen Economics. 2014. Northwest Ductless Heat Pump Initiative: Market Progress Evaluation Report #3.

5. Savings Rate – As discussed in Section 2.6, in January 2015, the RTF approved a savings rate of 5,696 kWh/DHP-yr for manufactured homes with electric forced air furnaces. This recommendation is based on an average of the savings in the 3 heating zones, and can be used for estimating savings. In an effort to more effectively estimate savings, NEEA has calculated a weighted average, based on the percentage of manufactured homes in each zone, where the number of homes in each zone is based on RBSA data. This method provides a good estimate of savings, and summary of findings is presented in Table 3. ILLUME recommends continuing to monitor the RBSA data for manufactured housing distribution by zone, as well as RTF decisions, to update the savings rate as applicable.
6. Consumer First Cost – Based upon CLEAResult's data and discussion in ILLUME Advising's Ductless Heat Pump ACE Model Evaluation – Initial Findings Memo.
7. Measure Life – Based upon information from Regional Technical Forum and supported by DHP manufacturer's data.
8. Consumer O&M Costs – There is limited quantifying information available regarding Operation and Maintenance costs for DHPs. What is known, though, is that O&M costs are dependent upon the number of zones served. For example, a 1:1 system will have lower O&M costs than an 8:1 system. Contractors typically offer optional, add-on maintenance service agreements for DHPs and can provide more detailed information about the service packages. Surveying installers regarding maintenance service packages as well as average service call prices, and surveying owners about operating costs, is a potential avenue of future investigation.
9. Non-Energy Benefit – As stated in the 2015 MPER, an abundance of DHP customers are satisfied with increased comfort levels subsequent to installation. Other non-energy benefits include reduced equipment footprint and the potential for recycling of the DHP unit at the end of equipment life. Quantifying these benefits is an area for further investigation and would solidify additional benefits and advantages of the DHP technology.
10. Non-Electric Benefit –As explained in the January, 2015, presentation to the Regional Technical Forum, the non-electric benefit is defined as the "difference in savings between houses without supplemental fuel and average savings, multiplied by the average retail electric rate."[16] A weighted average for the non-electric benefit is calculated as a weighted average by zone, similar to the Savings Rate (Item 5). The DHP savings, based on information from RTF and RBSA, are as follows:

[16] Halley, Adam, Hannas, Ben, and Davis, Bob, DHP for Houses with Electric Forced Air Furnaces Provisional UES Measure Proposal, January 21, 2015

Table 3: Savings for DHP with FAF in Manufactured Homes

Heating Zone	Weighting Factor[17]	Savings, kWh/yr	Non-Electric Benefit, $/yr
Zone 1	72%	5,736	27
Zone 2	24%	5,651	34
Zone 3	5%	5,701	29
Weighted Average		5,714	29

Source: DHP for Houses with Electric Forced Air Furnaces Provisional UES Measure Proposal

1.2 Market Saturation of 85% by 2039 for Existing Single-Family Homes with Zonal Heating System

Question: Is a market saturation of 85% by 2039 reasonable for existing single-family homes with zonal heating systems?

Overview

The 2015 preliminary ACE Model memo, prepared by ILLUME, detailed NEEA's previous target market saturation of 85% by 2029 for single-family homes. In order to evaluate the target, Message Testing study results were reviewed to determine customer awareness, existing market share was evaluated, and overseas market growth was examined. Combined, the results of the analysis suggested that an 85% market saturation by 2029 was an aggressive goal and suggested the target date be extended at least 10 years, to 2039.

Revising the goal, with intervention, includes overcoming a variety of barriers for the 1:1 installs in the existing single-family zonal heating market. As listed in Navigant Consulting's Residential Inverter-Driven Heat Pump Technical and Market Assessment report[18], these barriers include:

- Technical limitations: climate, wall construction, and floor plan
- Physical limitations: ducting
- Market limitations: lack of capital, lack of awareness and/or trust of technology, and contractor inexperience

Other potential barriers that were identified in the 2015 MPER include homebuilders and new construction trade allies believe DHP costs are prohibitive, and that many potential customers are unaware of DHP technology. However, with increased awareness and incentives, an optimistic target of 85% by 2039 appears to be a reasonable goal for 25 year market growth. Supporting this is additional information gleaned in the 2015 MPER, specifically:

[17] Weighting Factors : Zone 1 – 71.8%, Zone 2 – 23.64%, Zone 3 – 4.56%
[18] Residential Inverter Driven Heat Pump Technical and Market Assessment, Navigant Consulting, June 2, 2015

- Of three suppliers, one stated that awareness is not a barrier
- Increased marketing, Initiatives, and education about potential energy savings will improve awareness of DHP benefits
- NEEA's DHP Initiative has been successful to date and has many accomplishments
- Distributors think that a goal of 85% in the single-family, zonal heat market is ambitious, but might be achievable in 10-15 years.

Recommendation

Although the current market penetration is below 10%, market traction should continue to increase over time with technology improvements and consumer familiarity with technology. Market growth is also anticipated with continued market intervention, as well as DHP marketing and education strategies. The goal of 85% by 2039 should be revisited over time and adjustments made to the goal as necessary to account for program impact, market trends, and other variables.

1.3 Market Size for Manufactured Homes with Electric Forced Air Furnaces

Question: Is NEEA's estimate of the market size for manufactured homes with electric forced air furnaces appropriate?

Overview

Almost all of the new, manufactured homes are delivered with an electric forced air furnace, and NEEA is interested in understanding the market size for potential impact and establishing intervention goals. As discussed in Section 2.1, NEEA has estimated the DHP market size for manufactured homes with zonal heating systems to be 280,858 homes[19]. This number is based on the data collected in the 2011 RBSA for manufactured homes with electric forced air furnaces.

Comparatively, information contained within the 2011 RBSA report for manufactured homes provides the following information:

- Manufactured homes inventory: 543,730
- Percent with FAF for primary heating: 64.3% (349,618)
- Percent of electric FAF: 79% (278,995)

*543,730*0.643*0.79 = 278,995 homes*

The value calculated using report information is within 1% of the value from the data set query and the difference is statistically insignificant.

[19] Residential Building Stock Assessment – Manufactured Homes Characteristics and Energy Use, Ecotope, January 2013

Recommendation

A manufactured home, electric forced air furnace market size of 280,858 provides a strong baseline for establishing program goals. Future releases of RBSA manufactured homes market reports should be referenced to update forecast models.

1.4 Extending the Baseline and Maximum Market Saturation for Existing Single-Family Homes with Electric Forced Air Furnaces to the Manufactured Homes with electric Forced Air Furnaces Market

Question: Are the assumptions used to extend the baseline and maximum market saturation for existing single-family homes with electric forced air furnaces to the manufactured homes with electric forced air furnaces market segment reasonable?

Overview

In the 2014 ACE Model Evaluation – Preliminary Memo, ILLUME recommended a baseline saturation of 10%, and a regional saturation of 20% for existing single-family homes with forced air furnaces, where the baseline installations are assumed to occur naturally and regional installations occur with market intervention and includes both incented and non-incented installations. Recommendations of 10% baseline and 20% regional were based on current market trends, installation numbers, and insight into customer awareness of DHP technology.

NEEA's approach of extending the baseline and maximum market saturation percentages from single-family homes to the manufactured homes market relies upon data from the 2011 RBSA reports for self-funded conservation within the respective markets, as well as ILLUME's baseline and regional saturation goals for single-family homes. The 2011 RBSA provides the following data for self-funded conservation projects:

- Manufactured home, self-funded – *33.1%*
- Single-family home, self-funded – *47.5%*

In the spreadsheet titled 2015 MPER ACE Model Review Qs, and on the Manufactured Home Adjustment Factor worksheet, NEEA calculates the ratio of manufactured home to single-family, self-funded conservation projects in order to estimate the likelihood for a manufactured homeowner to adopt technology, compared to a single-family homeowner.

33.1% / 47.5% = 69.7%

This result implies that a manufactured homeowner is 69.7% as likely to install DHP technology compared to a single-family homeowner. Next, applying this ratio to the target saturation goals for the single-family forced air furnace homes mentioned, above, provides an estimate for establishing targets for the manufactured homes market:

- Baseline saturation - *10% * 69.7% = 7%*
- Market saturation: - *20% * 69.7% = 14%*

As mentioned in Section 2.1, the manufactured homes market size is estimated to be 280,858 homes. Using this value to determine the number of manufactured homes associated with targets of 7% baseline and 14% market (maximum) saturation reveals:

- Baseline saturation (7%) – *280,858 * 7% = 19,660* manufactured homes
- Market saturation (14%) – *280,858 * 14% = 39,320* manufactured homes

Recommendation

The manufactured homes market appears to have high potential for market intervention, as discussed in the findings in the previous MPER and in Section 2.3 of this memo. Increasing DHP technology awareness of customers and contractors in the manufactured homes market increases recommendations for DHP technology and initiates market transformational results, as demonstrated in the single-family home market. Therefore, extending the baseline and maximum market saturation values for existing single-family homes to the manufactured home market segment is reasonable and generates targets for the manufactured homes market of 19,660 baseline saturation and 39,320 market saturation. These goals should be monitored over time and adjusted as necessary to reflect market trends.

1.5 Timing of Achieving Maximum Baseline and Market Saturations for Manufactured Homes

Question: Is the timing of achieving maximum baseline (2050) and market (2040) saturations for manufactured houses reasonable?

Overview

The 2015 MPER, prepared by ILLUME, notes that, "Installers and other market actors interviewed believe the manufactured homes market continues to have high, untapped potential. In the last two years installers have nearly doubled their recommendations for DHPs for customers living in manufactured homes."[20] Specifically, insight from installers revealed that recommendations increased from 45% to 77%.

NEEA has an interest in continuing to develop programs and Initiatives to support DHP recommendations and installations in the manufactured homes market. As discussed in Section 2.4, the market size for manufactured homes with electric forced air furnaces is 280,858 homes, and the estimated maximum baseline and market saturations for installation of DHPs manufactured homes in are as follows:

- Baseline saturation - 7%, or 19,660 manufactured homes
- Market saturation: - 14%, or 39,320 manufactured homes

[20] Northwest Ductless Heat Pump Initiative: Market Progress Evaluation Report #4, Illume Advising, June 15, 2015

Where baseline installations include those that occur naturally, without intervention, and market (maximum) installations occur as both incented and non-incented installations.

Recommendation:

With continued programs to raise awareness of DHP technology, confidence can be placed in targets of 7% baseline saturation by 2050 and 14% market saturation by 2040. Saturation goals should be reviewed regularly, comparing targets against customer and contractor awareness data and installer surveys, and adjusting goals accordingly to account for increases or decreases in DHP installation trends.

1.6 Impact of an RTF Rate Decrease

Question: What is the impact of a potential RTF rate decrease in 2016 or 2017?

Overview

NEEA has an interest in understanding the impact of a DHP savings rate decrease. The following is a recent history of the Regional Technical Forum's (RTF) meeting discussions and decisions regarding the energy savings calculations approach for DHPs in single-family and manufactured homes and for the RTF

May 20, 2014: RTF adopted a heat transfer based energy efficiency DHP modeling calibration, rather than a thermostat adjustment based calculation, for Phase I (early) modeling. For Phase II, the calibration shifts from savings based on pre/post savings to a savings that is based on pre/post consumption.[21]

June 16, 2014: The presentation "Ductless Heat Pumps in Single Family Homes with Zonal Electric Heat, UES Measure Update" includes information summarizing and supporting the May 2014 decision and discusses the differences between the Phase II, two savings based calibration methods (pre/post savings versus consumption).[22]

December 16, 2014: RTF approves an update to the measure savings for the single-family DHP UES measure. The measure definition, cost, life, and sunset date will remain the same. This update utilizes RBSA data to address homes that have not yet participated.[23]

[21] "DHP Re-Calibration, Moving to U_o based Calibration," May 13, 2014
[22] "Ductless Heat Pumps in Single Family Homes with Zonal Electric Heat," June 17, 2014
[23] Regional Technical Forum website, accessed September 30, 2015

January 14, 2015: Data presented in "DHP for Houses with Electric FAF – Provisional UES Measure Proposal,"[24] is calculated using the savings based on pre/post consumption and RBSA approach and reveals the following:

Table 4: RTF Savings for DHP with eFAF

		Single Family Home		Manufactured Home	
Heating Zone	Weighting Factor[25]	Savings, kWh/yr	Non-Electric Benefit, $/yr	Savings, kWh/yr	Non-Electric Benefit, $/yr
Zone 1	72%	3,836	92	5,736	27
Zone 2	24%	3,592	112	5,651	34
Zone 3	5%	3,739	100	5,701	29
Regional Savings (RTF approved)		3,722		5,696	
Regional Savings (Weighted)		3,774	97	5,714	29

Note: As verified in the March 17, 2015, presentation, the regional energy savings rates of 3,722 kWh/yr for single family homes and 5,696 kWh/yr for manufactured homes were approved by the RTF. See Table 4.

March 2015: RTF approves the research strategy for the measure definition, savings, life, cost, and research plan for the UES measure Residential Existing MH and SF Ductless Heat Pumps for Electric Forced-Air with a sunset date of March 2016.[26] The intent of the sunset date is to see if research is supported by the region.

July 16, 2015: RTF publishes a Research Strategy for the DHP for forced air furnace unit energy savings (UES) measure in single-family and manufactured homes.[27] This strategy aims to more effectively estimate the mix of DHP and electric forced air furnace heating system operation, as well as the impact of supplemental fuel usage on measure savings.

Recommendation:

[24] "DHP for Houses with Electric FAF – Provisional UES Measure Proposal," Hadley, Adam, Hannas, Ben, Davis, Bob, June 21, 2015
[25] Weighting factors: Zone 1 – 71.8%, Zone 2 – 23.64%, Zone 3 – 4.56%
[26] Regional Technical Forum, accessed September 30, 2015
[27] "Research Strategy for DHP for Forced Air Furnace (SF and MH)," July 16, 2015

ILLUME recommends NEEA's current approach, using the weighted averages to reflect savings by zone in estimating the overall savings. As shown in Table 4, the weighted savings are:

- 3,774 kWh/yr for single family homes with eFAF
- 5,714 kWh/yr for manufactured homes with eFAF

ILLUME recommends continuing to monitor DHP updates and decisions issued by the RTF for both single-family and manufactured homes, and updating savings calculations and program impact estimates accordingly.

Appendix C – Final Demographics

Table 10. DHP Owner Survey Disposition

	2015 Purchasers	Prior Purchasers
Total incentive records	**1944**	**8379**
Less records missing valid contact information	(221)	(1444)
Less records that are not primary residence	(167)	(224)
Less respondents to MPER 4 survey	-	(200)
Eligible population	**1556**	**6511**
Sampling frame	**1556**	**500**
Combined Sampling frame (2015 purchasers and prior purchasers)	**2056**	
Not attempted	225	
Attempted	1831	
Not reached (Voicemail/answering machine, no answer, bad number)	1206	
Refusals	224	
Terminations	93	
Language/communication barriers	13	
Ineligible	65	
Total Number Completed	**230**	
Response Rate	12.6%	
Completion Rate	41.1%	
Number completed	**200**	**30**
DHP Owners identified in target market survey	3	24
Total Respondents used in analysis	**203**	**54**

Table 11. DHP Owner Survey Weighting – 2015 Purchasers

	Sampling Frame				Survey Respondents				Sample Weight	
	FAF	Zonal	FAF %	Zonal %	FAF	Zonal	FAF %	Zonal %	FAF	Zonal
Idaho	7	14	2%	1%	4	3	7%	2%	0.32	0.54
Montana	6	14	2%	1%	1	8	2%	6%	1.12	0.20
Oregon	138	383	45%	31%	24	55	41%	38%	1.08	0.81
Washington	158	836	51%	67%	29	79	50%	54%	1.02	1.23

Table 12. Final DHP Owner Survey and Target Market Survey Demographics

	DHP Owner (n=203)	General Population (n=297)
State		
Idaho	7	38
Montana	9	10
Oregon	79	108
Washington	108	141
Age		
18-24	1	18
25-44	44	111
45-64	74	114
65+	82	54
Refused	2	-
Household Income		
< $40,000	49	77
$40,000 - $49,999	23	41
$50,000 - $59,999	30	35
$60,000 - $79,999	32	57
$80,000 - $99,999	17	31
$100,000 - $119,999	14	15
$120,000 or more	16	29
Refused/Don't know	22	9
Previous or current primary heating system		
Zonal	145	185
Electric forced air furnace	58	112

Table 13. DHP Owner Survey and Target Market Survey Gender by State

	DHP Owner (n=203)		Target Market (n=297)	
	Male	**Female**	**Male**	**Female**
ID	59%	41%	29%	71%
MT	56%	44%	30%	70%
OR	58%	42%	22%	78%
WA	52%	48%	21%	79%
Total	54%	46%	23%	77%

Table 14. DHP Owner Survey and Target Market Survey Income by State

	DHP Owner (n=203)				Target Market (n=294)			
	ID	**MT**	**OR**	**WA**	**ID**	**MT**	**OR**	**WA**
< $40,000	52%	48%	32%	19%	47%	30%	25%	21%
$40,000 - $49,999	-	-	14%	11%	8%	10%	17%	14%
$50,000 - $59,999	18%	37%	15%	14%	11%	10%	13%	11%
$60,000 - $79,999	-	-	10%	19%	13%	-	22%	21%
$80,000 - $99,999	-	-	10%	8%	8%	20%	11%	10%
$100,000 - $119,999	11%	-	2%	9%	5%	10%	4%	6%
$120,000 or more	-	-	2%	11%	8%	20%	7%	12%
Refused/Don’t know	18%	15%	15%	9%	-	-	2%	5%

Table 15. Year of Purchase
Pre-2015 DHP Owners

	Pre-2015 DHP Owners (n=54)
2014	16
2013	15
2012	15
2005-2011	8

Table 16. Installer Survey Disposition

	Master	Other	Total
Number of Installers	124	894	1018
Less installers missing email address		-6	-6
Less installers that participated in focus groups or in-depth interviews	-11	-27	-38
Sampling frame	113	861	974
Ineligible		8	8
Total Number Completed	28	97	125
Response Rate	24.8%	11.3%	12.8%
Completion Rate	24.8%	11.4%	12.9%

Table 17. Installer Survey Sample Weights

	Sampling Frame				Survey Respondents				Sample Weights	
	Master	Other	Master %	Other %	Master	Other	Master %	Other %	Master	Other
Idaho	5	131	4%	15%	1	13	4%	13%	1.24	1.14
Montana	6	55	5%	6%	2	8	7%	8%	0.74	0.77
Oregon	48	309	42%	36%	9	39	32%	40%	1.32	0.89
Washington	54	366	48%	43%	16	37	57%	38%	0.84	1.11

Table 18. Final Installer Survey Demographics

	Master Installer (n=28)	Other Installers (n=97)
State		
Idaho	1	13
Montana	2	8
Oregon	9	39
Washington	16	37

Table 19. Final Installer Focus Group Demographics

	Other Installers (n=20)
Focus group location	
Kirkland, WA	9
Portland, OR	6
Spokane, WA	5

Table 20. Final Master Installer Interview Demographics

	Master Installer (n=11)
State	
Idaho	1
Montana	2
Oregon	3
Washington	5

Table 21. Partner Utility Interview Demographics

	Low Activity Level	Medium Activity Level	High Activity Level	Total
State				
Idaho	-	-	-	0
Montana	-	-	1	1
Oregon	-	1	1	2
Washington	1	2	4	7

Notes: Activity level defined by CLEAResult as follows: High = Utility regularly participates in webinars and working groups and communicates regularly with the implementer; Medium = Utility participates in some webinars and working groups, communicates with the implementer less frequently; Low = Utility does not participate in webinars or working groups and does not contact the implementer.

