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Northwest Ductless Heat Pump Initiative: Market Progress Evaluation Report #3

Prepared by:
Evergreen Economics
1648 Martin Luther King Jr. Way
Berkeley, CA 94709

Northwest Energy Efficiency Alliance
PHONE
503-688-5400
FAX
503-688-5447
EMAIL
info@neea.org

Evergreen Economics
Berkeley, CA
415.722.7678
EvergreenEcon.com

Prepared For:
Praveen Chalise
Project Manager, Market Research and Evaluation
Northwest Energy Efficiency Alliance
421 SW Sixth Avenue, Suite 600
Portland, OR 97204

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1 Executive Summary

This report is the third Market Progress Evaluation Report (MPER) of the Northwest Energy Efficiency Alliance's (NEEA's) Northwest Ductless Heat Pump (DHP) Initiative. This report presents evaluation findings based on telephone surveys of households that purchased DHPs through the Initiative, other general population households without DHPs and Northwest installation contractors. Evergreen staff also completed in-depth interviews with Northwest utilities that support the Initiative, and DHP manufacturers and distributors. The report also includes current data on the DHPs market in the Northwest.

Progress Towards Goals

Utilities that participated in the Initiative in 2012 installed almost 5,300 DHPs, primarily in Oregon and Washington. In comparison, the utilities installed about 4,800 DHP systems in 2011, resulting in a nine percent increase for 2012. Since the Initiative launch, utilities have installed over 19,000 DHPs in Northwest homes. There are almost one million detached, owner-occupied single-family electrically heated homes in NEEA's target market[1].

Market Progress

Overall, NEEA's Northwest Ductless Heat Pumps Initiative is well designed and performing well. General population awareness of DHPs (excluding gas heated homes) increased from 34% to 48% in one year and is growing. Households are learning about DHPs from a wide variety of sources, including utility information, friends/family/acquaintances and installation contractors. Most of the interviewed installers, manufacturers and distributors predict continued DHP market growth, and 26% of the surveyed general population households said they are "very" or "somewhat interested" in installing DHPs. The primary barriers to continuing market growth are installation costs, public awareness and understanding of DHP technology and aesthetic concerns. Following are some additional key findings from this evaluation:

1. **Households that have installed DHPs have high satisfaction on multiple DHP features – e.g., heating and cooling comfort, noise levels, appearance, and electricity bill savings.** Almost all households (94%) are using their new DHPs for primary heating, as opposed to using their previous equipment (e.g., wall heaters).

2. **NEEA's Initiative has had significant market transformation impacts among DHP suppliers.** Manufacturers have designed new products to fit the Initiative, adopted NEEA's marketing messaging, developed new retail partnership channels and increased market share in areas where they have worked with NEEA and utilities on coordinated marketing and rebate campaigns.

[1] Source: Estimates by Evergreen Economics from US Census Bureau, 2011 American Community Survey

3. **The share of concealed or short-run ducted units is increasing according to interviewed manufacturers.**

4. **Commercial installations are accounting for a larger share of the DHP market.**

5. **Installations are increasing in both single and multifamily new construction.** This should help the single-family retrofits market, as DHPs gain visibility among the general public.

6. **The manufactured homes market has high, untapped potential, and the initial experience of market actors working with the Initiative has been very positive.**

7. **Manufacturers and distributors reported that the share of non-incented DHP installations is increasing with growing market transformation.**

8. **About half of the surveyed installers are not doing any marketing of DHPs.**

9. **Average residential install costs for a single indoor head, single outdoor head (1:1) installation are about $4,000 and DHP suppliers do not expect them to decrease significantly.**

To continue building on the Initiative's success, NEEA should:

1. **Continue broad based, multi-media marketing to further increase public awareness.** While public awareness of DHPs is increasing, additional marketing and education is still needed to grow and solidify the market, which is still in a relatively early stage of development.

2. **Encourage the utilities to retain their rebate levels for the foreseeable future, to enable lower income households to buy DHPs, particularly in the slow-moving economy.** The majority of the DHP households surveyed reported that utility rebates were at least somewhat important in their purchase decisions. In the longer-term, deeper and more targeted incentives may be required to get the lowest income households to install DHPs.

3. **Facilitate more collaborative, targeted outreach efforts with local utilities.** According to Initiative staff and participating manufacturers, these efforts have been successful in generating short-term increases in the number of installations, which contribute to long-term word of mouth referrals and public awareness.

4. **Help contractors to develop marketing strategies and collateral.** Although some large manufacturers and distributors do this with selected contractors, it appears that at least half of regional installers are doing no marketing at all.

5. **Continue to target the manufactured homes market.** This market has high untapped potential and multiple interviewees reported that DHPs are particularly suitable for replacing noisy and obtrusive furnaces in primary living areas.

2 Introduction

2.1 Project Overview

This report is the third Market Progress Evaluation Report (MPER) of the Northwest Energy Efficiency Alliance's (NEEA's) Northwest Ductless Heat Pump Initiative. NEEA works in collaboration with the Bonneville Power Administration (BPA), the Energy Trust of Oregon and more than 100 Northwest utilities on behalf of more than 12 million energy consumers. NEEA uses the market power of the region to accelerate the innovation and adoption of energy-efficient products, services and practices.

In October of 2008 the region launched the Northwest Ductless Heat Pump Project, a pilot aimed at demonstrating the use of inverter-driven ductless heat pumps (DHPs) designed to displace electric resistance heat in existing Northwest homes. There are approximately one million detached, owner-occupied single-family electrically heated homes in the Northwest region (Section 4.1), and DHPs have high potential to deliver significant energy savings. Based on findings from the regional pilot that ended in December 2009, NEEA initiated a full-scale Initiative in 2010. Fluid Market Strategies is the program management contractor (PMC) in charge of implementing the Initiative at NEEA's direction. Additional information is available at: www.goingductless.com.

Over ninety Northwest utilities currently offer DHP rebates for their customers while NEEA's work is focused upstream to promote product availability, support local utility initiatives, and build consumer and market awareness, with the ultimate goal of market transformation. Since the pilot launch, utilities that participate in the Initiative have installed over 19,000 DHPs in Northwest homes.

Following are some of the key activities the Initiative conducted in 2012:

- The Initiative implemented a new consumer "pull" marketing strategy. Whereas previous promotions were educational in nature and focused on creating general awareness, new marketing messages specifically mention comfort-related benefits and attempt to drive consumers to the program website or call installation contractors to get detailed information.

- The Initiative solidified a partnership between Mitsubishi and Home Depot, and worked collaboratively with both parties to develop a new television advertising campaign, improve customer in-store education and train staff on sales closing.

- The Initiative offered 15 first-come, first-served $1,000 incentives for manufactured homes makers and retailers to give market actors more experience specifying, pricing and installing DHP systems. NEEA provided on-site technical assistance and factory training for each DHP installation receiving a sales incentive.

- The Initiative dedicated more resources to Master Installers (i.e., highly trained, higher volume installers), to hasten market transformation. In return for providing detailed projects data to the PMC, Master Installers receive first priority for co-op marketing funding, and feature more prominently than other installers on the Initiative website.