Table 22. Northwest Homes with Electric Heat

Cooling Zone, Urban/Rural	Number of Homes	Percent of Total
CZ1		
Rural	148,051	15%
Urban	483,942	50%
CZ2		
Rural	65,711	7%
Urban	121,483	13%
CZ3		
Rural	32,285	4%
Urban	107,992	11%
Total	**962,464**	**100%**

Source: Table 1 of Market Progress Evaluation Report #3 (Evergreen Economics 2014)

Table 23. Distribution of Electrically-Heated Homes

State	Number of Electric Homes	Percent of Electric Homes
Idaho	89,519	9%
Montana	30,729	3%
Oregon	282,848	30%
Washington	559,368	58%

Source: Table 2 of Market Progress Evaluation Report #3 (Evergreen Economics 2014)

Table 24. DHP Program Participation by Climate Zone

	2015	
Climate Zone	**Number of Installed DHP's**	**Percent of Installed DHPs**
Zone 4	2,087	61%
Zone 5	598	17%
Zone 6	740	22%
Total	3,425	100%

Notes: Source: Initiative database provided by CLEAResult March 2016.

Appendix D – Supplemental DHP Owner Survey Figures and Tables

Table 25. How DHP Owners First Learned of DHPs

	FAF	Zonal	Overall
Saw one installed or used	10%	6%	7%
From a friend, family member or colleague	23%	26%	25%
Utility	24%*	10%	14%
Newspaper	0%	3%	2%
TV/Radio	4%	8%	7%
Contractor/Installer materials or advice	5%	5%	5%
Internet	9%	7%	7%
Retail Store display or promotion	4%	7%	6%
Direct Mail	7%	4%	5%
Home Expo/Show	4%	5%	4%
At work	4%	3%	3%
During an energy audit	0%	2%	1%
Magazine ad or article	0%	2%	1%
Salesperson at a retail store	0%	1%	0%
Other	16%	17%	17%

AWAR1. How did you first hear about ductless heat pumps?
Base: All respondents, FAF n=58, zonal n=145.
*Difference is statistically significant, p<.10.
"Other" responses include don't recall or have known about them for years, Weatherization programs, the phone book, Habitat for Humanity and Energy Trust of Oregon.

Table 26. Other Ways DHP Owners Learned of DHPs

	FAF	Zonal	Overall
Saw one installed or used	7%	6%	7%
From a friend, family member or colleague	16%	24%	21%
Utility	11%	9%	10%
Newspaper	4%	5%	4%
TV/Radio	7%	9%	8%
Contractor/Installer materials or advice	7%	3%	4%
Internet	4%	14%	11%
Retail Store display or promotion	11%	12%	11%
Direct Mail	0%	2%	2%
Home Expo/Show	7%	4%	5%
At work	4%	0%	1%
During an energy audit	0%	1%	0%
Magazine ad or article	2%	4%	4%
Salesperson at a retail store	2%	1%	1%
Other	4%	1%	2%
Nowhere else	46%	36%	39%

AWAR2. Did you hear about it anywhere else? (Multiple responses accepted)
Base: All respondents, FAF n=58, zonal n=145.

Table 27. Influential Information Sources

	FAF	Zonal	Overall
Saw one installed or used	8%	4%	5%
From a friend, family member or colleague	27%	29%	30%
Utility	26%	16%	18%
Newspaper	2%	4%	3%
TV/Radio	5%	4%	5%
Contractor/Installer materials or advice	18%	10%	13%
Internet	4%	17%*	13%
Retail Store display or promotion	7%	3%	4%
Direct Mail	2%	3%	2%
Home Expo/Show	2%	8%	6%
At work	2%	1%	1%
During an energy audit	0%	1%	1%
Magazine ad or article	0%	2%	1%
Salesperson at a retail store	4%	5%	5%
Other	9%	6%	7%

AWAR3. Which information sources, including the one(s) you just mentioned, were especially important in your decision to install the ductless heat pump? (Record first two)
Base: All respondents, FAF n=58, zonal n=145.
*Difference is statistically significant, p<.10.

Table 28. Other Reasons for Initial Interest in DHP

	FAF	Zonal	Overall
Ease of installation	0.0%	5.1%	3.6%
WOM/Saw one	4.2%	3.4%	3.6%
Provided by utility	1.8%	2.9%	2.6%
Ease of use/convenience	0.0%	3.2%	2.3%
Don't take up much room	0.0%	2.3%	1.6%
Available at Costco	0.0%	1.7%	1.2%
Heating and cooling in one unit	0.0%	1.7%	1.2%
Quiet operation	0.0%	1.7%	1.2%
Install Cost	1.8%	0.8%	1.1%
Wanted to upgrade current system	3.6%	0.0%	1.0%
Contractor	0.0%	1.4%	1.0%
Safety	0.0%	0.8%	0.6%
Warranty	0.0%	0.8%	0.6%
Install cost	1.9%	0.0%	0.5%
Save money on heating	1.8%	0.0%	0.5%
Cleaner heat/air quality	0.0%	0.3%	0.2%
Making other improvements	0.6%	0.0%	0.2%
Their performance in heating and cooling	0.0%	0.1%	0.1%

Notes: M4. What initially interested you in the ductless heat pump? Multiple responses allowed.
Base: All respondents. Zonal n = 145, FAF n = 58.

Table 29. Installation Locations

	FAF	Zonal	Overall
Kitchen	11%	6%	7%
Dining	8%	13%	12%
Living	83%*	95%	92%
Bathroom	0%	2%	2%
Bedroom	18%*	34%	29%
Office	0%	5%	4%
Entertainment	4%	1%	2%
Basement	2%	1%	2%
Hallway	4%	1%	2%
Other	4%	10%	8%

E1. In which room or rooms in your house are the ductless heat pump units installed?
Base: All respondents, FAF n=58, zonal n=145.
*Difference is statistically significant, p<.10.

Table 30. How Often Filter has been Cleaned

	FAF	Zonal	Overall
Never cleaned or changed	32%	26%	28%
Once	12%	23%	20%
Twice	6%	8%	8%
3 times	10%	12%	12%
4 times	15%	3%	6%
5 times	2%	1%	1%
6 times	6%	4%	5%
More than 6 times	14%	16%	15%
Other	4%	5%	5%
Don't know	2%	1%	1%

E6. How many times, if ever, have you or someone else cleaned or changed the filter in your ductless heat pump?
Base: All respondents, FAF n=58, zonal n=145.

Table 31. Reasons Filter has not been Cleaned

	FAF	Zonal	Overall
It's too new, haven't had to yet	70%	62%	64%
Not sure how	0%	5%	4%
Too difficult	6%	0%	2%
Just haven't gotten around to it	6%	22%	17%
Forgot to	11%	0%	4%
Other	8%	8%	8%
Don't know	0%	3%	2%

E7. Why haven't you cleaned the filter?
Base: Respondents who haven't cleaned the filter. FAF n=18, zonal n=38.

Table 32. Percentage that Received Operations Guide

	FAF	Zonal	Overall
Yes	99%	98%	98%
No	0%	1%	1%
Don't know	1%	1%	1%

E8. Did you receive a homeowner operations guide with your ductless heat pump?
Base: All respondents, FAF n=58, zonal n=145.

Table 33. Percentage that have Referred to Operations Guide

	FAF	Zonal	Overall
Yes	81%	82%	81%
No	19%	17%	18%
Don't know	0%	1%	1%

E9. Have you referred to that guide since the initial installation?
Base: Respondents who received guide. FAF n=58, zonal n = 142

Table 34. Temperature Adjustment

	FAF	Zonal	Overall
Manual	62%	78%*	73%
Automatic/programmed	24%	16%	19%
Mixed	11%*	2%	5%
Don't know	4%	4%	4%

E10. Have you programmed your ductless heat pump to automatically adjust the temperature throughout the day, or do you usually adjust the temperature setting manually?
Base: All respondents, FAF n=58, zonal n=145.
*Difference is statistically significant, p<.10.

Table 35. Is DHP set as Primary Heating or Cooling Source

	FAF	Zonal	Overall
Yes	38%	83%*	67%
No	62%	14%	31%
Don't know	0%	3%	2%

E11. To maximize energy savings, some people program their ductless heat pump to be the primary source of heating or cooling so there is no overlap at all with any other heating or cooling equipment in the house. Have you done this in your house?
Base: Respondents who have programmed their DHP. FAF n= 14, zonal n=24.
*Difference is statistically significant, p<.10.

Table 36. Frequency of Electricity Bill Review

	FAF	Zonal	Overall
Each month	80%	86%	85%
Every couple of months	13%	6%	8%
Quarterly	2%	2%	2%
Twice each year	0%	1%	1%
Once a year	2%	2%	2%
Never	4%	1%	1%
Other	0%	1%	1%
Don't know	0%	1%	1%

EH1. How often do you review your electric bill?
Base: All respondents, FAF n=58, zonal n=145.

Table 37. Importance of Energy Efficient Home

	FAF	Zonal	Overall
Very important	88%*	70%	75%
Somewhat important	12%	28%*	24%
A little important	0%	1%	1%
Don't know	0%	1%	0%

EH2. How important is it for you to have an energy-efficient home? Would you say it is:
Base: All respondents, FAF n=58, zonal n=145.
*Difference is statistically significant, p<.10.

Table 38. When DHP Owners Adopt New Technology

	FAF	Zonal	Overall
I am the first among my friends to purchase new technology	7%	15%	13%
I purchase new technology sooner than most of my friends	18%	13%	15%
I am typically in the middle of the group	50%	41%	43%
I purchase new technology after most of my friends	0%	13%*	9%
I am one of the last people to purchase new technology	18%	16%	17%
Don't know	7%	1%	3%
Refused	0%	1%	0%

EH3. Now I'd like you to think about how quickly you, generally, adopt new technology. Which of the following do you think best describes you?
Base: All respondents, FAF n=58, zonal n=145.
*Difference is statistically significant, p<.10.

Table 39. Previous Primary Heating System

	FAF	Zonal	Overall
Forced air furnace	100%	0%	30%
Baseboards	0%	28%	20%
Wall heaters	0%	31%	22%
Electric radiant heat	0%	5%	4%
Wood-heat	0%	10%	7%
Space heaters	0%	4%	3%
Heat pump, not ductless	0%	2%	1%
Ceiling Heat	0%	15%	11%
Pellet stove	0%	4%	3%
None	0%	1%	1%
Other	0%	1%	1%

EQUIP1. What type of equipment did you use for your home's primary heating system before installing the ductless heat pump?
Base: All respondents, FAF n=58, zonal n=145.

Table 40. Secondary Heating System

	FAF	Zonal	Overall
Yes	44%	52%	50%
No	56%	48%	50%

EQUIP2. Did your home have a secondary, or back up, heating system before you installed the ductless heat pump?
Base: All respondents, FAF n=58, zonal n=145.

Table 41. Type of Secondary Heating System

	FAF	Zonal	Overall
Forced air furnace	8%	2%	4%
Baseboards	0%	11%	8%
Wall heaters	8%	13%	12%
Electric radiant heat	4%	3%	3%
Wood-heat	62%	43%	48%
Space heaters	12%	13%	14%
Ceiling Heat	0%	2%	1%
Pellet stove	0%	6%	5%
Other	5%	6%	6%

EQUIP3. What type of equipment did you use for your home's secondary heating system before you installed the ductless heat pump?
Base: Respondents that previously had back up heating system, FAF n=26, zonal n=75

Table 42. Cooling System

	FAF	Zonal	Overall
Yes	33%	25%	27%
No	67%	75%	73%
Don't know	0%	1%	0%

EQUIP4. Did your home have a cooling system prior to installing the ductless heat pump?
Base: All respondents, FAF n=58, zonal n=145.

Table 43. Type of Cooling System

	FAF	Zonal	Overall
Central/whole house AC	22%	7%	12%
Window air conditioner	50%	61%	57%
Portable air conditioner	11%	14%	13%
Evaporative/swamp cooler	5%	2%	3%
Other	11%	16%	15%

EQUIP5. What type of equipment did you use for your home's primary cooling system?
Base: Respondents with a cooling system, FAF n=19, zonal n = 37

Table 44. Is Previous Cooling System still in Use

	FAF	Zonal	Overall
Yes	17%	15%	15%
No	83%	83%	83%
Don't know	0%	2%	1%

EQUIP6. Do you still use this cooling equipment?
Base: Respondents with a cooling system, FAF n=19, zonal n = 37

Table 45. Year Home Built

	FAF	Zonal	Overall
2010 or later	5%	2%	3%
2000 - 2009	8%	6%	7%
1990 - 1999	17%	9%	11%
1980 - 1989	13%	12%	12%
1970 - 1979	28%	23%	25%
1960 - 1969	4%	13%	10%
1950 - 1959	5%	10%	9%
1940 - 1949	7%	12%	11%
earlier than 1939	11%	11%	11%
Don't know	2%	0%	1%
Refused	0%	1%	0%
1990 or after	31%*	17%	21%
Before 1970	27%	46%*	41%

D1. What year was your home built?
Base: All respondents, FAF n=58, zonal n=145.
*Difference is statistically significant, p<.10.

Table 46. Income

	FAF	Zonal	Overall
< $40,000	40%*	18%	24%
Between $40,000 and $49,999	9%	12%	11%
Between $50,000 and $59,999	9%	17%	15%
Between $60,000 and $79,999	16%	15%	15%
Between $80,000 and $99,999	6%	10%	8%
Between $100,000 and $119,999	6%	7%	7%
$120,000 or more	4%	10%	8%
Don't know	2%	2%	2%
Refused	9%	10%	10%

D5. Please stop me when I get to the category that best describes your approximate annual household income in 2015, before taxes?
Base: All respondents, FAF n=58, zonal n=145.
*Difference is statistically significant, p<.10.

Table 47. Gender

	FAF	Zonal	Overall
Male	64%*	50%	54%
Female	36%	50%	46%

D2. [Interviewer: Record Gender.]
Base: All respondents, FAF n=58, zonal n=145.
*Difference is statistically significant, p<.10.

Table 48. Age

	FAF	Zonal	Overall
18 to 24	0%	1%	1%
25 to 44	14%	25%	22%
45 to 64	45%	33%	36%
65 and over	41%	40%	40%
Refused	0%	1%	1%

D3. Which of the following best describes your age range?
Base: All respondents, FAF n=58, zonal n=145.

Table 49. Education

	FAF	Zonal	Overall
Less than 9th grade	0%	1%	1%
Some high school	0%	3%	2%
High school diploma or GED	41%	31%	34%
Associates degree	25%	18%	20%
Bachelor's degree	21%	32%	29%
Graduate or professional degree	13%	14%	14%
Refused	0%	1%	1%

D4. What is your educational level?
Base: All respondents, FAF n=58, zonal n=145.

Appendix E – Supplemental Target Market Survey Figures and Tables

Table 50. Influence on Decision to Purchase Heating System

		Not Influential	Somewhat Influential	Very Influential
Other customers' ratings and reviews	Zonal	3%	37%	60%
	FAF	4%	26%	71%*
Availability of rebates	Zonal	4%	41%	56%
	FAF	8%	44%	48%
Endorsement of utility company	Zonal	4%	39%	59%
	FAF	4%	35%	62%
Brand name or manufacturer	Zonal	10%	47%	42%
	FAF	11%	47%	43%
Friends and family members' opinions	Zonal	7%	42%	51%
	FAF	9%	46%	44%
Seeing the system installed elsewhere	Zonal	4%	39%	60%
	FAF	6%	29%	66%
Advice of installer	Zonal	4%	40%	58%
	FAF	3%	33%	64%
Advice of salesperson	Zonal	20%	56%	24%
	FAF	11%	65%	23%
Retail store display	Zonal	12%	60%	26%
	FAF	15%	55%	29%
Information available on Internet	Zonal	2%	39%	59%
	FAF	5%	27%	68%

EQUIP5. On a scale of 1 to 10, where 1 is not influential at all and 10 is very influential, how influential are each of the following in your decision when considering a new primary heating system?
Base: All respondents, Zonal n = 185, Forced Air Furnace n = 112.
*Difference is statistically significant, p<.10.
“Very influential” and “Not influential” categories are based on top three and bottom three scale options. “Somewhat influential” is based on the middle four scale options. Some categories do not sum to 100% due to rounding.

Table 51. Level of Concern Related to DHP

		Not Concerning	Somewhat Concerning	Very Concerning
More expensive than standard primary heating systems	Zonal	4%	26%	70%
	FAF	3%	29%	68%
Challenge to install oneself	Zonal	16%	39%	45%
	FAF	13%	38%	48%
Not offered by every installer	Zonal	21%	55%	24%
	FAF	21%	50%	29%
Are an unfamiliar technology	Zonal	14%	49%	37%
	FAF	11%	53%	37%
May be less visually appealing than a central system	Zonal	16%	46%	38%
	FAF	14%	44%	42%
May waste energy when improperly installed	Zonal	4%	39%	57%
	FAF	3%	35%	63%
Quiet when operating, but do generate some noise at indoor and outdoor units	Zonal	14%	49%	37%
	FAF	15%	54%	31%
Require basic maintenance	Zonal	26%	45%	29%
	FAF	22%	46%	32%
Require secondary heating source	Zonal	15%	45%	41%
	FAF	15%	37%	47%

BENE2. While there are many benefits to installing a ductless heat pump, there are also aspects that might concern some homeowners. On a scale of 1 to 10, where 1 is not a concern and 10 is a major concern, please indicate how much of a concern each of these factors would be to you if you were considering a ductless heat pump.
Base: All respondents, Zonal n = 185, Forced Air Furnace n = 112.
"Very concerning" and "Not concerning" categories are based on top three and bottom three scale options. "Somewhat concerning" is based on the middle four scale options. Some categories do not sum to 100% due to rounding.

Table 52. Motivation in Making Purchase Decision

		Not Motivating	Somewhat Motivating	Very Motivating
Cutting-edge technology	Zonal	13%	41%	46%
	FAF	12%	41%	47%
High-quality investment for your home	Zonal	3%	32%	65%
	FAF	4%	26%	70%
Easy to operate	Zonal	1%	30%	69%
	FAF	3%	22%	75%
Heat or cool areas of the home independently	Zonal	3%	28%	69%
	FAF	5%	21%	74%
Save energy	Zonal	1%	21%	78%
	FAF	2%	16%	82%
Save money on utility bills	Zonal	0%	17%	83%
	FAF	1%	13%	86%
Reduce waste	Zonal	2%	30%	68%
	FAF	2%	25%	73%
Can be self-installed	Zonal	12%	41%	48%
	FAF	8%	40%	52%
Provide more comfort	Zonal	1%	28%	71%
	FAF	2%	28%	71%
Quiet	Zonal	1%	32%	68%
	FAF	1%	29%	70%
Safe	Zonal	0%	23%	77%
	FAF	3%	18%	79%

M1. Below are statements that may be motivating to customers. Please score how motivating each statement is to you, where 1 would not motivate you to purchase a ductless heat pump at all, and 10 would be highly motivating to you in making your purchase decision.
Base: All respondents, Zonal n = 185, FAF n = 112.

Table 53. Ways Respondents Learned of DHPS

	Zonal	FAF
Saw one	20%	15%
Word of Mouth	35%	36%
Utility	11%	6%
Newspaper	7%	6%
TV/Radio	20%	24%
Installer	10%	15%
Internet	27%*	12%
Retail store	17%	21%
Direct mail	3%	15%*
Home Expo/Show	12%	9%
At work	4%	0%
During an energy audit	1%	0%
Magazine ad or article	8%	9%
Salesperson	4%	9%
Don't recall	4%	0%

AWAR3. How did you learn about ductless heat pumps? (Please check all that apply)
Base: Respondents who have heard of DHPs, Zonal n = 92, FAF n = 33.
*Difference is statistically significant, p<.10.

Table 54. Knowledge of Where to Purchase DHP

	Zonal	FAF	Overall
1	16%	23%	18%
2	7%	9%	8%
3	9%	9%	9%
4	11%	9%	10%
5	13%	12%	13%
6	7%	8%	7%
7	11%	16%	13%
8	12%	4%	9%
9	4%	4%	4%
10	9%	4%	8%
8 to 10	*26%**	*12%*	*21%*

AWAR6. On a scale from 1 (completely disagree) to 10 (completely agree), please indicate your assessment of the following statement: “I know exactly where to go to find a ductless heat pump in my area.”
Base: Respondents who have seen or heard of a DHP, Zonal n = 137, FAF n = 74.

Table 55. Target Market Information Sources

	Zonal	FAF	Overall
Friends or neighbors	34%	29%	32%
Professional contractor	52%	56%	54%
Retail store salesperson	44%	46%	44%
Utility	42%	37%	40%
Manufacturer	26%	35%*	30%
Internet	69%	69%	69%
Other	1%	2%	1%

EQUIP2. When considering a primary heating system purchase, where would you go for more information about your product options? (Please check all that apply)
Base: All respondents, Zonal n = 185, FAF n = 112.

Table 56. Preferred Methods for Shopping and Information Gathering for DHPs

	Preferred way to shop for DHPs	**Best way to gather information**
Retail store	38%	24%
Installers	32%	25%
Internet	18%	43%
Not sure	11%	6%
Other	1%	2%

Notes: EQUIP3. How would you prefer to shop for a ductless heat pump?
EQUIP3a. Which option do you believe would provide the best way to gather the information needed to make your purchase decision?
Base: All respondents, Zonal n = 185, Forced Air Furnace n = 112

Table 57. Importance of Appearance among Target Market

	Zonal	**FAF**	**Overall**
1	6%	4%	6%
2	5%	0%	3%
3	5%	4%	4%
Bottom 3	*16%**	*8%*	*8%*
4	8%	10%	9%
5	16%	13%	15%
6	8%	14%	10%
7	21%	14%	19%

Middle 4	*52%*	*52%*	*52%*
8	16%	15%	16%
9	4%	15%	8%
10	11%	10%	10%
Top 3	*31%*	*40%*	*35%*

A1. How important to you is the appearance of your heating equipment?
Base: All respondents, Zonal n = 185, FAF n = 112.
*Difference is statistically significant, p<.10.

Table 58. Concerns with Placing DHP in Living Room

	Zonal	FAF	Overall
No concerns	13%	10%	12%
Appearance	32%	42%*	36%
Size/placement	21%	26%	23%
Noise	20%	14%	18%
Uncertain about efficiency claims	11%	16%	13%
Cost	13%	12%	12%
Safety	8%	10%	9%
Concerns about installation	4%	6%	5%
Don't believe it will save energy	6%	4%	5%
Maintenance	1%	3%	2%
Other	10%	4%	8%
Don't know	3%	2%	3%

A2. What concerns would you have if you placed a ductless heat pump in your living room?
Base: All respondents, Zonal n = 185, FAF n = 112.
*Difference is statistically significant, p<.10.

Appendix F – Supplemental Installer Survey Tables

Table 59. Ductless Heat Pump Brands

	Other Installers		Master Installers		All Installers	
	Currently Offer	**Plan to Offer**	**Currently Offer**	**Plan to Offer**	**Currently Offer**	**Plan to Offer**
Bryant	7.3%	0.9%	0.0%	0.0%	5.6%	0.7%
Comfort Aire	2.1%		0.0%		1.6%	
Daikin	59.0%	5.3%	65.5%	0.0%	60.5%	4.1%
Friedrich	3.0%		0.0%		2.3%	
Fujitsu	37.9%	1.2%	25.7%	0.0%	35.1%	0.9%
Lennox	7.2%	0.9%	16.8%	0.0%	9.3%	0.7%
LG	7.0%	0.9%	0.0%	0.0%	5.4%	0.7%
Medea	0.9%		0.0%		0.7%	
Mitsubishi	74.7%	3.2%	82.9%	0.0%	76.5%	2.5%
Napolean	5.5%		0.0%		4.3%	
Panasonic	9.4%	0.9%	0.0%	0.0%	7.3%	0.7%
Quietside	0.0%		0.0%		0.0%	
Samsung	3.0%		0.0%		2.3%	
Sanyo	3.0%		0.0%		2.3%	
Toshiba-Carrier	14.8%	3.3%	17.1%	4.7%	15.3%	3.6%
York	1.8%		0.0%		1.4%	

Q3. Which DHP brands does your firm currently offer to customers? (Select all that apply)
Q4a. Which brands are you planning to add? (Select all that apply)
Base: All respondents, Master Installers, n= 28, other installers, n = 97.

Table 60. Northwest Ductless Heat Pump Initiative Orientation Session Attendance

	Other Installers	Master Installers	All Installers
Yes	83.9%	92.6%	85.8%
No	12.3%	4.4%	10.6%
Don't know	3.8%	3.0%	3.6%

Q6. Has anyone at your company attended the NW Ductless Heat Pump Initiative Installer Orientation session in person or via webinar?
Base: All respondents, Master Installers, n= 28, other installers, n = 97.

Table 61. States Where Firms Install DHP

	Other Installers	Master Installers	All Installers
Idaho	18.8%	7.4%	16.2%
Montana	6.4%	5.3%	6.1%
Oregon	45.1%	60.3%	48.5%
Washington	47.1%	62.1%	50.4%

Q9. In which of the following states does your firm install ductless heat pumps? (Select all that apply)
Base: All respondents, Master Installers, n= 28, other installers, n = 97.

Table 62. Types of Buildings Where Firms Install DHP

	Other Installers	Master Installers	All Installers
Single family	100.0%	100.0%	100.0%
Multifamily	58.8%*	84.9%	64.7%
Manufactured	64.1%*	89.6%	69.8%
Commercial	80.1%	83.6%	80.9%
Industrial	0.0%	12.4%	2.8%
Grow rooms	4.1%	0.0%	3.2%
Other (server rooms, churches, schools, boats)	6.2%	7.7%	6.6%

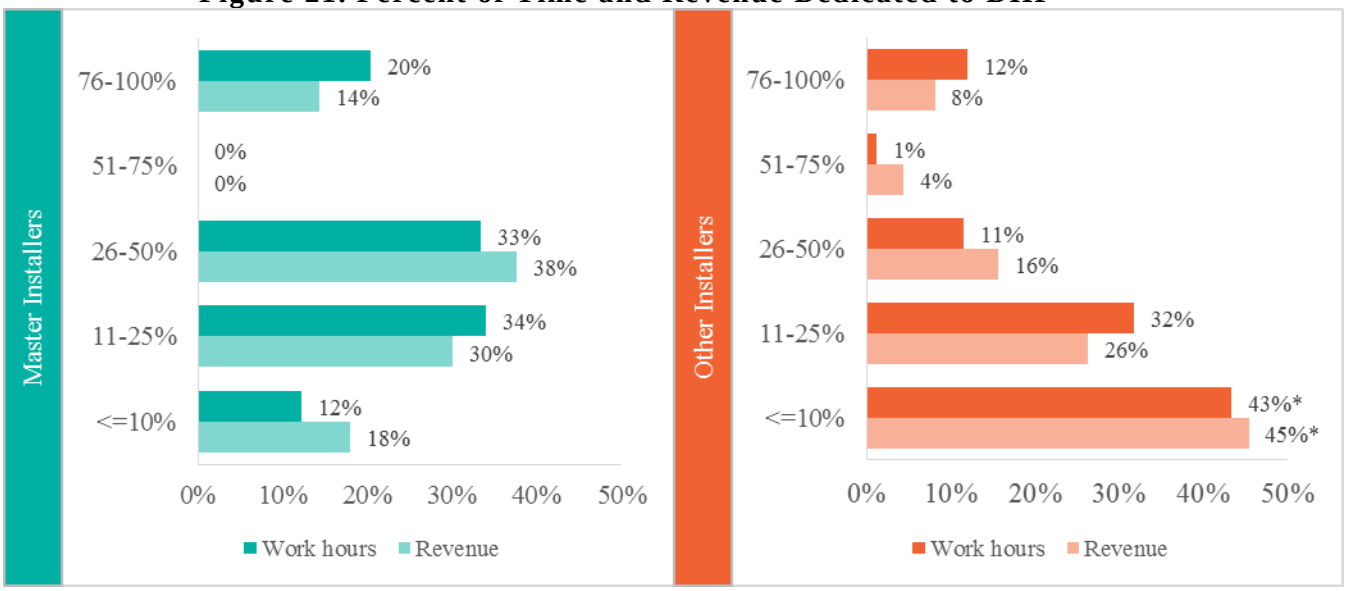
Q10. In what type of buildings do you install DHPs? (Select all that apply)
Base: All respondents, Master Installers, n= 28, other installers, n = 97.
*Difference between Master Installers and Other Installers is statistically significant, p<.05.

Table 63. Types of Multifamily Buildings Where Firms Install DHP

	Other Installers	Master Installers	All Installers
Do not install in multifamily	41.2%*	15.1%	35.3%
Small: 2-4 units	48.6%^	66.5%	52.6%
Mid-size: 5-30 units	6.5%	13.7%	8.1%
Large: more than 30 units	3.0%	4.7%	3.4%
Don't know	0.8%	0.0%	0.6%

Q10a. Thinking about your multifamily projects, would you say that the majority of your multifamily projects are
Base: All respondents, Master Installers, n= 28, other installers, n = 97.
*Difference between Master Installers and Other Installers is statistically significant, p<.05.
^Difference between Master Installers and Other Installers is statistically significant, p<.05.

Figure 21. Percent of Time and Revenue Dedicated to DHP



Q12. Thinking about your business for the past year from a revenue standpoint, of the products you currently carry and install, approximately what percentage of your business is dedicated to DHPs? Your best estimate is fine.
Base: Master Installers, n= 27, other installers, n = 90.
Q13. Thinking about your business for the past year (2015) from a working hours standpoint, approximately what percentage of your installation hours were spent selling or installing DHPs vs. other types of HVAC equipment?
Base: Master Installers, n= 23, other installers, n = 71.
*Difference between Master Installers and Other Installers is statistically significant, p<.05.

Table 64. Number of 2015 Residential DHP Installations

	Other Installers	Master Installers	All Installers
None	3.1%	0.0%	2.4%
1 to 4	8.1%	0.0%	6.3%
5 to 10	15.0%	3.0%	12.3%
11 to 25	36.5%	3.0%	29.0%
25 or fewer	*62.8%**	*6.0%*	*50.0%*
26 to 50	19.4%	37.5%	23.5%
51 to 75	6.0%	15.0%	8.0%
76 to 100	0.9%	20.1%	5.2%
101 to 150	4.1%	9.0%	5.2%
151 to 200	2.1%	3.0%	2.3%
Over 200	2.1%	9.4%	3.7%
Don't know	2.6%	0.0%	2.0%

Q15. Approximately how many residential DHP installations did your company complete in 2015? Again, we define residential as either single family, multifamily, or manufactured homes.
Base: All respondents, Master Installers, n= 28, other installers, n = 97.
*Difference between Master Installers and Other Installers is statistically significant, p<.05.

Table 65. Percentage of Installations in Homes with Existing Electric Forced Air Furnaces

	Other Installers	Master Installers	All Installers
None/No residential installations	11.1%	0.0%	8.6%
1% to 24%	52.1%*	79.0%	58.1%
25% to 49%	18.5%	7.7%	16.1%
50% to 74%	7.2%	10.3%	7.9%
75% to 99%	4.2%	0.0%	3.2%
100%	1.2%	0.0%	0.9%
Don't know	5.7%	3.0%	5.1%

Q17. Approximately what percentage of your DHP installations are in homes with existing electric forced air furnaces?
Base: All respondents, Master Installers, n= 28, other installers, n = 97.
*Difference between Master Installers and Other Installers is statistically significant, p<.05.

Table 66. Percentage of Installations that are One-to-One or "Single-Head" Systems

	Other Installers	Master Installers	All Installers
None/No res installations	3.1%	0.0%	2.4%
1% to 24%	13.7%	4.7%	11.6%
25% to 49%	19.5%	38.5%	23.7%
50% to 74%	30.7%	33.0%	31.2%
75% to 99%	29.3%	20.8%	27.4%
100%	1.1%	0.0%	0.9%
Don't know	2.6%	3.0%	2.7%

Q18. Approximately what percentage of your residential DHP installations are one-to-one, or "single-head" systems?
Base: All respondents, Master Installers, n= 28, other installers, n = 97.

Table 67. Number of Residential Cooling-Only DHPs Sold in 2015

	Other Installers	Master Installers	All Installers
None	61%	58%	60%
1 to 4	25%	19%	24%
5 to 10	7%	5%	7%
11 to 25	5%	0%	4%
26 to 50	0%	0%	0%
51 to 75	1%	8%	2%
76 to 100	0%	0%	0%
101 to 150	0%	3%	1%
151 to 200	0%	3%	1%
Over 200	0%	5%	1%
Don't know	1%	0%	1%

Q22. Approximately how many residential cooling-only DHPs did you sell in 2015?
Base: All respondents, Master Installers, n= 28, other installers, n = 97.

Table 68. Number of Commercial DHP Installations in 2015

	Other Installers	Master Installers	All Installers
None	26%	19%	24%
1 to 4	34%	23%	31%
5 to 10	20%	20%	20%
11 to 25	12%	30%	16%
26 to 50	3%	8%	4%
51 to 75	0%	0%	0%
76 to 100	0%	0%	0%
101 to 150	0%	0%	0%
151 to 200	0%	0%	0%
Over 200	1%	0%	1%
Don't know	3%	0%	2%

Q26. Approximately how many commercial DHP installations did your company complete in 2015? Again, commercial installations would include installations in non-residential buildings such as hotels, restaurants or retail stores.
Base: All respondents, Master Installers, n= 28, other installers, n = 97.

Table 69. Expected Change in Commercial DHP Sales Over Next Two Years

	Other Installers	Master Installers	All Installers
Increase significantly	7.9%	9.4%	7.9%
Increase somewhat	42.3%	39.4%	42.3%
Remain the same	20.7%	27.0%	20.7%
Decrease somewhat	1.1%	0.0%	1.1%
Don't know	7.0%	7.7%	7.0%
Did not install in commercial buildings in 2015	19.9%	16.4%	19.9%

Q27. Compared to your total 2015 sales of commercial DHPs, do you think your sales in the next 2 years will:
Base: All respondents, Master Installers, n= 28, other installers, n = 97.

Sample installer[28] comments that illustrating satisfaction with the Initiative:

"We were on the verge of losing everything we own. DHPs and NEEA completely transformed our business, our life, and our community."-Master Installer in-depth interview participant

"I love the technology and enjoy the installation of the DHP equipment. As a salesperson and installer I like how satisfied the customers are with the performance

[28] All quotes are from surveyed installers except where noted.

of the product. I feel like as a company we should probably take better advantage of some of the resources available through the DHP project."
"Thank you for bringing knowledge to the consumers about DHP!"

"I appreciate the work and the help. My company is so small, often reaching out for help is very difficult because we lack the time. I appreciate that you have called [for the survey] and would appreciate this continued proactive partnership. Thanks!"

Additional installer comments regarding areas in which the Initiative could improve:

"It has been a challenge for us, being a small shop, to stay informed on all of the rebates available, and the qualifications for receiving incentives, etc. It would be nice to get everything in one place, so that the process is not so burdensome. With one ductless install, we have tax credit forms, Energy Trust, and NW Ductless.[12]"
"I would like to see the utility rebate program streamlined form start to finish."

"Local utility told me to contact NDHPP.[29] I did. They responded two days later and said to contact local utility. Need to be on the same page."

[29] Northwest Ductless Heat Pump Project

Appendix G – Survey Instruments

Ductless Heat Pump Owner Survey

Screening and Verification Questions

SCREEN1: Our records indicate that you installed a ductless heat pump in your home in [INSERT INSTALL YEAR]. Is this correct?

IF NOT SURE: A ductless heat pump is a type of home heating and cooling system. It is sometimes called a "mini-split" system. It's unique in a couple of ways. First, it does not require the use of air ducts, like more common heating and cooling systems. Ductless heat pumps have an outdoor compressor unit and one or more indoor air-handling units, called "heads", linked by a refrigerant line. Indoor heads are typically mounted high on an indoor wall or ceiling. If multiple indoor heads are installed, each head serves a different heating and cooling zone that can be controlled independently. Ductless heat pumps are often used to displace electric resistance heating like electric forced air furnaces, baseboards, wall or ceiling units, as well as woodstoves and other space heaters.

1)	Yes – unaided	[CONTINUE]
2)	Yes – aided	[CONTINUE]
3)	No	[TERMINATE]
88)	Refused	[TERMINATE]
99)	Don't know	[TERMINATE]

SCREEN 2: Do you still live in the home in which you installed the ductless heat pump?

1) Yes **[CONTINUE TO SCREEN 4]**
2) No **[CONTINUE TO SCREEN 3 AND THEN TERMINATE]**
3) Don't Know **[TERMINATE]**

SCREEN 3: [ASK IF SCREEN 2 = 2] Did you find that having the ductless heat pump was an important feature in the sale of your home?

1) Yes **[TERMINATE]**
2) No **[TERMINATE]**
3) Don't Know **[TERMINATE]**

SCREEN 4: Do you own or rent your home?