- The Initiative coordinated "lead-development" campaigns with manufacturers, distributors, contractors and utilities. For the Eugene Water & Electric Board (EWEB), the Initiative recruited two manufacturers and five contractors and utilized utility customer profiles to distribute mailers advertising reduced price DHPs for a limited period. One manufacturer has subsequently initiated a similar campaign in Washington without Initiative assistance.

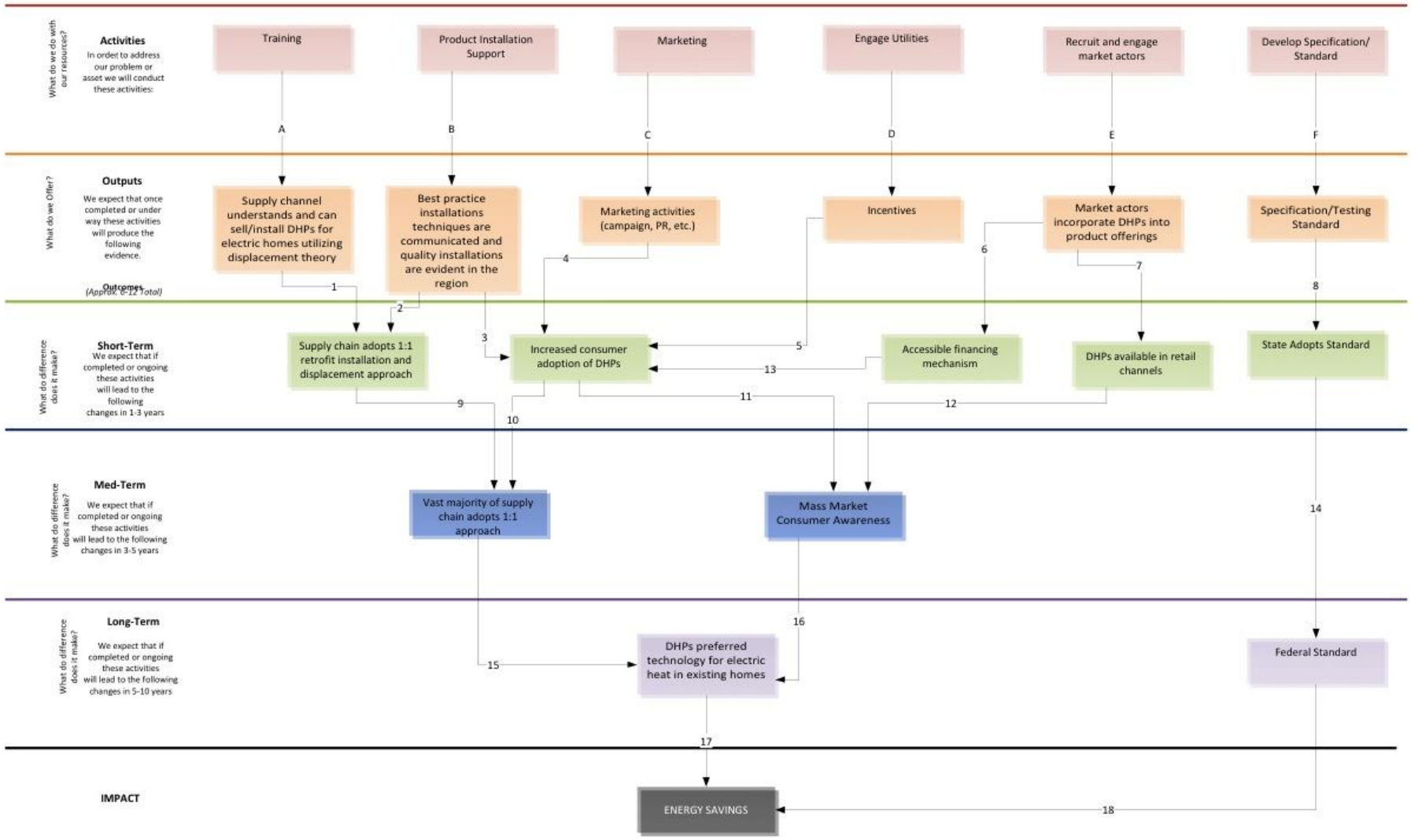
2.2 Initiative Goals and Logic Model

Following are some of the key objectives of NEEA's DHP Initiative:

- Partner with Northwest utilities and energy efficiency organizations to achieve a 15% market share of ductless heat pumps by 2016 in single family electrically heated homes
- Increase consumer awareness of ductless heat pump technology
- Maintain and enhance robust trade ally network
- Increase DHP product variety and availability throughout the region
- Increase affordability of DHPs throughout the region

The objectives above are reflected in various activity-outcome linkages in NEEA's Initiative logic model, which we present in Figure 1. Measurement and tracking of these objectives in past, current and future evaluations can provide an indication of the success of the overall Initiative design. Appendix C, which presents the theory underlying the logic model, includes more information on the logic model activities and linkages.

Figure 1: Ductless Heat Pump Initiative Logic Model



3 Evaluation Methodology

3.1 Market Characterization and Progress

One task of the evaluation was to characterize the DHPs market in the region. The objectives included:

- Describing the residential housing stock in the region so that we could assess the potential for DHP installations.
- Showing the number of DHPs installed in various parts of the region.
- Describing various aspects of the supply-side infrastructure, including DHPs manufacturers, distributors and installers.

We completed this task by utilizing US Census Bureau data and current participation data obtained from the Initiative tracking databases.

3.2 Telephone Surveys

Evergreen Economics obtained detailed market information via quantitative telephone surveys of 101 households that installed DHPs through Q1 2012, and 203 three general population households without DHPs. Some of the key information from these surveys includes DHPs awareness, interest in purchasing DHPs, DHP usage and maintenance characteristics and satisfaction with DHPs. Evergreen also conducted a telephone survey of DHP installation contractors that have and have not interacted with the Initiative, to learn about their business practices, DHP installation trends, customer perceptions of DHPs and market expectations. Evergreen Economics and John Stevenson developed the instruments and CIC Research fielded the surveys.

3.3 In-depth Interviews

We conducted extended phone interviews with representatives of 24 Northwest utilities with DHP programs and key marketing staff from 13 DHP manufacturing and distribution firms. This includes three interviews with companies that build or sell manufactured homes with DHPs installed. The interviews focused on program designs and business practices, experiences working in the DHP market, customer barriers and suggestions for improving the Initiative.

3.4 ACE Model Review

Prior to conducting the aforementioned primary research, our team reviewed key assumptions identified by NEEA in its Alliance Cost Effectiveness (ACE) Model; we included the findings in the Appendix I .

4 Market Characterization

This section provides an overview of the DHPs market for Idaho, Montana, Oregon and Washington through 2012. These data provide a high-level overview of the market and context for evaluation results presented in subsequent chapters.