1)	Own	[CONTINUE]
2)	Rent	[TERMINATE]
88)	Refused	[TERMINATE]
99)	Don't know	[TERMINATE]

SCREEN 5: Do you live in this home at least 10 months out of the year?

1) Yes [CONTINUE]
2) No [TERMINATE]
88) Refused [TERMINATE]
99) Don't Know [TERMINATE]

SCREEN 6. We understand that you had [# Indoor Units – from sample data] ductless heat pumps installed inside your house. Is this correct?

1. Yes [CONTINUE]
2. No [CONTINUE]
3. Don't know [CONTINUE]

SCREEN6A. [If SCREEN6 = NO] How many ductless heat pump units do you have installed inside your house? [CONTINUE]

[If INSTALL YEAR <2015 COMPLETE DHP EXPERIENCE BATTERY (E1-E12a) SATISFACTION BATTERY (SAT1 – SAT9) ONLY]

Terminate Script: *Based on your response we do not need you to complete this survey at this time. Thank you for your time and consideration. Good-bye.*

Awareness Battery

AWAR1. How did you first hear about ductless heat pumps? [DO NOT READ CHOICES; CHOOSE ONE, THE FIRST PLACE THEY HEARD OF IT.]

1. There is one in my home – someone else installed it **[TERMINATE]**
2. Saw one installed or used in another home or business
3. From a friend, family member or colleague/word of mouth
4. Utility
5. Newspaper
6. TV/Radio
7. Contractor/Installer materials or advice
8. Internet
9. Retail Store display or promotion (for example Home Depot or the Heat Pump Store)
10. Direct Mail
11. Home Expo/Show
12. At work
13. During an energy audit
14. Magazine ad or article
15. Salesperson at a retail store such as The Home Depot or the Appliance Store
77. Other (SPECIFY): _____

AWAR2. Did you hear about it anywhere else? (IF NEEDED: Or learn more about it from another source?) [DO NOT READ CHOICES, ACCEPT MULTIPLES.]

1. Saw one installed or used in another home or business
2. From a friend, family member or colleague/word of mouth
3. Utility
4. Newspaper or other printed materials such as flyers or brochure
5. TV/Radio
6. Contractor/Installer materials or advice
7. Internet
8. Retail Store display or promotion (for example Home Depot or the Heat Pump Store)
9. Direct Mail
10. Home Expo/Show
11. At work
12. During an energy audit
13. Magazine ad or article
14. Salesperson at a retail store such as The Home Depot or the Appliance Store
77. Other (SPECIFY): _____

AWAR3. Which information sources, including the one(s) you just mentioned, were especially important in your decision to install the ductless heat pump? [DO NOT READ, RECORD FIRST 2 MENTIONED]

1. Saw one installed or used in another home or business
2. From a friend, family member or colleague/word of mouth
3. Utility
4. Newspaper
5. TV/Radio
6. Contractor/Installer materials or advice
7. Internet
8. Retail Store display or promotion (for example Home Depot or the Heat Pump Store)
9. Direct Mail
10. Home Expo/Show
11. At work
12. During an energy audit
13. Magazine ad or article
14. Salesperson at a retail store such as The Home Depot or the Appliance Store
15. Other customers' ratings and reviews
16. [READ IN Q3 Open Response]
17. [READ IN Q4 Open Response]
18. Other (SPECIFY):

Heating and Cooling Equipment Battery

Now I have some questions about the heating and cooling equipment in your home. This first set of questions is about the equipment in your home **prior** to the installation of the ductless heat pump.

EQUIP1. What type of equipment did you use for your home's primary heating system before installing the ductless heat pump? [DO NOT READ LIST UNLESS NECESSARY, Accept 1 response]

1. Forced air furnace
2. Baseboards
3. Wall heaters
4. Electric radiant heat **[Autofill EQUIP1a = 1 and skip to EQUIP2]**
5. Wood-heat (examples include wood stove, fireplace, fireplace insert, pellet stove, wood boiler and hydronic heater) **[Autofill EQUIP1a = 6 and skip to EQUIP2]**
6. Ductless heat pump
7. Space heaters
8. Heat pump, not ductless
9. Ceiling Heat
10. Pellet stove (not wood)
11. None
77. Other

EQUIP1a. What type of fuel did your [INSERT EQUIP1 Response] use?

1. Electricity
2. Propane
3. Kerosene
4. Oil
5. Natural Gas
6. Wood
77. Other: (Please Specify)

EQUIP2. Did your home have a secondary, or back up, heating system before you installed the ductless heat pump? [Skip to EQUIP4 if = 2 or 3]

1) Yes
2) No

3) Don't Know

[IF EQUIP2=1]

EQUIP3. What type of equipment did you use for your home's secondary heating system before you installed the ductless heat pump?

1. Forced air furnace
2. Baseboards
3. Wall heaters
4. Electric radiant heat **[Autofill EQUIP3a = 1 and skip to EQUIP4]**
5. Wood-heat (examples include wood stove, fireplace, fireplace insert, pellet stove, wood boiler and hydronic heater) **[Autofill EQUIP3a = 6 and skip to EQUIP4]**
6. Ductless heat pump
7. Space heaters
8. Heat pump, not ductless
9. Ceiling Heat
10. Pellet stove (not wood)
11. None
77. Other

EQUIP3a. What type of fuel did your [INSERT EQUIP3 Response] use?

1. Electricity
2. Propane
3. Kerosene
4. Oil
5. Natural Gas
6. Wood
77. Other: (Please Specify)

EQUIP4. Did your home have a cooling system prior to installing the ductless heat pump? [Skip to EQUIP7 if = 2 or 3]

1. Yes
2. No
3. Don't Know

[IF EQUIP4 = 1]

EQUIP5. What type of equipment did you use for your home's primary cooling system?

1. Central/whole house AC
2. Window air conditioner
3. Portable air conditioner (not fan)
4. Evaporative/swamp cooler
5. Ductless Heat Pump
77. Other

EQUIP6. [IF EQUIP4 = 1] Do you still use this cooling equipment?

1. Yes
2. No
3. Don't Know

Now, I'm going to as you about the heating and cooling systems you use **after** installing the ductless heat pump.

EQUIP7. What type of equipment do you currently use for your home's primary heating system? [DO NOT READ LIST UNLESS NECESSARY, Accept 1 response]

1. Forced air furnace
2. Baseboards
3. Wall heaters
4. Electric radiant heat **[Autofill EQUIP7a = 1 and skip to EQUIP8]**
5. Wood-heat (examples include wood stove, fireplace, fireplace insert, pellet stove, wood boiler and hydronic heater) **[Autofill EQUIP7a = 6 and skip to EQUIP8]**
6. Ductless heat pump
7. Space heaters
8. Heat pump, not ductless
9. Ceiling Heat
10. Pellet stove (not wood)
11. None
77. Other

EQUIP7a. [ASK IF EQUIP7 <> 6 Ductless heat pump] What type of fuel does your [INSERT EQUIP7 Response] use?

1. Electricity
2. Propane

3. Kerosene
4. Oil
5. Natural Gas
6. Wood
77. Other: (Please Specify)

EQUIP8. Does your home currently have a secondary, or back up, heating system? [Skip to EQUIP10 if = 2 or 3]

1) Yes
2) No
3) Don't Know

[IF EQUIP8=1]

EQUIP9. What type of equipment do you use for your home's secondary heating system now?

1. Forced air furnace
2. Baseboards
3. Wall heaters
4. Electric radiant heat **[Autofill EQUIP9a = 1 and skip to EQUIP10]**
5. Wood-heat (examples include wood stove, fireplace, fireplace insert, pellet stove, wood boiler and hydronic heater) **[Autofill EQUIP9a = 6 and skip to EQUIP10]**
6. Ductless heat pump
7. Space heaters
8. Heat pump, not ductless
9. Ceiling Heat
10. Pellet stove (not wood)
11. None
77. Other

EQUIP9a. What type of fuel does your [INSERT EQUIP9 Response] use?

1. Electricity
2. Propane
3. Kerosene
4. Oil
5. Natural Gas

6. Wood
77. Other: (Please Specify)

EQUIP10. Does your home have a cooling system now? [Skip to EQUIP12 if = 2 or 3]

1. Yes
2. No
3. Don't Know

[IF EQUIP10 = 1]

EQUIP11. What type of equipment do you use for your home's primary cooling system?

1. Central/whole house AC
2. Window air conditioner
3. Portable air conditioner (not fan)
4. Evaporative/swamp cooler
5. Ductless Heat Pump
77. Other: (Please Specify)

EQUIP12. Since you purchased the ductless heat pump, have you purchased any additional heating or cooling equipment (If needed: space heaters, window ACs)? This would include additional indoor ductless heat pump room units added after your original installation.

1. Yes
2. No
3. Don't Know

EQUIP13. [If EQUIP12 = YES] What did you purchase? [DO NOT READ; CHECK ALL THAT APPLY]

1. Furnace
2. Baseboard heating
3. Wall heaters
4. Electric radiant heat
5. Space heater
6. Wood heat
7. Kerosene or oil heat
8. Central/full house AC
9. Window AC
10. Portable AC
11. Evaporative/Swamp cooler
12. **ductless heat pump** – heating and cooling

13. **ductless heat pump** – cooling only
77. Other (SPECIFY)
99. Don't know

Motivations Battery

Now, I would like to ask you some questions about your reasons for purchasing a ductless heat pump.

M1. Why did you decide to install a new heating system? [DO NOT READ, PROBE TO CODE, CHECK ALL THAT APPLY]

1. Existing primary heating system was broken
2. Existing heating was not working well/needed considerable repairs
3. Needed additional or supplemental heating/AC
4. Wanted to add cooling
5. Wanted to be more energy efficient
6. Wanted to save money
7. Not comfortable in home/wanted to improve home comfort
8. Contractor suggested I do it
9. Current heating source was unsafe
77. Other: (please specify)
99. Don't Know
88. Refused

M2. How long did you spend researching heating systems before deciding on the DHP? [Read Categories]

1. Less than 1 week
2. 1-4 weeks
3. 1 month
4. 2 months
5. 3 months or more
6. Other (please specify)
99. Don't know
88. Refused

M3. Whose idea was it to install a ductless heat pump – your or someone in your home, a contractor, or someone else?

1. Someone in home
2. Contractor/Installer
3. Someone else (please specify)

99. Don't know
88. Refused

M4. What initially interested you in the ductless heat pump? [DO NOT READ, PROBE TO CODE, CHECK ALL THAT APPLY]

1. Needed heating/AC and had no ducts
2. Needed additional or supplemental heating/AC
3. Existing heating was not working well enough/Existing heating was broken
4. Wanted to add cooling
5. Wanted to be more energy efficient
6. Wanted to save money
7. Not comfortable in home/wanted to improve home comfort
8. Available rebates
9. Wanted to heat or cool areas of the home independently

77. Other: (please specify)
99. Don't know
88. Refused

M5. Did a contractor ever discourage or recommend against your installing a ductless heat pump?

1. Yes
2. No

99. Don't know
88. Refused

M5a. What were the reasons given for recommending against the installation of a ductless heat pump? [Open Response]

M6. Was there any advertising or information about DHPs you heard or saw that motivated you to install one?

M7. Please rate how important each of the following factors was in your decision to purchase a ductless heat pump, were 1 is not at all important, and 10 is very important: [Rotate]

How important was the…	1	2	3	4	5	6	7	8	9	10
a. Potential for more comfort than your previous heating/cooling system offered by the ductless heat pump										
b. The cost, including any incentives or rebates for the technology.										

c. Operating costs of the ductless heat pump compared to your previous heating/cooling system										
d. Cooling capability of the ductless heat pump										
e. Ability to install heating or cooling equipment without needing to install ducts										
f. Ability to heat or cool different areas of the house independently										
g. Increased energy efficiency compared to other primary heating systems										
h. Potential to save on your energy bills										
i. Easier installation compared to standard primary heating systems										
j. The "smart" or advanced technology offered by DHPs										
k. The safety of ductless heat pumps compared to your previous heating/cooling system										

M8. [IF EQUIP1 (primary heat before DHP) < > 1 (forced air furnace)] Why did you ultimately decide to purchase the ductless heat pump? [IF EQUIP1 (primary heat before DHP) = 1 (forced air furnace)] Why did you ultimately decide to replace your forced air furnace with a ductless heat pump? [OPEN RESPONSE, RECORD VERBATIM]

M9. How did you gather information about the ductless heat pump before you made your purchase? [DO NOT READ; CHECK ALL THAT APPLY]

1. Internet/online
2. Contractor/Installer provided materials
3. Spoke to the Installer/Contractor
4. Spoke to someone who already had a **ductless heat pump** installed
5. Did not look for any information
6. Utility provided information
7. Other customer reviews
8. Home Show
9. Retail store salesperson
10. Talked to friends and/or neighbors
77. Other: (specify)

M10. Was there anything you were concerned about when you were considering a ductless heat pump? [DO NOT READ; CHECK ALL THAT APPLY].

1. No concerns **[DO NOT ASK M11 FOR THIS ITEM]**
2. Appearance
3. Capability/functionality – general
4. Capability/functionality – cold weather
5. Cost/Expense **[DO NOT ASK M11 FOR THIS ITEM]**
6. Noise
7. Maintenance needs
8. DHPs can be challenging to install yourself
9. DHPs are not offered by every contractor
10. DHPs are an unfamiliar technology
11. When improperly installed, DHPs may waste energy
77. Other: (specify)
99. Don't know
88. Refused

M11. [ASK FOR EACH ITEM MENTIONED IN M10:] Now that you have it installed, is [M10 ANSWER] a problem?

1. Yes
2. No
3. Don't Know

M11a. [If Yes] What problem do you have? [Open Response]

M12a. Did you receive a rebate or incentive from your local utility? (NOTE: WE'RE ONLY INTERESTED IN REBATES/INCENTIVES *FROM THEIR LOCAL UTILITY,* <u>NOT</u> REBATES/INCENTIVES/TAX CREDITS FROM OTHER SOURCES.)

1. Yes **[M12]**
2. No **[M14]**
3. Don't Know **[M14]**

M12b. What was the amount of the rebate or incentive? Your best guess is fine. [READ RANGES IF NECESSARY]

1. Under $500
2. $500 to $749
3. $750 to $1000
4. More than $1000
99. (Don't know)
88. (Refused)

M13. [SKIP IF M12a=2, 3 or 88] How important was the rebate you received to your decision to purchase the ductless heat pump? Would you say it was:

5. Extremely important
4. Very important
3. Neither important or unimportant
2. Not very important
1. Not at all important
88. (Don't know)
99. (Don't Know)
88. (Refused)

M14. Did you use any of the following sources to pay for your DHP?
[READ 1-4, ALLOW MULTIPLES]

1. Loan through a local bank or credit union
2. Loan through utility company
3. Loan through installation contractor
4. Credit card
5. (No, did not use a loan or credit card)

77. Other: (specify)
99. (Don't Know)
88. (Refused)

M15. How many different installation contractors did you get cost estimates from?
[IF RESPONSE IS NONE ASK IF THAT IS BECAUSE THEY INSTALLED THEMSELVES OR IF THE INSTALLATION WAS ARRANGED AND PAID FOR BY ANOTHER PARTY]

1. 1
2. 2
3. 3
4. 4
5. More than 4
6. Installed it myself **[skip to M17]**
7. Installation arranged & paid for by another party/program **[skip to M17]**
8. **0**

99. Don't know
88. Refused

M16. What were the main reasons you chose the installation contractor you did?
[DO NOT READ, ACCEPT MULTIPLES]

1. Offered the lowest cost
2. Offered an acceptable cost
3. They were very experienced with DHPs

4. Have used contractor before/satisfied with past work
5. Liked their presentation/customer service
6. Are local/close by
7. Could install DHP quickly
8. Are on goingductless.com website
9. Are on utility list of preferred contractors
10. Trust the contractor
11. Good company reputation
12. They were the only company that carries DHPs
13. They received positive online reviews/recommendation from others
77. Other: (specify)
99. Don't know

M17. [Ask if M15 = 6 or 7] What were the main reasons you chose to do the install yourself or why the install was arranged & paid for by another party/program? [Open Response, Accept Multiple answers]

M18. [ASK IF M15 <> 6] If it was an option, would you have been comfortable purchasing a DHP online or at a retail store and doing some or all of the installation work yourself?

1. Yes
2. No
99. Don't know
88. Refused

M18a. [ASK IF M18=1] Which elements of the installation would you have been comfortable handling yourself? [OPEN RESPONSE]

M19. On a scale of one to 10, where one is "very difficult" and ten is "very easy," how would you rate the entire process of having a DHP installed in your home, starting with making the decision to install one to having it installed?

M19a. [Ask if M19<7] Why did you rate your installation that way?

M20. [ASK IF M15 <> 6] On a scale of one to 10, where one is "not at all satisfied" and ten is "very satisfied," how would you rate your satisfaction with your installation contractor?

M20a. [Ask if M20 <7] Why did you rate your installation contractor that way?

DHP Experience Battery

Next, I'd like to ask about your experiences using your ductless heat pump.

E1. In which room or rooms in your house are the ductless heat pump units installed? [READ ROOMS IF NECESSARY] [CHECK ALL THAT APPLY]

1. Kitchen (with or without dining area)
2. Dining room (separate or formal)
3. Family, Living or Great room
4. Bathroom
5. Bedroom
6. Office, study or den
7. Entertainment or rec room
8. Garage
9. Detached living unit (e.g., "accessory " or "grandparents unit")
10. Basement
11. Hallway
77. Other: (Please specify)

E2. How would you say your house is configured, is it a fairly open floor plan or more divided with several different rooms?

1. Open floor plan
2. Divided
99. Don't know

E3. Since it was installed, have you used the ductless heat pump for: [READ CHOICES]

1. Heating
2. Cooling
3. Both heating and cooling

E4. [ASK IF E3 = 1 or 3] Has the ductless heat pump ever been unable to meet your heating needs?

1. Yes
2. No
3. Don't know

E4a. [IF E4= 1] Please describe the problems you have experienced.

[RECORD VERBATIM]

E5. [ASK IF E3 = 2 or 3] Has the ductless heat pump ever been unable to meet your cooling needs?

1. Yes
2. No
3. Don't know

E5a. [IF E5= 1] Please describe the problems you have experienced.

[RECORD VERBATIM]

E6. How many times, if ever, have you or someone else cleaned or changed the filter in your ductless heat pump?

1) Never cleaned or changed
2) Once
3) Twice
4) 3 times
5) 4 times
6) 5 times
7) 6 times
8) More than 6 times
9) Other (SPECIFY)_____
10) Don't know

E7. Why haven't you cleaned the filter?

1) It's too new, haven't had to yet
2) Not sure how
3) Too difficult
4) Just haven't gotten around to it
5) Forgot to
6) Need to find someone to do it
7) Other; specify _____
8) Don't know

E8. Did you receive a homeowner operations guide with your ductless heat pump?

1) Yes
2) No
3) Don't know

E9. Have you referred to that guide since the initial installation?

1) Yes
2) No

3) Don't know

E10. Have you programmed your ductless heat pump to automatically adjust the temperature throughout the day, or do you usually adjust the temperature setting manually?

1. Manual
2. Automatic/programmed
3. Mixed

99. Don't know

E11. [IF E10 = 2] To maximize energy savings, some people program their ductless heat pump to be the primary source of heating or cooling so there is no overlap at all with any other heating or cooling equipment in the house. Have you done this in your house?

1. Yes
2. No
3. Don't know

E12. On a scale of one to 10, where one is "very difficult" and ten is "very easy," how would you rate operating the DHP system? [IF NEEDED, For example, understanding the system interface and setting the system up?]

E12a.[Ask if E12 <7] Which aspects of operating the DHP system do you find most challenging or difficult to undertand? [OPEN RESPONSE]

Satisfaction Battery

Now I have some questions related to your satisfaction with your ductless heat pump and the purchase process.

SAT1. Please rate your satisfaction with the following aspects of your ductless heat pump on a 5-point scale, where 1 means "very dissatisfied" and 5 means "very satisfied":

How satisfied are you with ….	1	2	3	4	5	DK
A. the sound level of the indoor unit	1	2	3	4	5	99
B. your electricity bill since installing the ductless heat pump	1	2	3	4	5	99
C. the heating	1	2	3	4	5	99
D. the cooling	1	2	3	4	5	99
E. the maintenance required	1	2	3	4	5	99
F. the appearance of the indoor unit	1	2	3	4	5	99

G. And what is your overall satisfaction rating?	1	2	3	4	5	99

SAT2. [Ask if INSTALLYEAR < 2015] Has your satisfaction with your DHP changed over time?

SAT2a. [If yes] Have you become more or less satisfied than you were initially?

1. More satisfied
2. Less satisfied

Why do you say that? [Record answer]

SAT3. Some people say that after a while they no longer even notice the ductless heat pump unit on their wall. Is this true for you?

1. Yes
2. No
3. Don't know

SAT4. [IF SAT3 = YES] How long after you installed it would you say you stopped noticing it?

1. One week or less
2. More than one week but less than a month
3. 1-2 months
4. 3-5 months
5. 6 months or more

99. Don't know

SAT5. What do you consider to be the top three benefits of your DHP, other than energy savings? [DO NOT READ; RECORD UP TO THREE]

1. Increased comfort
2. Improved indoor air quality
3. Quiet operation
4. Reliable operation
5. Safe to use (as in no more fire hazards)
6. Better for the environment
7. Easy to use

77. Other: (specify)
99. Don't know

SAT6. Have you recommended the ductless heat pump to a friend, colleague or family member?

1. Yes, I have recommended
2. No, I have not recommended

99. Don't know

SAT7. [IF SAT6 = 2] Would you, recommend the ductless heat pump to a friend, colleague or family member?

1. Yes, I would recommend
2. No, I would not recommend
99. Don't know

SAT8. [IF SAT6 = 1 or SAT7=1] What are some of the reasons you have or would recommend it? [DO NOT READ, ACCEPT MULTIPLES]

1. Lower energy bills
2. Improved heating comfort
3. Improved cooling comfort
4. Equipment cost is reasonable
5. Appearance is good/acceptable
6. Good for the environment
7. Operates reliably
8. Requires little maintenance
9. Energy efficiency
10. It's quiet
11. Easy to install and/or use
12. Rebates available
13. The safety of DHPs compared to some heating systems
77. Other: (specify)
99. Don't know

SAT9. Thinking back over the entire experience with your DHP and the buying process - is there anything you would change?

1. Yes (SPECIFY)
2. No

Energy Habits Battery

This next set of questions is related to some of your energy-related habits.

EH1. How often do you review your electric bill? [READ IF NEEDED]

1. Each month (IF NEEDED: most months)
2. Every couple of months
3. Quarterly
4. Twice each year
5. Once a year
6. Never

77. Other (specify)
99. Don't know
88. Refused

EH2. How important is it for you to have an energy-efficient home? Would you say it is: [READ LIST]?

4. Very important
3. Somewhat important
2. A little important
1. Not at all important
99. Don't know
89. Refused

EH3. Now I'd like you to think about how quickly you, generally, adopt new technology. Which of the following do you think best describes you? [READ; ONE ANSWER ONLY]

1. I am the first among my friends to purchase new technology
2. I purchase new technology sooner than most of my friends
3. I am typically in the middle of the group when purchasing new technology
4. I purchase new technology after most of my friends have purchased it
5. I am one of the last people to purchase new technology

99. Don't know
88. Refused

Demographics Battery

The following questions are for classification purposes only. All your answers will be kept confidential.

D1. What year was your home built?

1. 2010 or later
2. 2000 - 2009
3. 1990 - 1999
4. 1980 - 1989
5. 1970 – 1979
6. 1960 – 1969
7. 1950 - 1959
8. 1940 - 1949
9. earlier than 1939

99. Don't know
88. Refused

D3. Which of the following best describes your age range?

0. Under 18
1. 18 to 24
2. 25 to 44
3. 45 to 64
4. 65 and over

99. Don't know
88. Refused

D4. What is your educational level? [READ IF NEEDED]

1. Less than 9th grade
2. Some high school, no diploma
3. High school diploma or GED
4. Associates degree
5. Bachelors degree
6. Graduate or professional degree

99. Don't know
88. Refused

D5. Please stop me when I get to the category that best describes your approximate annual household income in 2015, before taxes?

1. Less than $40,000
2. $40,000 to less than $50,000
3. $50,000 to less than $60,000
4. $60,000 to less than $80,000
5. $80,000 to less than $100,000
6. $100,000 to less than $120,000
7. $120,000 or more

99. Don't know
88. Refused

D6. How do you describe yourself? [READ ALL, ACCEPT MULTIPLES]

1. White
2. Black or African American
3. American Indian or Alaska Native
4. Asian
5. Native Hawaiian or Other Pacific Islander
6. Hispanic or Latino

77. Other: (Specify)
99. Don't know
88. Refused

D7. For verification purposes only, may I have your name?

1. Name: _____
88. Refused

D2. [Interviewer: Record Gender.]

1. Male
2. Female
99. Don't know

Those are all the questions I have for you. Thank you very much for your time and sharing this information!

Target Market Survey

Screening Questions

S1a. Do you rent or own your home?

1. Own
2. Rent **[THANK AND TERMINATE]**

S1b. Which best describes your home?

1. Single family home
2. Multi-unit dwelling **[THANK AND TERMINATE]**
3. Other **[THANK AND TERMINATE]**

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

1. Less than 1 year **[THANK AND TERMINATE]**
2. 1 year to less than 5 years
3. 5 years to less than 10 years
4. 10 years or more

[Screen break]

S3. How old is your heating equipment?

1. Less than 10 years old
2. At least ten years old
99. I don't know

[Screen break]

S4. What type of equipment do you currently use for your home's primary heating system? [Accept 1 response]

1. Forced air furnace
2. Baseboards
3. Wall heaters
4. Electric radiant heat **[Autofill S4a = 1 and skip to S5]**

5. Wood-heat (examples include wood stove, fireplace, fireplace insert, pellet stove, wood boiler and hydronic heater) **[THANK AND TERMINATE]**
6. Ductless heat pump **[SKIP TO S9]**
7. Space heaters
8. Heat pump, not ductless
9. Ceiling Heat
10. Pellet stove (not wood) **[THANK AND TERMINATE]**
11. None **[THANK AND TERMINATE]**
78. Other

[Screen break]

S4a. What type of fuel does your [INSERT S4 Response] use?

1. Electricity
2. Propane **[THANK AND TERMINATE]**
3. Kerosene **[THANK AND TERMINATE]**
4. Oil **[THANK AND TERMINATE]**
5. Natural Gas **[THANK AND TERMINATE]**
6. Wood **[THANK AND TERMINATE]**
78. Other: (Please Specify) **[THANK AND TERMINATE]**

[Screen break]

S5. Does your home currently have a secondary, or back up, heating system? [Skip to S7 if S5 = 2 or 3]

1) Yes
2) No
3) Don't Know

[Screen break]

[IF S5=1]

S6. What type of equipment do you use for your home's secondary heating system?

1. Forced air furnace
2. Baseboards
3. Wall heaters
4. Electric radiant heat **[Autofill S5a = 1 and skip to S7]**

5. Wood-heat (examples include wood stove, fireplace, fireplace insert, pellet stove, wood boiler and hydronic heater) **[Autofill S6a = 6 and skip to S7]**
6. Ductless heat pump
7. Space heaters
8. Heat pump, not ductless
9. Ceiling Heat
10. Pellet stove (not wood)
11. None
78. Other

[Screen break]

S6a. What type of fuel does your [INSERT S6 Response] use?

1. Electricity
2. Propane
3. Kerosene
4. Oil
5. Natural Gas
6. Wood
78. Other: (Please Specify)

[Screen break]

S7. Does your home have a cooling system? [Skip to S9 if S7 = 2 or 3]

1. Yes
2. No
3. Don't Know

[Screen break]

[IF S7 = 1]

S8. What type of equipment do you use for your home's primary cooling system?

1. Central/whole house AC
2. Window air conditioner
3. Portable air conditioner (not fan)
4. Evaporative/swamp cooler
5. Ductless Heat Pump

78. Other: (Please Specify)

S9. [ASK IF S4 = 6 or S8 = 5, DUCTLESS HEAT PUMP] Was the ductless heat pump installed before or after you purchased the house?

1. Before **[S9a]**
2. After **[S9b]**

78. Other: (Please Specify) **[THANK AND TERMINATE]**

[Screen break]

S9a. [ASK IF S9 = 1] How much of a factor was the ductless heat pump in your decision to purchase the home?

Not a factor at all								A very considerable factor	
1	2	3	4	5	6	7	8	9	10
	[TERMINATE]								

[Screen break]

S9b. [ASK IF S9 = 2] In what year did you install the ductless heat pump? [Record Year]

S9c: [ASK IF S9 = 2] Do you live in this home at least 10 months out of the year?

1) Yes [CONTINUE]
2) No [TERMINATE]
99) Don't Know [TERMINATE]

S9d: [ASK IF S9 = 2] How many ductless heat pump units do you have installed inside your house? [Record Number]

S9e: [ASK IF S9=2] Did you receive a rebate or incentive through your utility when you purchased the ductless heat pump?

1. **Yes [S9e]**
2. **No [DO NOT ASK M12 in DHP Owner Survey]**

S9f: [ASK IF S9d=1] What is the name of the utility that provided the rebate or incentive on your ductless heat pump?

[RECORD UTILITY NAME]

[Proceed to DHP Owner survey – Use INSTALL YEAR criteria to complete entire survey or Experience and Satisfaction batteries]

Terminate Script: *Based on your response we do not need you to complete this survey at this time. Thank you for your time and consideration. Good-bye.*

General Awareness & Perceptions of DHP technology

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

1. Yes
2. No **[SKIP TO AWAR4]**

[Screen break]

AWAR2. [ASK IF AWAR1=1; ELSE GO TO AWAR4] How familiar are you with this technology?

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

[**Screen break]**

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

1. There is one in my home – someone else installed it **[TERMINATE]**
2. Saw one installed or used in another home or business
3. From a friend, family member or colleague/word of mouth
4. Utility
5. Newspaper
6. TV/Radio
7. Contractor/Installer materials or advice
8. Internet
9. Retail Store display or promotion (for example Home Depot or the Heat Pump Store)
10. Direct Mail
11. Home Expo/Show
12. At work
13. During an energy audit
14. Magazine ad or article
15. Salesperson
78. Other (SPECIFY):
99. Don’t know

[Screen break]

AWAR4. [ASK IF AWAR1=2] A ductless heating and cooling system is a highly efficient zonal heating and cooling system that does not require the use of air ducts. Ductless systems consist of an outdoor compressor unit and one or more indoor air-handling units, called "heads," linked by a dedicated refrigerant line. Indoor heads are typically mounted high on a wall or ceiling covering a three-inch hole where the refrigerant line passes through from the outside unit, which is mounted at the base of the house. Each indoor head corresponds with a heating and cooling zone that can be controlled independently.

Based on this description, have you heard of a ductless heat pump before?

1. Yes
2. No
99. Don't know

[Screen break]

AWAR5. This is a ductless heat pump. Have you seen this equipment in person before?

1. Yes
2. No

[IF AWAR1=2 or 99 AND AWAR4=2 or 99 AND AWAR5 = 2 or 99 SKIP TO BENE1]

[Screen break]

AWAR6. [ASK IF AWAR1 = 1 or AWAR4 = 1 or AWAR5 = 1] On a scale from 1 (completely disagree) to 10 (completely agree), please indicate your assessment of the following statement: "I know exactly where to go to find a ductless heat pump in my area."

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

[Screen break]

AWAR7. Have you ever considered installing a ductless heat pump in your home?

1) Yes

2) No **[Go To AWAR10]**

3) Don't know **[Go To AWAR10]**

[Screen break]

AWAR8. [ASK IF AWAR7 = 1] What was the <u>primary</u> reason you chose not to install one? [ACCEPT ONE RESPONSE ONLY]

1. Existing equipment works fine
2. Can't find a local installer
3. Doesn't work in my climate
4. Aesthetics/do not like the appearance
5. They cost too much
6. Maintenance hassles
7. Don't believe savings claims

8. Prefer a ducted heating system
9. I was not confident the DHP could meet my heating and/or cooling needs
77. Other, specify
99. Don't know

[Screen break]

AWAR9. Were there other reasons why you chose not to install a ductless heat pump? (Please check all that apply)

1. Existing equipment works fine
2. Can't find a local installer
3. Doesn't work in my climate
4. Aesthetics/do not like the appearance
5. They cost too much
6. Maintenance hassles
7. Don't believe savings claims
8. Prefer a ducted heating system
9. I was not confident the DHP could meet my heating and/or cooling needs
77. Other, specify
99. Don't know

[Screen break]

AWAR10. Were you aware that most utilities in the Northwest offer their customers cash rebates for purchasing and installing a ductless heat pump?

1. Yes
2. No
99. Don't know

[Screen break]

Understanding of Energy Benefits & Barriers to Installation

BENE1. There are a number of things people look for in a new primary heating system. For each item listed below, on a scale of 1 to 10, where 1 is not important at all and 10 is very important, please indicate how important this item is to you when considering a new primary heating system. [ROTATE]

How important is the…	1	2	3	4	5	6	7	8	9	10
l. Potential for more comfort than your previous heating/cooling system										
m. Cost, including any incentives or rebates for the technology.										
n. Operating costs compared to your previous heating/cooling system										
o. Cooling capability										
p. Ability to install heating or cooling equipment without needing to install ducts										
q. Ability to heat or cool different areas of the house independently										
r. Increased energy efficiency compared to other primary heating systems										
s. Potential to save on your energy bills										
t. Easy installation										
u. "Smart" or advanced technology										
v. Safety of the heating technology compared to your current heating/cooling system										

[Screen Break]

BENE2. While there are many benefits to installing a ductless heat pump, there are also aspects that might concern some homeowners. On a scale of 1 to 10, where 1 is not a concern and 10 is a major concern, please indicate how much of a concern each of these factors would be to you if you were considering a ductless heat pump. [ROTATE]

	Not a concern								A major concern	
Ductless heat pumps…	1	2	3	4	5	6	7	8	9	10
a. … are typically more expensive than standard primary heating systems										
b. …can be a challenge to install yourself										
c. …are not offered by										

every contractor										
d. …are an unfamiliar technology										
e. … may not be as visually appealing as a built in central system										
f…. may waste energy when improperly installed										
g. …are quiet when operating, but they do generate some noise at both the indoor and outdoor units										
h. …require basic maintenance like keeping the filters and coils clean and keeping the outdoor unit clear of snow and ice										
i. …require secondary heat source, usually your previous heat source, as a backup										

[Screen break]

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

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

[Screen break]

A2. What concerns would you have if you placed a ductless heat pump in your living room?

[OPEN END]

[Screen break]

Sources of Information and Influence

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

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

[Screen break]

EQUIP2. When considering a primary heating system purchase, where would you go for more information about your product options? (Please check all that apply)

1. Friends or neighbors
2. A professional contractor
3. A retail store salesperson (for example, at The Home Depot or the Appliance Store)
4. My utility
5. Manufacturer
6. Internet
7. Other: [Please describe]

[Screen break]

EQUIP3. How would you prefer to shop for a ductless heat pump?

1. At retail stores (for example, The Home Depot, Appliance Store, Sears)
2. Through local installers or contractors
3. Online
77. Other [Please describe]
99. Don't know

EQUIP3a. Which option do you believe would provide the best way to gather the information needed to make your purchase decision?

1. At retail stores (for example, The Home Depot, Appliance Store, Sears)
2. Through local installers or contractors
3. Online
77. Other [Please describe]
99. Don't know

[Screen break]

EQUIP4. If you were seeking information on the Internet related to ductless heat pumps, where would you start your search?

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

[Screen break]

EQUIP5. On a scale of 1 to 10, where 1 is not influential at all and 10 is very influential, how influential are each of the following in your decision when considering a new primary heating system? [ROTATE]

	Not at all important								Very important	
	1	2	3	4	5	6	7	8	9	10
a. Other customers' rating and reviews										
b. The endorsement of your utility company										
c. The brand name or manufacturer of the household equipment										
d. Friends and family members' opinions										
e. Seeing the system installed or used in another home										
f. The advice of a professional contractor										
g. The advice of a salesperson										
h. A retail store display										
i. Information available on the Internet										

j. Availability of rebates										

[Screen break]

EQUIP6. Who would you first call if your current heating or cooling system needed repairs?

1. Contractor that installed the system
2. Local repair person
3. Retail store
4. Friend or family member
5. Contractor found through online or yellow pages search
77. Other
99. Don't know

[Screen break]

Messaging

M1. Below are statements that may be motivating to customers. Please score how motivating each statement is to you, where 1 would not motivate you to purchase a ductless heat pump at all, and 10 would be highly motivating to you in making your purchase decision. [ROTATE]

	Not at all motivating								Highly motivating	
	1	2	3	4	5	6	7	8	9	10
a. Ductless heat pumps are a cutting-edge technology										
b. Ductless heat pumps help you to heat or cool areas of the home independently										
c. Ductless heat pumps save energy										
d. Ductless heat pumps save money on utility bills										
e. Ductless heat pumps reduce waste										

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

[Screen break]

M2. You indicated that the following statements were motivating to you. Looking at them now, please rank them in order, where 1 = the most motivating. [ROTATE]

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

- Cutting edge technology
- Ductless heat pumps help you to heat or cool areas of the home independently
- Energy savings
- Save money on energy bills
- Reliability
- Reduce waste
- Increased comfort
- Quiet
- Safety
- High quality investment
- Easy to operate

[Screen break]

M3. How interested would you be in installing a ductless heat pump system in your home if you needed to replace your current heating system?

4. Very interested

3. Somewhat interested

2. Not too interested

1. Not at all interested

99. Don't know

M4. Why do you say that?