4.1 Target Market and Project Achievements

The primary target markets for the Initiative is single-family homes using electric resistance zonal heating systems as the primary home heating source. Table 1 shows the distribution of existing, detached owner-occupied single-family homes in NEEA's four-state territory, by cooling zone (CZs) and urban/rural classification; see Appendix E for additional information on NEEA's urban/rural classifications methodology.

Table 1: Northwest Homes with Electric Heat[2]

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	35,285	4%
Urban	107,992	11%
Total	**962,464**	**100%**

Source: Estimates by Evergreen Economics from US Census Bureau, 2011 American Community Survey

As shown in Table 2, utilities participating in the Initiative installed almost 5,300 DHP systems in 2012, and the largest share of installations occurred in Washington. Overall, the statewide distribution of DHP installations roughly mirrors the distribution of owned, single-family electrically heated homes in the Northwest. Annual installation counts are available at the utility level, however we were not able to analyze and map DHP installations by cooling zone and urban/rural location as in the prior evaluation, since NEEA currently only has detailed data on about 65% of regional installations. BPA processes and provides other utility installations data, which do not include detailed location information.

[2] This data source does not distinguish between *types* of electric heat, e.g., baseboard zonal versus forced air furnace. In addition, owned single-family homes with propane, kerosene and/or wood heating have also installed DHPs through the Initiative. When these homes are counted the market size increases to over 1.4 million homes.

Table 2: Distribution of Electric Heat Homes and Incented 2012 DHP Installations

State	Number of Electric Homes	Percent of Electric Homes	Number of Installed DHPs	Percent of Installed DHPs
Idaho	89,519	9%	177	4%
Montana	30,729	3%	225	4%
Oregon	282,848	30%	2,069	39%
Washington	559,368	58%	2,818	53%
Total	**962,464**	**100%**	**5,289**	**100%**

Source: Initiative database provided March 2013

Participating utilities installed 4,833 DHP systems in 2011, resulting in a nine percent increase for 2012. This increase occurred despite the federal government's elimination of $300 in tax credits early in the year and the subsequent reinstatement of those tax credits, after most households that purchased in 2013 had already made their purchasing decisions.

4.2 Supply Side Characteristics

The Initiative has established strategic relationships with eight manufacturing companies and nine key distributor firms (other distributors also participate in the Initiative). Table 3 lists the DHP manufacturing and distributing companies that have historically been the most involved in supporting the Initiative.

Table 3: DHP Manufacturing and Distribution Companies Involved with Initiative

Manufacturing Companies	Distribution Companies
Daikin AC	Airefco (Hadco/Nor-Air)
Mitsubishi Electric	Geary Pacific
LG	Gensco
Panasonic (purchased Sanyo)	Keller Supply
Lennox	Thermal Supply
Fujitsu General America	York, Johnson Controls
Quietside Corporation	Ductless Supply
Friedrich Air Conditioning	Johnstone Supply
	MarHy

Across 2011 and 2012, Mitsubishi has remained the most popular DHP brand with about 50% market share. Notably, Daikin increased its market share from 13% in 2011 to 25% in 2012. Panasonic is a relatively new market entrant and expects to gain market share with the introduction of DHPs with Seasonal Energy Efficiency Ratios (SEERs) of 28 and higher. The market shares of other manufacturers remained relatively level between 2011 and 2012.

Table 4: DHP Manufacturer Market Shares – 2011 and 2012*

Brands	2011 Percentage	2012 Percentage
Comfort Aire	0%	0.2%
Daikin	13.0%	25.4%
Fujitsu	21.3%	15.9%
Friedrich	0%	0.1%
Goodman	0%	0%
Lennox	0.3%	5.5%
LG	2.8%	1.1%
Mitsubishi	58.4%	48.6%
Panasonic	0%	0.7%
Quietside	0%	0%
Samsung	0.1%	0.2%
Sanyo	3.9%	2.2%
Toshiba-Carrier	0.3%	0.1%
Total	**100%**	**100%**

Source: Initiative database provided March 2013
* Complete program data only through March 31, 2012; thereafter for about 65 percent of all installations.

Over 600 DHP installation contractor firms are actively participating in the Initiative. NEEA has oriented/trained other firms as well, but these "inactive" firms have not completed recent installations. Table 5 shows that the vast majority of firms have completed 20 or fewer installations overall, and that 80 firms have completed 50 or more installations.

Table 5: Active DHP Contractors by Cumulative Installations Volume

Number of DHP Installations	Number of Firms
1 to 20	482
21 to 50	75
51 to 200	60
201+	20
Total	637

Source: Initiative data provided March 2013

The Initiative has also trained over 100 Master Installers. In addition to attending Orientation and Best Practices training, Master Installers have completed at least 15 Initiative-approved installations and submitted customer testimonials and photographs proving compliance with specific installation guidelines.

Lastly, over ninety Northwest utilities (i.e., the vast majority) provide rebates that average about $1,300 for customers that upgrade zonal resistance heating systems to a ductless system. Twenty-seven utilities also offer loans at 0 to 7 percent interest, which borrowers can pay back as part of their utility bills or through payment mechanisms.

5 Findings

5.1 Homeowners Phone Survey

Evergreen Economics completed a total of 304 phone surveys with single-family homeowners in May and June of 2013. Households that installed a DHP through the Initiative (in July 2011 through March 2012) completed 101 surveys, and general population households without DHPs completed 203 surveys.

Evergreen stratified the surveys by cooling zones and urban/rural locations, and provided a confidence/precision level of 90/06 at the regional level. In addition, this sample design provided 90/10 confidence at the cooling zone level, and 90/10 for both the urban and rural portions of the region. (See Appendix E for details regarding how counties are assigned urban and rural designation codes). For our sampling and analysis we combined the high and low-density rural sub-classifications.

Table 6: Final Survey Completes

Cooling Zone, Urban/ Rural	Participant Completes	General Population Completes
CZ1		
Rural (n=63)	25	38
Urban (n=59)	24	35
CZ2		
Rural (n=45)	10	35
Urban (n=62)	27	35
CZ3		
Rural (n=34)	5	29
Urban (n=41)	10	31
Total (n=304)	101	203

Initiative Participant Results

The most common sources from which Initiative participants learned about DHPs were from someone they knew (39%), utility sources (including advertisements, bill stuffers, websites and displays – 37%), home shows (20%) and Internet/social media (19%). Some of the other, less common sources from which they learned about DHPs are community seminars, non-profit energy organizations and observing DHPs in foreign countries. Table 7 gives a detailed breakdown of DHP awareness sources.

Table 7 also shows that utility sources influenced 19% of participants to make purchases, word of mouth and seeing other DHPs installed influenced 17% and materials from

contractors influenced 15%. Other, less common factors (community seminars, nonprofit energy organizations, employees in the energy industry) influenced 24% of the purchases.