[OPEN END]

[Screen break]

M5. [If M3 <=3] What additional information would you need before considering a ductless heat pump?

[OPEN END]

M6. Please tell us which statement best represents your opinion of when you will replace your current primary heating system:

1. I will replace my current primary heating system before it breaks.
2. I will wait to replace my current primary heating system until it breaks.**[GO TO H1]**

99. Don't know **[GO TO H1]**

M7. [If M6 = 1] How soon do you anticipate needing to replace your current primary heating system?

1. Within the next year
2. In 1 to 3 years
3. In more than 3 years

99. Not sure

[Screen break]

Energy Habits

This next set of questions is related to some of your energy-related habits.

H1. How often do you review your electric bill?

1. Each month (IF NEEDED: most months)
2. Every couple of months
3. Quarterly
4. Twice each year
5. Once a year
6. Never

78. Other (specify)

100. Don't know

[Screen break]

H2. How important is it for you to have an energy-efficient home?

4. Very important
3. Somewhat important
2. A little important
1. Not at all important
99. Don't know

[Screen break]

H3. Now think about how quickly you, generally, adopt new technology. Which of the following do you think best describes you?

1. I am the first among my friends to purchase new technology
2. I purchase new technology sooner than most of my friends
3. I am typically in the middle of the group when purchasing new technology
4. I purchase new technology after most of my friends have purchased it
5. I am one of the last people to purchase new technology

99. Don't know

Demographics

The following questions are for classification purposes only. All your answers will be kept confidential.

D1. What year was your home built?

10. 2010 or later
11. 2000 - 2009
12. 1990 - 1999
13. 1980 - 1989
14. 1970 – 1979
15. 1960 – 1969
16. 1950 - 1959
17. 1940 - 1949
18. earlier than 1939
99. Don't know
89. Refused

[SCREEN BREAK]

D2. What is your gender?

1. Male
2. Female

D3. Which of the following best describes your age range?

0. Under 18
1. 18 to 24
2. 25 to 44
3. 45 to 64
4. 65 and over
99. Don't know

[SCREEN BREAK]

D4. Which of the following best describes your educational background?

1. Less than 9th grade
2. Some high school, no diploma
3. High school diploma or GED
4. Associates degree
5. Bachelors degree
6. Graduate or professional degree
99. Don't know

D5. Which of the following categories best represents your approximate annual household income from all sources in 2015, before taxes?

1. < $40,000
2. Between $40,000 and $49,999
3. Between $50,000 and $59,999
4. Between $60,000 and $79,999
5. Between $80,000 and $99,999
6. Between $100,000 and $119,999
7. $120,000 or more
99. Don't know
88. Refused

[Screen break]

D6. Which of the following ethnicities would you say describe you? (Please check all that apply)

1. White
2. Black or African American
3. American Indian or Alaska Native
4. Asian

5. Native Hawaiian or Other Pacific Islander
6. Hispanic or Latino
77. Other: (Specify)
99. Don’t know
88. Refused

[Screen break]

Thank and Terminate script

The survey has been completed. Thank you very much for your time and for sharing this information. Have a great day!

Installer Survey

Screening Questions

Q 1. Does your company install ductless heat pumps, also known as DHPs or mini-splits, or do you just supply them for others to install?

1. Yes, we install DHPs **[CONTINUE]**
2. No, we do not install DHPs **[THANK AND TERMINATE]**
99. Don't know **[THANK AND TERMINATE]**

Installer Background

Q 2. Most of the electric utilities in this region participate in the Northwest Ductless Heat Pump Project. Are you familiar with the Project?

1. Yes
2. No
99. Don't know

Q 3. Which DHP brands does your firm currently offer to customers? (Select all that apply)

1. Comfort Aire
2. Daikin
3. Friedrich
4. Fujitsu
5. Lennox
6. LG
7. Mitsubishi
8. Panasonic
9. Quietside
10. Samsung
11. Sanyo
12. Toshiba-Carrier
13. York
77. Other (Please specify):
99. Don't know

[SKIP IF Q3=99]
Q 4. Are you planning to add any other DHP brands in the next 12 months?

1. Yes
2. No
99. Don't know

Q 4a. [IF Q4 = YES] Which brands are you planning to add? (Select all that apply)

1. Comfort Aire
2. Daikin
3. Friedrich
4. Fujitsu
5. Lennox
6. LG
7. Mitsubishi
8. Panasonic
9. Quietside
10. Samsung
11. Sanyo
12. Toshiba-Carrier
13. York
77. Other (Please Specify):
99. Don't know

Q 5. How many people are employed by your firm at the location you are based in? Please count part time staff as .5. Your best estimate is fine.

Record Number _____

Q 6. Has anyone at your company attended the NW Ductless Heat Pump Project Installer Orientation session in person or via webinar?

1. Yes
2. No
99. Don't know

Q 7. About how many of your company's staff have received training on ductless heat pumps through a manufacturer? Your best estimate is fine.

1. None
2. 2
3. 3
4. 4 to 5

5. 6 to 9
6. 10 to 14
7. 15 or more
99. Don't know

Q 8. Do you have any plans to send staff to DHP manufacturer training in the next year?

1. Yes
2. No
99. Don't know

Q 9. In which of the following states does your firm install ductless heat pumps? (Select all that apply)

1. Washington
2. Oregon
3. Idaho
4. Montana

Q 10. In what type of buildings do you install DHPs? (Select all that apply)

1. Single-family homes
2. Multifamily buildings such as apartment buildings or condos, including senior or assisted living
3. Manufactured homes
4. Commercial facilities (Non-residential buildings such as hotels, restaurants or stores)

77. Other (Please specify):

Q10a. [IF Q10=2] Thinking about your multifamily projects, would you say that the majority of your multifamily projects are…

1. Small buildings - 2-4 units
2. Mid-sized apartments – 5-30 units
3. Large apartment building – more than 30 units

[TERMINATE IF Q 10 IS NOT 1, 2, 3 or 77] [if it's only Commercial, DK or Refused]

DHP Installations

This next section of questions is about your firm's experiences with DHPs that your firm has sold or installed for residential homes, either single-family, multifamily or

manufactured homes.

Q 11. In what year did your company install its first residential DHP?

Record: _____ as YYYY, or 99=Don't know

Q 12. Thinking about your business for the past year from a revenue standpoint, of the products you currently carry and install, approximately what percentage of your business is dedicated to DHPs? Your best estimate is fine.

_____ Record Number 99=Don't know

Q 13. Thinking about your business for the past year (2015) from a working hours standpoint, approximately what percentage of your installation hours were spent selling or installing DHPs vs. other types of HVAC equipment?

_____ Record Number 99=Don't know

Q 14. Including all equipment and labor, how much does it cost your customers, on average, to install a one-to-one, or "single-head," residential DHP before any rebates or tax credits are applied?

By one-to-one systems, we mean systems that have one outdoor unit or compressor and one indoor unit or air handler. A multiple headed system would be one that has multiple indoor units or "heads".

Record Cost: _____ 99=Don't know

Q 15. Approximately h**ow many residential DHP installations did your company complete in 2015? Again, we define residential as either single family, multifamily, or manufactured homes.**

0. None
1. 1 to 4
2. 5 to 10
3. 11 to 25
4. 26 to 50
5. 51 to 75

6. 76 to 100
7. 101 to 150
8. 151 to 200
9. Over 200
99. Don't know

Q 16. [If Q15 = 1 – 9] Thinking about all of your residential customers, about what percentage of your customers who have electric heat have a central thermostat?

1. None
2. 1% to 24%
3. 25% to 49%
4. 50% to 74%
5. 75% to 99%
6. 100%
99. Don't know

Q 17. [If Q15 = 1 – 9] Approximately what percentage of your DHP installations are in homes with existing electric forced air furnaces?

1. None
2. 1% to 24%
3. 25% to 49%
4. 50% to 74%
5. 75% to 99%
6. 100%
99. Don't know

Q 17. [ASK IF Q 17 = 2 to 6] What reasons do customers give for replacing electric forced air furnaces with DHPs? (select all that apply)

1. Lower installation costs
2. Lower operating and maintenance costs
3. Ductwork was faulty or in need of repair
4. Better comfort
5. Reduced noise levels
6. Availability of utility incentives
77. Other (Please specify):
99. Don't know

Q 18. [If Q15 = 1 – 9] Approximately what percentage of your <u>residential</u> DHP installations are one-to-one, or "single-head" systems?

1. None
2. 1% to 24%

3. 25% to 49%
4. 50% to 74%
5. 75% to 99%
6. 100%
99. Don't know

Q 19. [If Q15 = 1 – 9] About what percentage of your 2015 DHP installations received utility incentives?

1. None
2. 1% to 24%
3. 25% to 49%
4. 50% to 74%
5. 75% to 99%
6. 100%
99. Don't know

Q 20. [If Q15 = 1 – 9 AND Q19 < 6] Why did some of your installations not get incentives through a utility? (Select all that apply)

1. Home heating fuel did not qualify
2. Indoor application did not qualify (not primary heat or in primary living space)
3. Building type did not qualify (commercial, multifamily, etc.)
4. No local utility incentives available for DHPs
5. Disliked utility program requirements
77. Other (Please specify):
99. Don't know

Q21. [If Q15 = 1 – 9 AND Q19 < 6] For customers who do not qualify for utility rebates, are you able to offer them any other incentives?

1. Yes
2. No
99. Don't know

Q 21a. [If Q21 = 1] What other types of incentives do you offer your customers? What other types of incentives do you offer your customers? (select all that apply) [ROTATE]

1. In-house discounts or sales
2. Manufacturer rebates
3. Tax credits

4. Financing
5. Free hand-held remotes
6. Nest thermostat
7. Gift card
77. Other (Please specify):

Q 22. Approximately how many residential cooling-only DHPs did you sell in 2015? [Q22 MUST BE <= Q15]

0. None
1. 1 to 4
2. 5 to 10
3. 11 to 25
4. 26 to 50
5. 51 to 75
6. 76 to 100
7. 101 to 150
8. 151 to 200
9. Over 200
99. Don't know

Q 23. Compared to your total 2015 sales of <u>residential</u> DHPs, do you think your sales in the next 2 years will:

5 Increase significantly
4 Increase somewhat
3 Remain about the same as 2015
2 Decrease somewhat
1 Decrease significantly
99 Don't know

Q 24. [IF Q 23 = 1,2,4 or 5] Why do you say that?

[OPEN RESPONSE]

Q 25. [IF Q 23 = 4 or 5] Do you expect increases in one-to-one systems, increases in multi-headed systems, or increases in both in your <u>residential</u> installations?

1. One to One

2. Multi-headed systems
3. Both
99. Don't know

Q 26. [IF Q 10 Response 4 = True] Approximately how many commercial DHP installations did your company complete in 2015? Again, commercial installations would include installations in non-residential buildings such as hotels, restaurants or retail stores.

0. None
1. 1 to 4
2. 5 to 10
3. 11 to 25
4. 26 to 50
5. 51 to 75
6. 76 to 100
7. 101 to 150
8. 151 to 200
9. Over 200
99. Don't know

Q 27. Compared to your total 2015 sales of commercial DHPs, do you think your sales in the next 2 years will:

5 Increase significantly
4 Increase somewhat
3 Remain about the same as 2015
2 Decrease somewhat
1 Decrease significantly
99 Don't know

Q 28. [IF Q 27 = 1,2,4 or 5] Why do you say that?

[OPEN RESPONSE]

Q 29. [IF Q 27 = 5 or 4] Do you expect increases in one-to-one systems, increases in multi-headed systems, or increases in both for your commercial installations?

1. One to One
2. Multi-headed systems
3. Both
99. Don't know

Q 30. In which of the following applications have you recommended a DHP?

(select all that apply) [ROTATE]

1. Manufactured homes
2. Multifamily homes
3. Newly constructed homes
4. Spaces like basements, in-laws units, garages – spaces that were previously unheated or are new additions to existing homes
5. Homes with zonal electric heat
6. Homes with wood heat
7. Homes with gas heat
8. Homes with oil heat
9. Commercial spaces
77. Other (Please specify):

Q 31. Are there situations where you would not recommend a DHP?

1. Yes
2. No
99. Don't know

Q 31a. [ASK IF Q31=1] In what situations would you not recommend a DHP?

[OPEN RESPONSE]

Q 32. In your opinion, what advantages do you think DHPs offer your customers? (select all that apply) [ROTATE]

1. More efficient
2. Lower **operating costs** than other heating and/or cooling systems
3. Lower **installation costs** than other heating and/or cooling systems
4. Ability to heat **and** cool
5. Easy to operate
6. Don't need furnace/central AC or ducts
7. Save energy
8. Zonal applications/Can heat or cool one room
9. Improved air quality/filtration
10. They are a safe heating source
77. Other (Please specify):
99. Don't know

Q 33. In your opinion, what are the disadvantages of DHPs? (select all that apply) [ROTATE]

1. None
2. Installation cost
3. Cost to heat or cool multiple rooms or whole home
4. Appearance
5. Hard to locate or place indoor units
6. Unfamiliar technology
7. Don't work well in cold weather
8. Are designed to heat and/or cool only one room
9. Noise

77. Other (Please specify):
99. Don't know

Marketing and Outreach

Q 34a. In 2015, about what percentage of your residential DHP customers came to you specifically seeking a DHP? (Compared to customers who were trying to improving their heating or cooling in general, but didn't specifically request a DHP)

(RECORD ANSWER) _____

99 Don't know

Q 34b. In 2015, about what percentage of your residential DHP customers came to you seeking to improve their heating or cooling, but didn't specifically request a bid for a DHP?

[PERCENTAGES FROM Q34a and Q34b MUST ADD UP TO 100%]

(RECORD ANSWER) _____

99 Don't know

Q 35. [If Q 34a=1-100] Was the percentage of customers specifically asking for DHPs higher in 2015 compared to years past?

1. Yes
2. No

99. Don't know

Q 36. What types of DHP marketing, if any, has your company done in 2015? (Select all that apply)

1. None **[GO TO Q 38]**
2. Direct mail or fliers

3. Newspaper Ads
4. Magazine ad/article
5. Radio
6. TV
7. Company webpage
8. Social Media
9. Home/trade shows
10. Phone calls
11. Emails
77. Other (Please Specify):
99. Don't know **[GO TO Q 38]**

Q 37. Which of the following audiences were you trying to market to in 2015? (select all that apply)

1. Single-family homes
2. Multifamily buildings (Such as: apartment buildings or condos, including senior or assisted living)
3. Manufactured homes
4. Commercial facilities (Such as: non-residential, such as hotels, restaurants)
5. Homes or buildings with electric forced air furnaces
6. Homes or buildings with electric resistance heating
7. Homes or buildings with primary heating systems other than electric forced air furnaces or electric resistance heating

77. Other (Please specify):

Q 38. When you want to introduce customers who are not familiar with the technology to DHPs, which of the following marketing tools do you use? (select all that apply) [ROTATE]

1 Marketing materials distributed by the Northwest Ductless Heat Pump Project
2 Marketing materials your firm created
3 Materials your supplier or manufacturer created
4 Talking to them
5 Display unit
6 Information from the utility or energy efficiency program
77 Or something else (Please Specify):

Q 39. Which of the following types of support would be beneficial to you? (select all that apply)

1. Additional technical support from distributors
2. Additional marketing materials/resources
3. Additional support from manufacturers
4. Additional support from the utility

5. Additional training
6. None
77. Other (Please specify):

Q 40. Is there any marketing or technical support that the NW **Ductless Heat Pump Project could provide that might help you to increase the number of DHPs you sell? Specifically, are there any resources that the Project could provide to assist your business?**

1. Yes
2. No
99. Don't know

Q 40a [IF Q40=YES, ASK:] What support or resources do you need: [OPEN RESPONSE]

Q 41. Based on your experience working with customers, what are the key reasons your customers are initially interested in DHPs? (select all that apply) [ROTATE]

1. To replace unsatisfactory or failing equipment
2. Ducts or a furnace/central ac are not required
3. To heat or cool a space not served by their existing heat
4. To add cooling (only) to a space
5. To add cooling (only) to the whole house
6. Energy efficiency, lower heating costs or lower energy bills
7. Want the most current technology
8. Zonal control
9. Available rebates
10. Affordability
11. To increase heating comfort
77. Other (Please specify):

Q 42. Among the customers that are aware of DHPs before they meet with you, what are the primary perceived barriers to DHP sales? (select all that apply) [ROTATE]

0 None
1 Appearance/Not visually appealing
2 Cost too high
3 Effectiveness in general
4 Effectiveness in cold weather
5 Requires more than 1 unit
6 Noise
7 Maintenance
8 Rebates unavailable

9 Don't understand technology
10 Lack of interest
11 Not offered by every contractor
12 Improper installation wastes energy
13 Challenge to install by oneself
77 Other (Please specify):

Q 42a. Do you think that there is an issue with customers not having confidence in the DHP technology?

1. Yes
2. No
99. Don't know

Q 42b. [IF Q 42a = 1] What do you think might be causing this lack of confidence?

[OPEN RESPONSE]

Q 42c. [IF Q 42 > 1] Are there additional barriers among customers with forced air furnaces?

1. Yes
2. No
99. Don't know

Q 42d. [IF Q42c = 1] What are those additional barriers? [OPEN RESPONSE]

Q 43. In your opinion, is there anything more or different that the NW DHP Project could do to help promote the adoption of DHPs among residential customers?
[OPEN RESPONSE]

Q 44. How important would you say that utility rebates are to residential DHP sales? Would you say they are:

5 Extremely Important
4 Very Important
3 Somewhat Important
2 Not Very Important
1 Not At All Important
0 Rebates Not Available In My Service Areas
99 Don't Know

Q 45. What type of financing do you offer for your customers? (select all that apply)

1. Credit card
2. Utility financing
3. Manufacturer financing
4. Financing through a local bank
5. Home equity loan
6. None
77. Other (Please specify):

Q 46. What percentage of your customers end up financing their DHP through each of the following sources? Your best estimate is fine.

Financing Option	None	10% or less	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%	Don't know
Credit Card												
Utility financing												
Manufacturer financing												
Financing through a local bank												
Home equity loan												
Other **[From Q 45]**												

Q 47. How important would you say that each of the following financing options is to residential DHP sales?

	Not at all Important	Not very Important	Somewhat Important	Very Important	Extremely Important	Don't know
Financing Option	1	2	3	4	5	99
Credit Card						
Utility financing						
Manufacturer financing						
Financing through a local bank						
Home equity						

loan						
Other **[From Q 45]**						

Q 48. We are interested in your thoughts on your customers' satisfaction with their DHPs. On a scale of 1 to 10, where 1 is not at all satisfied and 10 is extremely satisfied, how would you rate your customers' overall satisfaction with their DHPs?

Not at all Satisfied									Extremely Satisfied	Don't know
1	2	3	4	5	6	7	8	9	10	99

Q 49. After customers have had their DHP for more than a year, do you think their satisfaction with the equipment changes?