Table 7: Participants' Sources of DHPs Awareness and Factors that Influenced Purchases

Sources/ Factors	Sources of Awareness (n=101)	Factors that Influenced Purchases (n=101)
Friend or acquaintance /saw one installed/ word of mouth	39%	17%
Utility print advertising/ bill stuffer/ website/ display	37%	19%
Home show	20%	6%
Internet research/ social media	19%	7%
Newspaper ad/ story	14%	5%
Materials or information from contractor/installer	12%	15%
Television/ radio ad	5%	0%
Retail store display or promotion	5%	3%
Other	13%	24%

Q3. How did you first hear about DHPs? Q4 Did you hear about it anywhere else? Or learn more about it from another source? Q8. 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 for Q3, Q4 and Q8.

Table 8 shows the main reasons Initiative participants became interested in DHPs. Fifty-one percent were initially interested because they wanted to be more energy efficient. Sixteen percent of the participants considered DHPs because they needed heating or cooling and had no ducts and 16% specifically wanted to lower their energy bills.

Table 8: Participants' Initial Reasons for Interest in DHPs

Reason	Responses (n=101)
Wanted to be more energy efficient	51%
Needed heating/cooling, had no ducts	16%
Lower energy bills	16%
Existing heating was not working well enough	11%
Rebate	8%
Better/safer than wall heater or baseboards	6%
Wanted to add cooling	5%
Installation cost	5%
Not comfortable in home/wanted to improve home comfort	5%
Needed additional or supplemental heating/AC	4%
Cleaner air/dehumidifier	4%
Heat & AC in one unit	3%
Easy installation	3%
Other	5%

Q32. What initially interested you in the ductless heat pump? Multiple responses allowed for Q32.

As shown in Table 9, most participants used either baseboard heaters or wall heaters as their primary household-heating source prior to installing a DHP (25% and 22%, respectively). Another 21% of participants used electric radiant heat before installing a DHP. After their installations, the majority of participants (94%) rely on their DHP for primary heating.

Table 9: Participants' Primary Heating Before and After DHP Installation

Equipment Type (n=101)	Percent Using as Primary Heat Before DHP	Percent Using as Primary Heat After DHP
DHP	NA	94%
Fireplace/wood heat	18%	5%
Electric radiant heat	21%	1%
Forced air furnace	7%	0%
Baseboards	25%	0%
Wall heaters	22%	0%
Space heaters	2%	0%
Propane	2%	0%
Other	5%	0%

Q45E. Before the DHP, what was your primary heat? Q45F. What is your primary heat now? Multiple responses allowed for Q45.

Approximately 21% of the Initiative participants had window or room air conditioning units prior to their DHP installations, compared to 77% with no cooling. After their DHP installations 15% of the participants still use window/room ACs.

Table 10 depicts the level of importance for various factors that can potentially influence DHP purchasing decisions. As shown, 93% of Initiative participants described cheaper operating costs as at least somewhat important. In addition, over 80% of the participants indicated that purchase/installation costs (83%) and comfort potential (81%) were at least somewhat important in driving their DHP purchases.

Table 10: Importance of Factors in Participants' Purchase Decision

Factor/Importance (n=101)	Very Important	Somewhat Important	Not too Important	Slightly Important	Not at all Important	Don't Know
Cheaper operating costs	75%	18%	7%	0%	0%	0%
Comfort potential	59%	22%	17%	0%	2%	0%
Purchase/install cost	58%	25%	11%	4%	0%	3%
Cooling capacity	47%	18%	11%	11%	12%	2%

Q33.Please rate how important each of the following factors was in your decision to purchase a DHP, where 1 is not at all important, and 5 is very important: A. The comfort potential offered by the ductless heat pump. B. The cost of the DHP, including any incentives. C. The potentially cheaper operating costs of the ductless heat pump compared to your previous heating/cooling system. D. The cooling capability of the ductless heat pump.

Table 11 illustrates the common ways Initiative participants collected information about DHPs prior to installing one. Forty-one percent of the participants gathered information from the Internet prior to their DHP purchase, 33% spoke to contractors, 19% referred to contractor provided materials and 16% spoke to someone who already had a DHP installed. Overall, DHP purchasers are obtaining information from a wide variety of sources.

Table 11: How Participants Gathered Information Before DHP Purchase

Sources	Project Participant Responses (n=101)
Internet/online	41%
Spoke to the contractor	33%
Contractor provided materials	19%
Spoke to someone who had a DHP	16%
Utility provided information	15%
Retail store salesperson	12%
Other	15%
Don't Know	3%

Q35. How did you gather information about the DHP before you made your purchase? Multiple responses allowed for Q35.

Table 12 displays participants' concerns when they were considering DHPs and after their installations. Overall, 40% of the participants had no concerns prior to their purchase, while 21% had concerns about the general capability or functionality of a new DHP. Notably, very few participants had any concerns about their DHP performance after their installations.

Table 12: Participants' Concerns Regarding DHPs

Concern (n=101)	Before Installation Responses	After Installation Responses
No concerns	40%	NA
Capability/functionality - general	21%	5%
Capability/functionality - cold weather	11%	3%
Cost	11%	0%
Appearance	9%	1%
Installation	3%	0%
Would it filter/humidify the air	3%	1%
Would it save money/efficiency	2%	0%
Noise	2%	0%
Other	9%	5%

Q36. Was there anything you were concerned about when you were considering a ductless heat pump? Q37. Now that you have it installed, [Q36 ANSWER] a problem? Multiple responses allowed for Q36.

Table 13 highlights the importance of rebates in purchasing decisions, as 35% of the participants indicated that rebates were very important, while 46% said they were somewhat important. Only two percent stated that rebates were not at all important in their DHP purchasing decision.

Table 13: Importance of Rebates in Participants' Purchase Decisions

Importance (n=92)	Very Important	Somewhat Important	Not too Important	Slightly Important	Not at all Important	Don't Know
Percentage	35%	46%	8%	9%	2%	0%

Q40. (If rebate amount known) How important was the rebate you received to your decision to purchase the ductless heat pump?

The majority of the Initiative participants (85%) did not take any loans to purchase their DHP, while seven percent financed through local banks or credit unions, six percent used financing from utility companies and two percent took loans from installation contractors.

The vast majority of Initiative participants (92%) recalled that the idea to install a DHP came from someone within the household, while six percent said it was an installation contractor's idea. Thirty-six percent only obtained estimates from one installer, 24% from two installers, 30% from three installers and eight percent from four or more installers. Two percent of participants reported that another party paid for and coordinated the DHP installation. The main reasons that the participants chose the installation contractor that they did included the

fact they trusted the contractor (29%), they liked the presentation and customer service (26%), good company reputation (24%) and lower costs (19%). See Appendix F, Table 40, for additional details.

Table 14 shows that DHPs are being installed in variety of locations, including family or living rooms (22%), bedrooms (21%), dining rooms (15%) and kitchens (11%).

Table 14: Location of Participants' DHP Installations

DHP Installation Location	Participant Responses (n=101)
Family or living room	22%
Bedroom or bedrooms	21%
Dining room	15%
Kitchen	11%
Basement	3%
Entertainment or rec room	3%
Hallway	2%
Office or studies	2%
Garage	1%

Q52_2 In which room in your house is each of those unit(s) installed? Multiple responses allowed for Q52_2.

Most of the Initiative participants (79%) have used their new DHPs for both heating and cooling, and 22% used it for heating only. Overall, 69% of participants reported that their DHPs always provide sufficient heating and cooling, while 26% stated that their DHPs had been unable to meet their heating needs at some time.

Those that had problems most often reported that their DHPs did not provide adequate heat in very low temperatures. (A few other respondents reported refrigerant leaks, electric parts failures.) At the time of their DHP purchase, 16% expected the DHP to work at zero or below zero degrees Fahrenheit, 23% expected sufficient heating for temperatures between one and twenty degrees Fahrenheit and 29% expected the DHP to perform over 20 degrees Fahrenheit (30% did not know). Regarding their cold weather performance expectations, 32% got their information from product literature or owner's manuals, 30% from installation contractors, 24% did not refer to any information, and about 10% developed expectations by browsing on the Internet.

About 46% of Initiative participants had cleaned their DHP filters between one and five times, 40% had cleaned their filters six or more times and 12% had never cleaned their filters (three percent didn't know this information). Amongst those that had not cleaned their filters, 44% gave no concrete reasons (e.g., "just haven't gotten around to it") and 28% felt their equipment was too new. The other 28% were not sure how to clean their filters, forgot to clean them or found the process too difficult.

Most participants (72%) use the manual setting on their DHP, 21% use the automatic function and seven percent uses both (Appendix F, Table 41). Amongst those that use the automatic setting, 69% program their DHPs to be the primary source of heating or cooling so that there is no overlap at all with other heating or cooling equipment in the house (in order to maximize energy savings).

Table 15 displays participants' satisfaction levels for specific DHP performance criteria, and shows that satisfaction ratings are high overall. Most Initiative participants (70%) stated that they were very satisfied with the sound levels of their indoor DHP units. Similarly, 66% were very satisfied with the maintenance that the DHP requires, 56% were very satisfied with the comfort from the new cooling and 54% with the new heating. When asked how long after the installation they stopped noticing their indoor DHP head(s), 57% of DHP owners stated that it was between one and six months later, 15% said less than one month, eight percent said more than six months and approximately 20% did not know.

Table 15: Participant Satisfaction with DHP Performance Criteria

Criteria (n=101)	Very Satisfied	Somewhat Satisfied	Not too Satisfied	Slightly Satisfied	Not at all Satisfied	Don't Know
Sound level of the indoor unit	70%	26%	2%	2%	0%	0%
Maintenance the DHP requires	66%	21%	8%	0%	0%	6%
Comfort of the new cooling	56%	17%	6%	0%	0%	21%
Comfort of the new heat	54%	36%	9%	1%	0%	0%
Electricity bill since installing DHP	50%	31%	16%	0%	1%	3%
Appearance of indoor unit	45%	37%	14%	3%	2%	0%

Q66. Please rate your satisfaction with the following aspects on a 5-point scale, where 1 is "very dissatisfied" and 5 is "very satisfied".

One in three Initiative participants (32%) had recommended DHPs to a friend, colleague or family member and 68% said that they would suggest DHPs in the future (see Appendix F, Table 42). The most common reasons for recommending DHPs were lower energy bills (51%) and energy efficiency (43%).

Table 16: Reasons Why Participants Recommend DHPs

Reasons (n=98)	Percentage
Lower energy bills	51%
Energy efficiency	43%
It's quiet	20%
Improved heating comfort	19%
Operates reliably	16%
Improved cooling comfort	13%
Equipment cost is reasonable	11%
Both heat & AC	6%
Easy to use	5%
Good for the environment	5%
Easy installation	4%
Rebate	4%
Units up and out of the way	3%
Clean air	3%
Other	8%

Q71. What are some of the reasons you recommend it? Multiple responses allowed for Q71.

General Population Results (Non-DHP Households)

Among the general population of single-family homeowners without DHPs, 48% are aware (43% unaided) of DHPs and one in two within this segment had actually seen a DHP before completing the survey. In comparison, only 34% of general population respondents were aware of DHPs in the 2012 phone survey. DHP awareness is higher in the urban areas of the region while there were no large differences in awareness across the three cooling zones. We have included additional details in Appendix F, Table 33.

Among the general population that have seen or heard of DHPs, 36% learned about DHPs from friends, relatives or acquaintances. Twenty-six percent heard of DHPs from the TV or radio, 15% from Internet or social media sources and 10% from newspapers. Twelve percent of the general population learned of DHPs from other sources such as home improvement shows, magazines and community seminars.

Table 17: Sources of DHP Awareness among Non-DHP Households

Source	Initial Sources (n=74)	Secondary Sources (n=74)
Friends/Acquaintances/Word of Mouth	22%	14%
TV/Radio	20%	6%
Internet/Social Media	12%	3%
Through Employers/In the Industry	8%	0%
Utility	7%	0%
Newspaper	5%	5%
Material from Contractors/Installers	2%	5%
Other	2%	10%
Don't Know	12%	5%

Q3. (If aware of DHPs) How did you first hear about DHPs? Q4 Did you hear about it anywhere else? Or learn more about it from another source?

Among the general population households that are aware of DHPs, 29% had considered installing one in their home. Primary reasons for not installing DHPs include high costs/lack of funds (79%), aesthetic concerns (12%) and satisfactory performance of existing equipment (six percent). Some of the secondary reasons for not installing DHPs included appearance concerns (19%), noise (10%) and inadequate information about DHPs (five percent). Appendix F, Table 34, details all the primary and secondary reasons for not installing DHPs.

Amongst those who are aware of DHPs, 39% also knew that most utilities in the Northwest offer cash rebates for customers who install DHPs. In this group, 31% were able to specify a rebate amount ranging from $500 to $2,000. Nineteen percent of aware, non-DHP households also knew that financing for DHPs is available through banks in the Northwest.

Table 18 depicts the overall interest level in DHPs among non-DHP households and their likelihood of using bank or utility financing to install DHP systems in their homes. Twenty-six percent of non-DHP households reported that they were “very interested” or “somewhat interested” in installing DHP systems (those that were initially unaware of DHPs were read a brief description). Among this group, 49% said that they were very or somewhat likely to use bank financing, while 55% were somewhat or very likely to use local utility financing for DHP installations.

Table 18: Interest in DHPs and Likelihood of Using Financing Among Non-DHP Households

Response	Very Interested / Likely	Somewhat Interested/ Likely	Not Too Interested / Likely	Not at All Interested / Likely	Don't Know
Overall Interest in DHPs (n=203)	7%	19%	14%	55%	4%
Likelihood of Using Bank Financing (n=42)	11%	38%	14%	32%	5%
Likelihood of Using Utility Financing (n=42)	18%	37%	14%	22%	9%

Q15. How interested would you be in installing a DHP system in your home? Q22. (If Q15. = "Very interested", "Somewhat interested" or "Don't know") If bank financing and a utility rebate like this were available in your area, how interested would you be in using it to finance a ductless heat pump purchase and installation? Q24. (If Q15. = "Very interested", "Somewhat interested" or "Don't know") If utility financing like this were available in your area, how interested would you be in using it to finance a ductless heat pump purchase and installation?