5 Yes, they are significantly more satisfied
4 Yes,they are somewhat more satisfied
3 No, their satisfaction remains about the same
2 Yes, their satisfaction decreases somewhat
1 Yes, their satisfaction decreases significantly
99 Don't know

Project Services

Q 50. [ASK IF Master Installer = YES] How long have you been a Master Installer with the Project?

1. Less than a year
2. 1 – 2 years
3. 3 – 5 years
4. More than 5 years
99. Don't know

Q 51. [ASK Master Installer = YES] On a scale of 1 to 10, where 1 is not beneficial at all and 10 is extremely beneficial, how beneficial is being recognized as a Master Installer to your business?

Not at all Beneficial									**Extremely Beneficial**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

Q 51a. [ASK IF Q51 <=3 or Q51 >=8] Why do you rate it that way? [OPEN RESPONSE]

Q 52. [ASK IF Master Installer = NO] Have you heard of the Master Installer Program offered through the Project?

1. Yes **[GO TO N 8a]**
2. No **[GO TO Q 71]**

99. Don't know

Q 52a. Have you ever considered becoming a Master Installer?

1. Yes **[GO TO Q52b]**
2. No **[GO TO Q52c]**
3. Was previously a Master Installer **[GO TO Q52d]**

99. Don't know **[GO TO Q 53]**

Q 52b. Why haven't you become a Master Installer? (select all that apply)

1. Don't meet minimum installation requirement
2. Don't meet the minimum utility-incented DHP requirement
3. Unable to submit installation activity, testimonial and/or photo-documentation required to become a Master Installer
4. Not interested
5. Don't see any benefit to becoming a Master Installer
6. Other (Please specify):

99. Don't know

Q 52c. Why haven't you considered becoming a Master Installer? (select all that apply)

1. Don't meet minimum installation requirement
2. Don't meet the minimum utility-incented DHP requirement
3. Unable to submit installation activity, testimonial and/or photo-documentation required to become a Master Installer
4. Not interested
5. Don't see any benefit to becoming a Master Installer

77. Other (Please specify):

99. Don't know

Q 52d. Why are you no longer a Master Installer with the Project? [OPEN RESPONSE]

Q 53. Have you visited the Northwest Ductless Heat Pump Project website, goingductless.com?

1. Yes **[CONTINUE]**
2. No **[SKIP To Q 57]**

99. Don't Know **[SKIP To Q 57]**

Q 54. How useful did you find the website information to be? Would you say it was:

5 Extremely useful
4 Very useful
3 Somewhat useful
2 Not very useful
1 Not at all useful

Q 55. On a scale of one to five, where one is not at all familiar and 5 is very familiar, how familiar are you with the resources available to installers through the Northwest Ductless Heat Pump Project website, goingductless.com?

Not at all familiar	Slightly familiar	Moderately familiar	Very familiar	Extremely familiar
1	**2**	**3**	**4**	**5**

Q 56. Which of the following resources available on goingductless.com has your company used? (select all that apply)

1. None
2. Marketing materials
3. Testimonial forms
4. Homeowner guides
5. Participation forms
6. Image library
77. Other (Please specify):

Q 57. Have you contacted NW Ductless Heat Pump Project staff?

1 . YES **[CONTINUE]**
2. NO **[SKIP TO Q 60]**
99. DON'T KNOW **[SKIP TO Q 60]**

Q 58. Regarding what issues or questions? (select all that apply)

1 DHP Equipment Eligibility
2 Utility Rebates
3 Marketing/Promotional Assistance
4 Master Installer Eligibility
5 Technical Installation/best Practices
77 Other (Please specify):
99 Don't Know

Q 59. How responsive were the Project staff? Would you say they were:

5 Extremely responsive
4 Very responsive
3 Somewhat responsive
2 Not very responsive
1 Not at all responsive
99 Don't know

Q 60. Would you like to offer any comments, either positive or negative, about the Northwest Ductless Heat Pump Project or the ductless heat pump technology?

[OPEN RESPONSE]

CLOSING

Thank you very much for helping us with this important study!

Appendix H – Interview Guides

Non-Master Installer Focus Group Guide

Screening

Hi, my name is _____ calling from [Robinson Research/FieldWork/VuPoint Research] on behalf of the Northwest Energy Efficiency Alliance, also known as NEEA (KNEE-AH) – and the Northwest Ductless Heat Pump Project. The DHP Project is working to support businesses that sell DHPs by providing incentives, including customer rebates, targeted at growing the market for the technology. We're calling businesses that have been involved with the program in the past because we'd like to gain insight into their experiences through a focus group.

I would like to talk with a sales manager or the person who is most knowledgeable about your firm's sales of residential HVAC equipment, especially ductless heat pumps. Who would I need to speak with? *GET REFERRAL TO CORRECT PERSON.* _____

As mentioned [or repeat introductory paragraph if speaking with new person], NEEA is interested in gaining insight into your experience with the DHP Project and will be holding a focus group at our facilities the evening of [November 17th/18th/19th]. This focus group is scheduled from 6:30 pm to 8:00 pm and you will receive light refreshments and a cash incentive of $100 for your time and opinions.

[If Needed]

A Focus Group is a round-table discussion of 8 to 10 people on products and services that you use. The discussions are moderated by market research professionals and usually last between 1-2 hours. When you're done, you are compensated for your time and opinions!

Would you be interested in participating in this focus group if you qualify?

[If no] Thank you for you time.

[If yes] Great, I just have a few questions I need to ask to make sure your business is eligible to participate.

1. Our records indicate you are a participating installer with the Northwest Ductless Heat Pump Project, are you familiar with this Initiative?
    - [If yes] Continue
    - [If no] Continue to Question 3, but limit to 3 or 4 installers

2. Are you currently a Master Installer with the Initiative? [Master Installers are not included in the recruitment list but this will be asked just to be sure they were not a recent addition]
    - [If yes] Thank and terminate
    - [If no] Continue

3. How long have you been installing ductless heat pumps?
    - [If < 2 years] Thank and terminate
    - [If >= 2 years] Continue

4. How many ductless heat pumps have you installed since you first started installing them?
    - [If < 5] Thank and terminate
    - [If >= 5] Continue
    -
5. How many ductless heat pumps have you installed so far in 2015?
    - [If >2] Continue
    - [If <=2] Continue, but limit to 2 installers if possible

Focus group facility to collect name and contact information and provide focus group details including that any parking costs will be paid for as well if applicable

Introduction (5 minutes)

Moderator Script: Hi Everyone. Thank you for taking the time to meet with us today. My name is Anne Dougherty, with ILLUME Advising, a market research company. Today we are going to talk about Ductless Heat Pumps and the Northwest Ductless Heat Pump Project, with particular focus on some of the benefits of DHPs and barriers to selling them, installation practices, the Master Installer program and training opportunities.

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

- This focus group will be recorded. This is just for my note-taking purposes and for our analysis. Your specific thoughts and answers will not be directly associated with you.
- Also, we have some interested colleagues watching as well. But you probably already knew that.

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

- First, please turn your cell phones off.

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

Intros: Now, I would like to go around the room and learn a little about each of you. Please tell us your name, your company name, how long your business has been installing DHPs and an estimate of the number of ductless heat pumps your business has installed so far in 2015.

Warm-Up (10 minutes)

Set-up: Before we jump in to DHP technologies, can you walk me through your typical sale from end-to-end?

Question: What usually prompts a customer to reach out to you?

Question: When customers do reach out to you, do they have specific HVAC technology product in mind? If so, what percent have a clear idea of what they are looking to install?

Question: How do you typically arrive at a product choice with customers?

Probe: Do you typically recommend product options or a specific model to the customer?

Probe: If so, how many options do you provide? How often does this include an energy efficient model? How often does it include a DHP?

Question: When customers ask for a specific product, how do they describe it to you. For example, do they say, I want to an HVAC system within a specific price range, or do they request specific features? Or both? What's most common?

Question: What product attributes do customers most often request?

Probe: Do they ever change their mind throughout the sales process? If so, what prompts them to change their mind?

DHP Features (5 minutes)

Question: [Ask each attendee] What is your company's primary business? [i.e. general HVAC, DHPs, electrician etc.]

Probe: About what percentage of your business would you say is represented by HVAC sales? Of that, what percent are energy efficient? And what percent are DHPs?

Set-up: As you know, DHPs are a technology that is highly efficient. Sometimes DHP features may align with customers needs. Sometimes they do not.

Question: We just discussed a number of features that customers might request when looking for a new HVAC system. [moderator to list features on a flip chart]. Are there any other features that are important to customers that we missed? If so, what are they?

Question: [going around the room] Which of these features are the most important to customers? Which are the second most important? [moderator takes notes and looks for consistencies and differences in the participants' responses]

Question: Thinking about these features, are there any of these features where DHPs exceed expectations? Are there any features where they fall short? Why?

Question: Would any of you ever consider dedicating your business entirely to DHPs?

Probe: Why or why not?

DHP Market Barriers (20 minutes)

Set-up: Let's dig in to DHPs more. While DHPs provide many benefits to the customer, there can also be some challenges to customer adoption of the technology. Please take a moment to think about them.

Question: On the paper in front of you, please write down the top three barriers to selling ductless heat pumps.

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

Set-up: I would like to build on those barriers a little further to really get into why customers do not proceed with the purchase of a DHP.

Question: [Going around the room, writing on the flipchart] What percent of your customers actively consider installing a DHP? What percent ultimately install a DHP? [moderator to call out and note the differences]

Question: [To all] What are some of the reasons customers who were considering a DHP give for not proceeding with the purchase? In other words, why do they ultimately move in a different direction?

Probe: Is a lack of customer confidence in the technology an issue? [If any respond yes] Why do you think homeowners have low confidence in the technology? Where do you think this comes from?

Probe: [If low customer confidence is an issue] What, if anything, have you done to combat this lack of confidence in the technology?

Probe: [If low customer confidence is an issue] Is there anything NEEA can do to address low confidence in the technology?

Set up: Next I'd like to learn a little more about who your typical DHP customer is. If you had to describe your typical DHP customers, who are they?

Question: What are the characteristics of your typical DHP customer? In terms of housing type, location (urban vs rural), existing primary heating source and fuel or any other characteristics that represent your DHP customers. [write them down on the flipchart, probe for differences of opinion and/or consensus]

Question: Where do you see the biggest potential for DHPs?

Probe: Are there certain home configurations or types (i.e. single family, multifamily, manufactured), regions, or primary heating types you think offer the greatest potential?

Installation Practices (20 minutes)

Set-up: Now I'd like to ask you some questions about installation practices. We talked a little bit earlier about the possibility of certain home configurations having the greatest potential for DHPs.

Question: Now I'd like to ask for what types of home configurations you typically recommend ductless heat pumps?

Probe: What are some of the barriers to installation in various home configurations?

Probe: Does the home layout ever prevent a 1:1 installation? In what cases? Does the Initiative need to consider recommending other installation configurations to accommodate these?

Probe: How frequently, if ever, does the homeowner believe that a 1:1 installation will not meet their needs when that is what is recommended for their home?

Question: What products do you typically recommend in electric forced air furnace replacements? How often do you recommend DHPs?

Probe: [For those that do] What are your primary reasons for recommending DHPs in these situations? Do homeowners have any additional reasons for choosing DHPs in these situations

Probe: In these forced air furnace replacements, are you typically replacing the furnace entirely or is it kept as a back up? Why? [If some are replacements], In what percent of these installations would you say you are replacing rather than displacing the furnace?

Probe: **[For those that do]** What are the reasons that homeowners with electric forced air furnaces who are considering a DHP choose not to install one?

Probe: [For those that do not] Why don't you recommend DHPs to homeowners with electric forced air furnaces?

Question: Have you ever **discouraged** the installation of a DHP? If so, why? Please describe the situation.

Question: When it comes to sizing the unit, do you find that customers are coming into the buying process with a size already in mind?

Question: How often does this happen?

Question: Do you find that homeowners that have a size specification in mind will take your recommendation on sizing, even if it differs from their opinion?

Probe: Who would you say is driving the sizing of the DHP unit overall? [Installer or customer]

Master Installer Program (20 minutes)

Set-up: Now let's talk about the project's Master Installer program. The Master Installer program is a way for installers who meet certain requirements to differentiate themselves as experienced and knowledgeable professionals. And Master Installers are highlighted in the goingductless.com Installer Finder.

As you may know, the Initiative has decreased support for the Master Installer program this past year and there are fewer benefits to becoming one than there used to be. However, the Initiative is trying to determine if this is the right approach and would like your input.

[If requirements are needed]

In order to become a Master Installer, installers must attend Orientation and Best Practices

training and have completed a minimum of 25 total installations (15 or more utility-incented installations), in the last three years. In order to qualify, installers must also submit installation activity, at least one homeowner testimonial and photo-documentation of two utility-incented installations in addition to completing the Master Installer agreement.

Question: [Asking for a show of hands] How many of you are aware of the Master Installer status available through the project?

Question: [Again, asking for a show of hands] Have you ever considered becoming a Master Installer?

Probe: [For those that considered, but didn't become one] Why didn't you end up becoming a Master Installer? [Probe for barriers such as the program requirements, lack of interest, not enough volume to support]

Probe: [For those that haven't considered] Why haven't you considered becoming a Master Installer? [Probe for barriers such as the program requirements, lack of interest, not enough volume to support]

Question: What, if any, benefits to your business do you see in becoming a Master Installer?

Question: Do you feel that not becoming a Master Installer has been detrimental to your DHP business in any way?

Question: Would you consider becoming a Master Installer in the future?

Probe: Why or why not?

Probe: Is there anything the Initiative could do to address these issue that are preventing you from becoming a Master Installer?

Probe: [If lack of sales volume is a problem] What do you think is necessary to help you increase your sales volume to a level that would get you to the Master Installer level?

Question: How many of you also participate in a utility contractor network? [If needed: this would mean you are listed as a participating contractor or installer on a utility website in addition to goingductless.com]

Probe: What benefits does that participation provide to your business? Do you think it is more beneficial than becoming a Master Installer?

Initiative Involvement and Training (10 minutes)

Set-up: Now I'd like to talk about some of the resources and training available through the Initiative and other sources.

Question: Where do you get information and training on ductless heat pumps? [Let them discuss freely]

Question: Do you use any of the DHP Project resources? These resources include training, the website (goingductless.com), program staff, and marketing and technical support?

Probe: [To those that don't use] Were you aware that these resources are available to you?

Probe: [To those that don't use] What would make these resources more useful to you?

Question: Do you use resources such as training, marketing materials or technical support provided by the utility or manufacturer?

Probe: Which of the resources [DHP Project, utility or manufacturer] do you find most useful? Why is that?

Question: Does your company participate in any DHP training opportunities?

Probe: Through which sources?

- Manufacturer
- Distributor
- Company or contractor sponsored
- NEEA
- Other

Set-up: Now I would like to discuss different types of training that may be helpful to your business.

Question: On a scale of 1 to 10, where 1 is not helpful at all and 10 is very helpful, how helpful would the following types of training be for your business?

- General sales
- DHP Sales/overcoming barriers to DHP sales
- Installation techniques
- Advertising
- Others?

Closing (1 minute)

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

Master Installer Interview Guide

Introduction & Warm Up

I'm with ILLUME Advising, an energy efficiency program evaluation firm in Madison, Wisconsin. We are currently evaluating the Northwest Ductless Heat Pump Project for the Northwest Energy Efficiency Alliance (NEEA). Right now we're interviewing Master Installers in the DHP market to better understand how well the Initiative is working, impacts it is having in the market, and to gather feedback on how it might be improved.

We'd like to conduct a brief 30-minute interview with you to discuss your DHP program and experience working with NEEA. We understand that you may have also been contacted regarding the Heat Pump Water Heater Initiative so we will do our best to keep this conversation brief.

Is now a good time to talk?
(IF NEEDED) Can we schedule a time to talk for about 30 minutes?

(IF NEEDED: Please know that your answers will be kept confidential and will be grouped with other respondents for reporting in aggregate form only. Neither your name nor company will be mentioned in any reports or documents.)

The interview should take approximately thirty minutes of your time. Before we start, I would like to ask for your permission to record this interview to ensure my notes are accurate.

1. First, could you please describe your role and responsibilities in your company?

Initiative Awareness & Value

1. Just to give me a baseline…

a) Are you familiar with the NEEA DHP Project and your company's interactions with the Project? (How familiar?)

b) How many DHPs would you estimate you have you installed in 2015?

c) What percentage of your sales/installations do DHPs represent?

i. [ASK IF >=50%] Would you ever consider dedicating your business entirely to DHPs?

2. What impact has NEEA's Project had on your sales of <u>residential</u> DHPs?

3. How, if at all, has the Project impacted the <u>types</u> or <u>number</u> of DHP units that you…

(a) Install?
(b) Keep in stock?

4. During the past year, would you say the Project's impact on your residential DHP sales increased, decreased, or stayed the same as previous years? Why is that?

5. What value does your company see in participating in the DHP Project?

6. Our records indicate that you are a Master Installer with the DHP Project, is that correct? Do you recall when you became a Master Installer? And why did you decide to become a Master Installer? What value do you see in participating in the Master Installer program?

7. If the DHP project were to end the Master Installer program would that change how you engage with the Project? Would it change your approach to selling and promoting DHPs? If yes how?

8. Do you use the DHP Project marketing materials? How else do you promote DHPs to your customers?

9. Do you take part in any DHP-related trainings? (Probe for trainings offered through local utilities, manufacturers or distributors)

10. Do you also participate in a utility contractor network? [If needed: this would mean you are listed as a participating contractor or installer on a utility website in addition to being listed on goingductless.com]

11. What benefits does that participation provide to your business? Do you think it is more beneficial than being a Master Installer?

Customer Insight

1. Who is the typical DHP Customer? [IF NEEED: In terms of housing type, location (urban vs rural), existing primary heating source and fuel or any other characteristics that represent your DHP customers.) Which customers are more likely to show interest in DHPs?

2. Do the customers you sell/install DHPs for typically come to you asking for a DHP?

3. For those who do not, do you include DHPs in the options you provide them as part of your standard sales approach? If no why not?

4. Do you offer DHPs as an option to homes with electric forced air furnaces? Why or why not? What reasons do customers with existing forced air furnaces give for proceeding with a DHP?

5. Are there ways in which the Project could assist in making DHPs a more widely accepted product option for residential customers?

6. Is there any additional support you want or need from the Project to be more successful in selling DHPs? Examples of support that could be provided include, demand generation, marketing support, technical or sales trainings. Is there anything else you would find helpful?

Barriers & Opportunities

1. What are the biggest barriers to increasing the overall installation of DHPs? How about in homes with electric forced air furnaces?

2. Is there a customer type that typically has the biggest barriers to considering a DHP? Is there a common factor across these customers [income, housing type, type of existing system]?

3. Does the style of layout of the home impact your decision to promote a DHP to certain customers? If yes, what home type or layout presents a barrier, in your mind, to a DHP installation?