We asked non-DHP households that were very or somewhat interested in installing a DHP to identify features that are most attractive to them. In summary, 44% mentioned reduced bills or energy costs, 24% wanted to be energy efficient, 13% cited new cooling capacity and 12% indicated the small size of the DHP unit. Appendix F, Table 35 includes detailed results.

About one-quarter of the households that were very or somewhat interested in DHPs were able to name a DHP brand without assistance. In this small group (nine respondents), 66% had heard of Mitsubishi DHPs, 45% knew about the Toshiba- Carrier brand, 45% knew about the LG brand and 26% were aware of Frigidaire DHPs. When presented with a comprehensive list of DHP brands, 96% said they would consider buying Mitsubishi or Toshiba-Carrier DHPs and 88% would consider buying Samsung or Panasonic branded DHPs.

We also asked non-DHP households that are interested in installing DHP systems to name "triggers" that would increase their likelihood of buying a new DHP. Eighty-eight percent stated lower costs of DHPs, 76% would require rebate increases and 65% said special promotions offered by contractors or retail businesses would make them much more likely to purchase DHPs (detailed in Table 19). Within this segment, 41% gave other reasons that would make them more inclined to buying DHPs, including the potential likelihood of lower bills, environmental reasons, specific location factors within homes and proof of reliability.

Table 19: Events Impacting Likelihood of DHP Purchases Among Non-DHP Households

Reason (n=42)	Yes	No	Don't know
The cost of DHPs declines	88%	12%	0%
Your utility rebate increases	76%	16%	8%
A special promotion is offered by a contractor or retail business	65%	28%	8%
The performances of DHPs improves	63%	24%	13%
Your current heating or cooling equipment fails	62%	33%	5%
Your household finances improve	60%	37%	3%
Other	41%	59%	NA

Q26. (If Q15= "Very interested" or "Somewhat interested" in purchasing a DHP) Which of these reasons- if any- would make you much more likely to buy a new ductless heat pump?

About 20% of non-DHP households described particular DHP-related factors about which they would like to know more. Some common themes were related to DHP efficiency, cost and functionality. Among all non-DHP households, almost seven in ten would go online or use Internet sources for additional information, 10% would refer to utilities, and nine percent would seek information from HVAC contractors. Some of the other responses included NEEA, libraries, newspapers, the American Heating and Refrigeration Association and consumer reports. Table 20 presents further details on preferred information sources.

Table 20: Non-DHP Households' Preferred Sources for Additional Information

Source (n=203)	Responses
Internet/online	66%
Utility	10%
HVAC contractor	9%
Friends/family I trust	4%
Electrical contractor	4%
Local retailer	3%
Manufacturer	2%
Phone book	2%
Other	2%
Refused	1%
Don't Know	12%

Q29. Where would you go if you wanted more information about DHPs? Multiple responses allowed for Q29.

The primary heating sources among non-DHP households were ducted heat pumps (22%), forced air furnaces (21%), wood heat (21%) and baseboards (12%). Sixty percent of non-DHP

households had no cooling while 15% use ducted heat pumps and 10% use window air conditioning. Appendix F (Table 38 and Table 39) includes additional details.

5.2 Installers Phone Survey

Evergreen completed 187 phone surveys with DHP installers in May, June and July of 2013. As shown in Table 21, we completed 98 surveys with firms that were known to have interacted with the Initiative in some way (e.g., attended an orientation, working directly with a partner utility), and 89 surveys with other firms with no known interactions with the Initiative. The overall sample design provided a confidence/precision level of 90/10 at the regional level, and the survey results presented in this section are weighted to reflect the regional distribution of installers.

Table 21: Installers Final Survey Completes[3]

Installers Interacting with Initiative	Completes
Oriented – Installing	41
Oriented – No Installs	45
Non-Oriented – Installing	2
Non-Oriented – No Known Installs	10
Total Interacting	**98**
Other Northwest Installers	**Completes**
Rural – Large	0
Rural – Mid Large	3
Rural – Mid Small	8
Rural – Small	20
Urban – Large	0
Urban – Mid Large	0
Urban – Mid Small	8
Urban – Small	50
Total Other NW Installers	**89**

[3] Among the other Northwest firms, there were very few in the Large categories and relatively few in the Mid Large categories. These groups also included distributors that do not directly install DHPs, which were dropped from the survey during initial screening.

Business Practices

The most popular DHP brands currently offered by installers are Mitsubishi (71%), Daikin (44%), and Fujitsu (39%). Only eight percent of installers offer the next most popular brand – Panasonic. Nearly three-quarters of all installers do not plan on offering any more DHP brands in the next 12 months. Half of the firms started installing residential DHPs before 2006. Some began as early as 1989, and others as recently as 2013. Appendix G, Table 49, includes additional details.

Almost all firms reported as having at least one person attend manufacturer trainings on DHPs and almost seven in ten firms plan to send additional staff to training in the next year. On average, almost four persons from each firm have already received DHP training.

Across all firms, the average residential installation cost for single-headed DHP installations, including all equipment and labor, was estimated to be $4,000. Firms trained by the Initiative estimated an average installation cost of $3,911 for their residential customers, whereas the rest of the firms' estimates averaged $4,066.

Table 22 displays the most common reasons why DHP installations do not receive utility incentives. Nearly one-third of installers cited the home's heating fuel type as a cause for not receiving an incentive[4]. Other common responses included installs outside of the primary heating/living space or done in an ineligible building type. Sixteen percent of installers also noted that local DHPs programs were not available, or had expended their incentives budget.

Table 22: Reasons for Installs With No Incentive

Reason	Installation Contractor Responses (Percentage) (n=138)
Home heating fuel did not qualify	32%
Indoor application did not qualify – not primary heat/living space	20%
Building type	17%
No local program/incentives ran out	16%
Don't know	8%
Customer didn't want	8%
Disliked utility program requirements	6%

Q24. (If some installations non-incented) Why did some installations not get incentives through a utility? Multiple responses allowed.

About 11% of 2012 residential installations were of the "short run" or "concealed duct" type. Nearly eight percent of installers said that all of their 2012 installs were of this type, while 62% said that none of their installs included these systems.

[4] Incentive only available for DHP installed in the primary living space in a zonal electrically heated home.

Installers estimated that they had installed more than 3,500 cooling-only DHPs in 2012. The cooling only unit sales did not increase for most of the installers (67%) in the past 12 months. Installers explained that some customers tend to prefer cooling-only units for three main reasons: many customers are happy with their existing heat source; prices are lower; and/or they only want to cool a specific location.

As displayed in Table 23, 73% of installers expect their DHP sales to increase in the next two years, seven percent believe that DHP sales will decrease, and 18% said that sales would remain about the same. Among the installers who expect increasing DHP sales, 14% expect an increase in one-to-one systems, 16% expect increases in multi-headed systems, and 70% expect an increase in both types. They cite increasing awareness among customers due to better advertising, an increase in rebates or incentives, a better economy, and the efficiency/ease of installing systems for the optimistic outlook.

Table 23: Installers' Sales Expectations

Response	Installation Contractor Responses (Percentage) (n=187)
Increase significantly	33%
Increase somewhat	40%
Remain about the same	18%
Decrease somewhat	6%
Decrease significantly	1%
Don't know	2%

Q45. Compared to your total 2012 sales of residential DHPs, do you think your sales in the next two years will: Increase significantly? Increase somewhat? Remain about the same as 2012? Decrease somewhat? Decrease significantly?

Installers that expect future sales to decrease based their predictions on a deteriorating economy, decreasing natural gas prices, and the loss of rebates or incentives.

Nearly all of the Initiative participant (99%) and non-participant installers (95%) are recommending DHPs to their residential customers. The most common reason for not recommending DHP systems to their customers was that the current heating/cooling systems were still working.

Table 24 displays the various applications that installers have recommended DHP systems for. The most common recommendation for DHP systems is for spaces that were previously unheated or were new additions to existing homes (e.g., basements, in-law units, garages), followed closely by homes with zonal electric heat. Less than half of the installers recommend installing DHPs in manufactured homes.

Table 24: DHP Recommendations by Application Type

Response	Installation Contractor Responses (Percentage) (n=175)
Spaces that were previously unheated or new additions	95%
Homes with zonal electric heat	91%
Homes with wood heat	85%
Commercial spaces	85%
Homes with oil heat	76%
Homes with gas heat	72%
Newly constructed homes	66%
Multifamily homes	63%
Manufactured homes	45%
Other	13%

Q49. Which of the following applications have you recommended them for? Multiple responses allowed.

Marketing and Outreach

As displayed in Table 25, most firms do not do any marketing for DHPs. Those who do engage in marketing tend to focus on single-family homeowners that may be remodeling or making upgrades, and homeowners with electric/zonal/resistance heat.

Table 25: Marketing Media Used by Installers

Response	Installation Contractor Responses (Percentage) (n=187)
None	51%
Print – flyers	16%
Company webpage	15%
Radio	14%
Print – newspaper ads	12%
Home/trade shows	11%
TV	6%
Social media	6%

Q58. What types of DHP marketing, if any, has your company done? Multiple responses allowed.

On average, installers estimated that 43% of DHP purchasers specifically asked for DHPs while the rest, 57%, did not request DHP systems but were seeking to improve their heating or cooling. Seventy-three percent of installers reported that the percent of customers specifically asking for DHP systems had increased in the past 12 months.

The majority of installers (90%) use materials from their supplier or manufacturer when talking to customers who are not familiar with DHPs, and 34% use materials distributed by the Initiative. One in two installers stated that additional marketing materials and additional manufacturer support would be beneficial.

The most commonly reported barriers to selling DHPs were the installation costs and the DHP appearance. Thus, 76% of installers stated that utility rebates are very important or extremely important to DHP sales – 15% felt rebates are somewhat important.

Only 38% of installers reported that utility financing is available in their service area, and three-quarters of these installers felt utility financing was at least somewhat important for DHP sales. Appendix G, Table 55, includes additional details.

Initiative Awareness and Interactions

Nearly 75% of the non-interacting installers reported that they were familiar with NEEA's DHP Initiative. Among these installers, half said that someone from their company had attended a contractor orientation session in the past.

Among the companies that had not yet attended an orientation, 42% said they were extremely or very likely to attend an orientation in the next 12 months. For the 27% that were not very or not at all likely to attend, the key issues were time constraints and a lack of installations and/or customer interest in DHPs.

Table 26: Likelihood of Attending a Contractor Orientation in the Next 12 Months

Response	Installation Contractor Responses (Percentage) (n=52)
Extremely likely	18%
Very likely	24%
Somewhat likely	26%
Not very likely	14%
Not at all likely	13%
Don't know	6%

Q69. (If no company staff had attended an Orientation session) Earlier you said that no one from your company had attended a Contractor Orientation session on DHPs. How likely do you think it is that you will have someone attend in the next 12 months?

Thirty-five percent of installers familiar with the Initiative had contacted DHP Initiative staff, most often to discuss utility rebates/incentives. Overall, the vast majority of installers (92%) were extremely or very satisfied with the responsiveness of Initiative staff to their issues or questions. Appendix G, Table 58, includes additional details.

Table 27: Reasons for Contacting Northwest Ductless Staff

Reasons	Installation Contractor Responses (Percentage) (n=71)
Utility rebates/incentives	39%
Marketing/promotional assistance	19%
Enroll in program/application	17%
DHP equipment eligibility	15%
Technical installation/best practices	12%
Master installer eligibility	10%
Don't know	9%
Webinar/training	8%
Forms/paperwork	5%

Q74. Regarding what issues or questions (have you contacted Northwest Ductless staff)? Multiple responses allowed.

5.3 DHP Suppliers Interviews

Evergreen staff interviewed regional sales managers for five DHP manufacturing firms and five DHP distributor companies. All of the interviews were completed in May and June of 2013. The primary objectives of the interviews were to learn about suppliers' marketing and business practices, understand their interactions with the Initiative, distinguish expected market trends and identify any additional assistance needed from NEEA.

Marketing

All of the DHP suppliers promote both single and multiple head systems, as both can serve different customer needs (and contribute to firm revenues). The DHP manufacturers are mostly marketing to distributors and contractors via equipment trainings, advertising in trade journals (e.g., HVAC News), architecture and engineering magazines, television shows (e.g., Designing Spaces), radio programs (e.g., Fox radio) and press releases. One manufacturer targets households via national magazines (e.g., Sunset, Better Homes and Gardens), home improvement trade shows and national television. They also use local radio and print media when partner distributors want to use Initiative co-funding. The distributors primarily promote DHPs to local dealers and contractors using cold calls, equipment trainings, company flyers, and "lunch and learns" with manufacturing sales representatives. Two distributors were also marketing to households through Internet advertising, newspaper advertising, home shows, cable television, and social media.

Notably, the suppliers have adopted NEEA's messaging in their marketing strategies. In their messaging, the firms usually emphasize multiple benefits (e.g., energy efficiency, zoning/controllability, ease of installation, bill savings, (some) local rebates), and four suppliers reported that they are starting to emphasize "comfort" and "better living" themes more than other benefits. One firm recently stopped referring to "mini-split" heat pumps and

only uses the term "ductless" now, which “is an easier concept for people to understand.” None of the suppliers described any conflicting marketing from NEEA’s Initiative.

One manufacturer has products in Costco stores while another has DHPs in Home Depot stores; both of these manufacturers work with local distributors to establish their retail channels. A third manufacturer sells through Sears Home Improvement stores, which do the installations using only contractors trained by the manufacturer (Sears maintains the warranty). The other two manufacturers do not use retail channels due to the intensive labor required to establish and train a large network of product-knowledgeable contractors, and concerns about installer cost mark-ups (one large retailer’s contracts require installers to pay them 10% of revenues from leads generated.)