4. What is the biggest challenge you face when encouraging a customer to consider a DHP?

5. Are there ever situations in which you discourage the installation of a DHP? [Probe for housing type, existing heating source]

6. What can the DHP Project do to overcome these barriers?

7. What are some of the reasons customers who were considering a DHP give for not proceeding with the purchase? In other words, why do they ultimately move in a different direction?

a. **Probe:** Is a lack of customer confidence in the technology an issue? [If any respond yes] Why do you think homeowners have low confidence in the technology? Where do you think this comes from?

b. **Probe:** [If low customer confidence is an issue] What, if anything, have you done to combat this lack of confidence in the technology?

c. **Probe:** [If low customer confidence is an issue] Is there anything NEEA can do to address low confidence in the technology?

8. How do you think the market and/or your activity around DHPs will change in the next two years, the next five years?

Closing

1. Is there anything else you would like to share with us in regard to the DHP Project?

Thank you for your time. Is it ok if I contact you in the future with any follow-up questions that I may have regarding the Northwest Ductless Heat Pump Project?

Partner Utility Interview Guide

Email Introduction

Dear _____,

I'm with ILLUME Advising, an energy efficiency program evaluation firm in Madison, Wisconsin. We are currently evaluating the Northwest Ductless Heat Pump Project for the Northwest Energy Efficiency Alliance (NEEA). Right now we're interviewing NEEA's utility partners to better understand how well the Project is going, and to gather feedback on how it might be improved. I realize that you may have been contacted in regards to the HPWH Initiative as well. Please know that we appreciate your assistance with this effort and will do our best to be respectful of your time.

If possible, we'd like to schedule a quick 30 minute interview with you in the next week or two (2/8 -2/19) to discuss your experiences and for you to share any feedback you may have. I will be following up with you next week via telephone in order to schedule a time for the interview. However, if it is more convenient for you, feel free to reply to this email with a few time windows that work for you and we can confirm the interview time via email.

Finally, just to let you know, your responses from this interview will be kept confidential and grouped with other respondents for reporting in aggregate form only. Neither your name nor utility will be mentioned in any reports or documents.

Please feel free to contact me, the project manager Sara Conzemius (Sara@illumeadvising.com), or Anu Teja with NEEA (ATeja@neea.org) if you have any questions.

I look forward to speaking with you about this effort.

Phone Introduction

Hello, my name is _____ and I'm with ILLUME Advising, an energy efficiency program evaluation firm in Madison, Wisconsin. We are currently evaluating the Northwest Ductless Heat Pump Project for the Northwest Energy Efficiency Alliance (NEEA). Right now we're interviewing NEEA's utility partners to better understand how well the Project is going, and to gather feedback on how it might be improved.

I realize that you may have been contacted in regards to a different market progress evaluation taking place right now focusing on the HPWH Initiative as well. Please know that we appreciate your assistance with this effort and will do our best to be respectful of your time.

Is now a good time to talk?

(IF NEEDED) Can we schedule a time to talk for about 30 minutes?

(IF NEEDED: Please know that your answers will be kept confidential and will be grouped with other respondents for reporting in aggregate form only. Neither your name nor utility will be mentioned in any reports or documents.)

Local Utility Program

Program Design and Model [If not interviewed last year]

First I'm going to ask you some questions about your own utility's DHP program. Then I'll ask you some questions about NEEA's Northwest DHP Project.

1) To start off, can you tell us about your current Ductless Heat Pump program?

2) What types of customer homes are you targeting? Do you target homes with electric forced air furnaces? Do you have plans to target any additional types of customer homes in the future? (IF NEEDED ADD: such as multifamily or manufactured homes)?

3) What rebate amount(s) did you offer in 2015? *Distinguish between: existing SFR – zonal heating, existing SFR – forced air furnace, other existing homes.*
   a) How do these rebate amounts compare to those offered previously?
   b) If different in 2015: Why did you make these changes? (Probe on savings changes, BPA funding levels, changes in local install costs, shifting utility priorities, other)

4) Do you offer customer financing for DHPs?
   a) If NO: Why not?
   b) If NO: Do you think your utility will offer this financing in the future?
      i) If NOT, ask why?
   c) If YES: Get details
   d) If YES: What percent of your DHPs customers use this financing if they are eligible?

5) How are you promoting your DHPs program?
   Probe for:
   Direct mailings
   Newspaper ads
   TV/Radio
   Social media
   Internet
   In store displays

Community displays
Other

6) Which aspects of your program (e.g., rebates, marketing, technical training, contractor referrals, financing) have had the most impacts on driving customer participation?

7) Have your promotion efforts increased or decreased in the past year? Why, and how so?

8) Has your overall program budget increased or decreased in the past year? Why, and how so?

9) How does your program educate your customers about DHPs versus their existing system?
   a) Do you talk about displacement theory, i.e., leaving the existing heat in place and adding a DHP?
   b) When talking about DHP installation options, are you primarily focused on 1 head to 1 compressor installation or do you promote other options?

10) Did you achieve your installation goals for 2015? Why or why not? (Probe on program challenges, successes)

11) Were your goals for 2015 different than 2014 (or previous years in general)? If yes, how so?

12) [If More Active] Your utility program is one of the more active DHP programs. Why do you think that is? What do you think contributes to the success of your program?

13) Can you tell me about your installation inspection process?

14) How is the inspections process going?
   a) Are you doing mostly random inspections, or are you also doing discretionary inspections to check on specific installers?
   b) Are you having any pervasive problems with any specific installers, or recurring installation issues?

15) Do you need any additional assistance to improve the inspections process in your area?
   a) If YES: What type of additional assistance would be helpful?

Program Design and Model [If interviewed last year]

Since you were interviewed as part of last year's evaluation, I would like to start by first getting an update on any significant changes to your utility's DHP program since last year. Then I'll ask you some questions about anticipated program changes, installers, barriers and NEEA's Northwest DHP Project.

16) Has your program changed significantly in any of the following areas during the last year? [Record details of any changes noted]
    i) Customer types targeted?
    ii) Rebate amount?
    iii) Financing offered?
    iv) Program marketing?
    v) Overall program budget?
    vi) How your program educates customers about DHPs?
    vii) Approach to recommending 1:1 vs multi-headed systems?
    viii) Installation inspection process?

17) Did you achieve your installation goals for 2015? Why or why not? (Probe on program challenges, successes)

18) Were your goals for 2015 different than 2014 (or previous years in general)? If yes, how so?

19) [If More Active] Your utility program is one of the more active DHP programs. Why do you think that is? What do you think contributes to the success of your program?

Anticipated Program Changes [ALL]

20) In the next 12 months, will your promotion efforts change in any way? If so, how?

21) In the next 12 months, will your program budget change in any way? If so, how?

22) In the next two years, do you think your DHPs rebate amount(s) will increase, decrease, or remain the same? Why do you say that?

23) What is your utility's long-term vision for DHPs? Is it a high priority measure for your utility, or will other measures be promoted more heavily?

24) Does your utility have an expected time frame for when DHP rebates will no longer be offered? Why is that?

Installer Support and Recognition [ALL]

25) Does your utility have an approved or participating contractor network or listing?
   a) If yes, what are the requirements for installers?
   b) Do you designate different levels of installers? Or provide any recognition of the Project's Master Installers?

26) Does your utility program refer customers to the goingductless.com website to locate installers?

27) Do you see a value in having the Project recognize Master Installers?
   a) [If utility has approved/participating listing] How does this compare to the value of your own utility participating contractor network?

28) What services, if any, does your utility provide to DHPs installers? (E.g., free or subsidized training, marketing assistance, other? Get details.)

   a) Have any of these services changed in the last year? How so/Why not?

Barriers and Opportunities [ALL]

29) Do you have concerns about savings changes for DHPs coming out of the Regional Technical Forum (RTF)? How might your program be affected?

30) What are the biggest challenges for selling DHPs in your service territory?
   i) Do you have any concerns about meeting your utility's cost-effectiveness requirements for your DHP program?
   ii) Is customer confidence in the DHP an issue? If yes, what do you think is the cause?
   iii) Do you face additional obstacles in electric forced air furnace replacements? If yes, what are these additional obstacles?
   iv) Do certain housing configurations or types cause additional challenges? If yes, what types of challenges are related to housing configurations?

31) What, if anything, has your utility done do address the barriers you mentioned? Is there anything NEEA can do to address these issues?

[IF LESS ACTIVE] (Probe further to find out if there is anything that could help them overcome barriers and increase DHP rebate activity in their service territory or if there are some other limiting factors contributing to the low activity level. Lack of qualified installers? Lack of eligible customers? Local economy? Climate? Low priority for the utility?)

32) What do you see as the biggest opportunity for DHPs?

Regional Initiative and Coordination **[ALL]**

Now I'd like to ask you some questions regarding the Northwest Energy Efficiency Alliance's Northwest DHP Project and then we'll be done.

33) Has your utility used any of the marketing support offered by the Project? Examples of some of the marketing support offered include: manufacturer promotion packets, marketing templates, advertising and direct mail support.
   a) If yes, how satisfied have you been with the Project's marketing support?

34) Does your utility promote any manufacturer promotions? Why or why not?
   a) Are there plans to promote them in the future?

35) Are there any marketing resources that would help you promote the DHP technology?

36) Who is the primary administrator/implementer of your DHP program? (PROBE: Do you process rebates for the equipment or do you have external support for this?)

37) Do you foresee any changes regarding the implementation of this program in the future?
   a) Is there any area in the implementation that you could envision needing or wanting additional support?

38) How well you are able to stay informed about NEEA's current or planned project activities?
   a) If YES: Are you or other staff usually able to attend NEEA's webinars covering DHP Project updates?

39) Have you visited the NEEA DHP Project website in the past 3 months?

   If YES, ask:
   a) How many times?
   b) For what purposes?
   c) Did you find the information you were looking for?
      i) If NO, ask: What other resources did you use to find the information you needed?

d) Do you have any recommendations for improving the website?

If NO: Why not?

40) How satisfied have you been with the technical resources that are available through the NW DHP project?

41) What features of NEEA's NW DHP project do you like best or find most useful?

42) How could NEEA's NW DHP project better support your program? (PROBE to see if any specific marketing to customers or installers needed, other activities).

Those are all the questions I have right now. Thank you very much for your time and good information!

Supplier Interview Guide

Email Introduction

Dear _____,

I'm with ILLUME Advising, an energy efficiency program evaluation firm in Madison, Wisconsin. We are currently evaluating the Northwest Ductless Heat Pump Project (the Project) for the Northwest Energy Efficiency Alliance (NEEA). Right now we're interviewing Ductless Heat Pump (DHP) market stakeholders to better understand the DHP market and to gather feedback on the Project.

We'd like to schedule a brief 30-minute interview with you to discuss your DHP program and your insight into the DHP market. We understand that you may have also been contacted regarding the Heat Pump Water Heater Initiative so we will do our best to keep this conversation brief.

If possible, we'd like to schedule some time within one of the following windows, please let us know what time works best for you:
[OPEN WINDOWS OF TIME]

If you have any questions, please do not hesitate to respond to this email or contact Suzi Asmus, NW Ductless Heat Pump Program Manager at sasmus@neea.org.

Thank you in advance for your assistance.

Telephone Introduction

Hello, my name is _____ and I'm with ILLUME Advising, an energy efficiency program evaluation firm in Madison, Wisconsin. We are currently evaluating the Northwest Ductless Heat Pump Project (the Project) for the Northwest Energy Efficiency Alliance (NEEA). Right now we're interviewing Ductless Heat Pump (DHP) stakeholders to better understand the DHP market and to gather feedback on the Project.

Is now a good time to talk?
[IF NEEDED] Can we schedule a time to talk for about 30 minutes?

[IF NEEDED] Please know that your answers will be kept confidential and will be grouped with other respondents for reporting in aggregate form only. Neither your name nor company will be mentioned in any reports or documents.

Interviewee Role/Background

1) (All) First, can you please describe your role at your company?
    a. How long have you been involved with DHPs?
2) (All) Just to give me a baseline, are you familiar with the Northwest Ductless Heat Pump Project and your company's interactions with the Project? How familiar?

Sales

1) (All) How do DHPs compare with other heating and cooling products that you manufacture/carry – are they a strong market for you? [Probe: How so?]

2) (Distributors and Retailers) Thinking about your stock in 2015, how many different DHP models did you have in stock? And how many of these models qualified in 2015 for utility incentives in the NW region? [IF NEEDED] We're defining the Northwest region as ID, MT, OR and WA.

3) (Distributors and Retailers) Have you changed your stocking practices based on 2015 sales? How so, and why?

4) (All) What are your most popular DHP models? Why are these sales highest?

5) (All) Has the market share of any of the DHP brands or models you make/offer changed significantly in the past year? How so? [Probe for numerical estimates by functionality (e.g., heating/cooling v. cooling only]

6) (Manufacturers) What percentage of units in the US go to the Northwest market (i.e., Idaho, Montana, Oregon & Washington)? How has this changed in recent years? What are the top brands or models of those units?

7) (All) What impact has the Project had on your sales of residential DHPs? Has the Project impacted the types or number of DHP units that you…

    i. [MANUFACTURERS and REPS] Manufacturer/distribute? [Probe for numerical estimates]]

    ii. [DISTRIBUTORS/RETAILERS] Keep in stock? [Probe for numerical estimates]

8) (All) What challenges, if any, have you experienced in meeting demand?

9) (All) In the past year, has the impact of the Project on your residential DHP sales increased, decreased, or stayed the same? Why is that?

10) (All) In the Northwest, what proportion of your DHP sales for whole house solutions are multi-headed DHP units (one or more outdoor units with multiple indoor heads) vs. "one-to-one" configurations (to displace zonal electric heat)? Do you expect this proportion to change in the future? If yes, how so?

11) (Manufacturers) How does your company accommodate do-it-yourself (DIY) installs in other countries?
    a. How might the Project support a potential DIY market in the NW if DHPs become more widely available in retailers in the future?

12) (Manufacturers and Distributors) What is your company's approach to working with retailers to stock and sell DHPs?

    a. [IF CURRENTLY WORKING WITH RETAIL] What about this approach has been successful/unsuccessful so far? What, if anything, has been problematic?

    b. [IF NOT WORKING WITH RETAIL] What are the potential advantages and disadvantages of working with retailers to sell DHPs? Do you see this as a viable way to sell DHPs?

i. [IF NEEDED] Do you think that potential for misapplication and improper installation of DHPs could be addressed by implementing a retail sales model whereby sales include the cost of installation through a network of professional installers? Why/Why not?]

c. Do you have a sense for how many DHPs could be sold using retail channels?

13) (Retailers) How long have you been selling DHPs?

a. How successful have you been in selling DHPs? Who is your typical DHP customer?

b. What do you think the long-term prospects for DHP sales are for your company? [IF NEEDED] Do you expect them to continue to grow? Do you think you are already reaching the segment of the population willing to purchase this way?

Barriers to DHP Adoption

1) (All) What are the primary market barriers to increased residential DHP sales? [Probe for customer confidence with the technology]

a. [If multiple barriers mentioned] Which of these barriers do you think is the biggest?

b. Have you done anything to address the(se) barrier(s)?

2) (All) [Ask if first cost/expense not mentioned in Question 1] Do you think that the first cost or expense of DHPs compared to other heating technologies is an issue for residential customers?

a. [IF YES] How big of an issue would you say it is?

b. [IF YES] Have you done anything specifically to address the issue of first cost?

Marketing

1) (Distributors and Retail) Does your company promote any manufacturer promotions? Why or why not?

2) (All) In the past year, has your company invested in any (other) marketing efforts for DHPs targeted toward the residential market?

    a. [IF YES] What types of activities are included in your marketing strategy? [Probe for: presentations, Internet/website, TV, radio, newspaper, social media, in-store promotions, trade magazines]

        i. (Manufacturers and Distributors) Do any of these efforts come from the Project's marketing support?

    b. [IF NO] Why haven't you invested in marketing to the residential market?

3) (All) Specifically, who are you targeting with this marketing? (E.g., residential segments, distributors, installers)

4) (All) And what are your key marketing messages? (Probe for: energy savings, comfort, monetary savings, rebates, etc.)

5) (All) In the past year, have you changed your marketing in any way?

    a. [IF YES] What changes have you made? [Probe for messaging, channels and amounts]

        i. Why did you make these changes?

    b. [IF NO] Why haven't you made any changes?

6) (All) For the Northwest, what type of installations does your company's DHP marketing primarily promote? Why is that? [Probe for: multi-headed DHP units for whole house solutions, one-to-one configurations to displace whole house zonal electric heat or single zone configurations in the main area of the house?]

7) (All) Are there any marketing resources that would help your company promote the DHP technology?

Interactions with Project

[If interviewed last year ask Q1 and then skip to Future Expectations]

1) (All) Has your involvement with the NW Ductless Heat Pump Project changed in the last year? Why or Why not?

[If <u>not</u> interviewed last year and time permits]

2) (All) What involvement have you had with the NW Ductless Heat Pump Project in 2015? [Probe on interactions with Northwest utilities, project staff and installers.]

3) (All) Has the Northwest DHP Project influenced your marketing efforts in any way? [Probe to see if more marketing is focused in NW due to rebates, if focusing more on specific home types (e.g., forced air), new messages, etc.]

4) (All) What types of marketing support have you received from the Project? [Probe on: ad templates, sales fact sheets, staff training, signage, website or publication content, co-op ad funding, other]

    a. Are there any types of support you would like going forward?

        i. [IF YES] Please explain.

        ii. [IF NO] Why not?

Future Expectations

Let's conclude by talking about the DHP market more broadly.

1) (All) What technological trends are you seeing with DHPs?

2) (All) Do you think the price of DHP installations will change in the next 2 years? Five years? If so, how and why? [Probe for reason for change, is it due to the equipment cost, labor cost, market demand.]

3) (All) What are your expectations for the future regarding your company's DHP sales or market share in the Northwest?

    a. How much does this depend on the availability of utility incentives, which can go up to $1,500 per system?

    b. Do you think that your company will be able to keep up with market-demand for DHPs?

4) (All) Are there any new or growing market segments for DHPs? [Probe for retail channel, online sales, new construction, DIY, remodels, manufactured housing, etc.]

5) (Manufacturers and Distributors) The Northwest DHP Project has a long-term goal to have DHPs installed in 85 percent of single-family, zonal heat homes in the Northwest by 2029. Currently DHPs have a market share of about 10 percent in this market, and market share has increased about 1 percent annually in recent years.

    a. [IF INTERVIEWED LAST YEAR] Has your opinion on the feasibility of this goal changed since you were interviewed last year?

    b. [IF NOT INTERVIEWED LAST YEAR] In your opinion, is this goal achievable?

    c. [IF NOT INTERVIEWED LAST YEAR] Why or why not?

    d. [IF NOT INTERVIEWED LAST YEAR] Do you have a sense of the DHP market penetration for homes with a forced air furnace?

    e. [IF NOT INTERVIEWED LAST YEAR] In your opinion, what do you think needs to happen to increase the market share for forced air furnace homes?

6) Lastly, do you have any other thoughts or comments about DHPs in general, the market, or the Northwest Ductless Heat Pump Project?

Those are all the questions I have for you. Thank you very much for your time.