Sales Trends

Daikin and Mitsubishi are the brands most often stocked by distributors, owing to their high efficiencies, brand recognition and perceived reliability. Many factors drive customer decisions, however, and distributors usually carry multiple brands at different price points. In addition, state and federal tax credits can drive stocking and sales of particular single and multi-head models that are eligible for the credits. Not surprisingly, low ambient (i.e., cold weather) models are more popular in Idaho, Montana and eastern Washington. One manufacturer expected to gain market share quickly with a new 12.5 HPSF, 28.5 SEER model that it has presold to two large distributors.

Some suppliers perceived a sales dip early in 2012 due to the lapsing federal tax credits, followed by a rebound. According to the suppliers, the federal tax credits do improve sales of specific, eligible models; however, they reportedly have a small impact on the overall market. In comparison, state tax credits can go up to $1,000 and are much more influential. Similarly, multiple suppliers stated that utility rebates increase DHP sales (and have more impact than federal tax credits), and noted that some customers will wait for expected utility promotions. That said, multiple suppliers stated that non-incented sales seem to be increasing, and may comprise 50% of the market.

Multiple suppliers reported that small commercial installations are increasing rapidly (with no incentives), and that “market transformation is occurring” in this sector. These projects do not require 3-phase power and gas removals and can be easier to do than residential retrofits. Some manufacturers estimated that the commercial market share of DHP sales may be as high as 30%. One supplier speculated that many commercial projects use cooling-only DHPs – in computer rooms and restaurant kitchens.

Most suppliers reported low current market share for manufactured homes DHPs (less than five percent), although this segment accounts for 15% of sales for one distributor. High growth is expected in this large, untapped market due to more common utility rebates, technology suitability, and high customer satisfaction (customers prefer DHPs significantly compared to noisy electric furnaces in closets). One supplier, however, noted that the federal

requirement for a HUD sticker on indoor ducted fan coils is driving up costs and causing market confusion – most DHPs do not have a vertical air handler with a HUD sticker, but one brand does and inspectors incorrectly think the stickers are needed for all DHPs.

Perceptions of the new construction market varied by company; collectively, the manufacturers were observing growth in multiple submarkets. One manufacturer was starting to do many single-family builder bids, starting initially with "green" builders and optional installations and more recently working with three large production builders to make DHPs standard equipment. The manufacturer expects that these builders (in Oregon, Washington and a national builder) will help "to mainstream" DHPs for the whole Northwest market. Another manufacturer was already seeing rapid growth of multi-head installations in large and/or custom homes, and expected this trend to continue. In contrast, two other manufacturers were observing more rapid growth in the multifamily new construction market, noting that projects with 200 to 400 units were becoming more common. Collectively, the manufacturers generally placed the share of DHPs going into new construction between 10 and 20%.

While the manufacturers were starting to see some minor growth in the multifamily retrofit market, they noted that this market is still difficult to penetrate due to cash-constrained property owners and split incentives, and emphasized that utility rebates are required to make more progress.

Interactions with Installers

Three manufacturers (with high market shares) run very comprehensive contractor training and marketing programs in collaboration with distributors. Although there are variations in the details, the programs generally have combinations of: high levels of technical training (usually subsidized but not free), templates and co-funding for approved marketing messages, equipment financing and additional rebates from distributors, extended warranties, requirements for annual installations and assistance developing Internet advertising (e.g., YouTube). Conversely, another manufacturer (a newer market entrant) does no contractor training, and expects that installers will stay with their very efficient DHP models after completing a few successful installs. The last manufacturer has a minor presence in the Northwest and does not get involved with distributors' interactions with contractors.

The suppliers reported that about 10% of installations have problems, typically related to line set flaring or undercharged refrigeration. Moreover, in Oregon and Washington, where regulations require electricians to do the wiring, electricians sometimes use 220-volt wire that stops communicating. The manufacturer and distributor trainings discussed above focus on these technical issues in particular.

Regarding installation costs, a few suppliers think they are higher in the Northwest than other regions but could not say why or by how much. One supplier noted that Northwest DHP installers build-in electrical contractor fees, which adds $350 to the cost, $400 with a markup.

Some suppliers believed that installation contractors partially "capture" utility rebates through inflated prices; some did not, and most were not sure.

Two manufacturers noted that installation costs have already declined as "phase 1" installers have gained knowledge and improved practices, and stated that costs are not likely to decrease significantly . Some suppliers speculated that installation costs might still decrease slightly with market competition, while others thought costs could increase to cover other rising costs (e.g., health care, refrigerant, permitting).

Four of five distributors said they would sell DHPs to trained electricians with refrigerant licenses, and one already does this occasionally. Overall, the distributors did not think electricians could grow the market significantly.

One manufacturer plans to introduce a less expensive product in 2014 that only requires cutting small holes in the wall, and will be "very close" to a do-it-yourself (DIY) model. This product is already being piloted in the northeastern states, and attracting a large amount of retailer interest. This model has a patent-pending quick connect line set and does not need a licensed HVAC contractor or electrician. The other manufacturers are less enthusiastic about DIY installations in the U.S. and have no plans to facilitate them. In Japan and Europe DIY models are sold in retail outlets and often go into apartments. Japan in particular has few government regulations on refrigerant handling. One of the manufacturers requires a trained installer in Japan to ensure performance (or the warranty is void), and stressed that NEEA should require this too. Most of the manufacturers advised against promoting DIY installations, because: refrigerant can cause severe burns, DHPs require proper sizing to household size, and even experienced installers sometimes make mistakes. Overall, the manufacturers were concerned that poor installations and/or safety problems could damage their long-term reputations.

Project Interactions and Impacts

Most suppliers had attended regional Initiative workshops in the past year, and some had given presentations on their DHP brands. The manufacturers proactively contact the Initiative when they develop new models that should be added to the qualified products list. One manufacturer had recently developed a new marketing handout in collaboration with NEEA "to reduce the engineering-speak" and make the messaging more understandable to households. The new marketing handouts are given to distributors to hand out to households at home improvement shows. One distributor had also collaborated with NEEA to develop a new marketing piece, and others noted they have used Initiative marketing templates and messaging in the past.

Multiple suppliers recognize that the Initiative is increasing customer awareness of the technology. One manufacturer described growth in the Northwest market this way: "it was initially started by Mitsubishi and Fujitsu coming to the U.S., which created a critical mass of similar messaging. Mitsubishi was struggling initially and then Fujitsu corroborated their

messaging. Then NEEA came in and added many facts and figures, and more validity." Suppliers also mentioned the following impacts:

- One manufacturer designed new models to fit the Initiative.
- One manufacturer has worked closely with NEEA to develop coordinated marketing and rebate campaigns in Oregon with local dealers and contractors. This company has increased its market share in Oregon from five percent in 2008 to over 30%, due to campaigns like these and aggressive dealer and contractor trainings.
- One manufacturer greatly appreciated NEEA's assistance establishing a large retail marketing channel, which is "moving the market a lot." NEEA helped to create special incentives and sales messaging for retailer staff and the approved contractors that staff booths in stores.
- One distributor has added more brands and stock over the years to more effectively serve growing and diversifying demand.
- One manufacturer stated that there is no program like NEEA's with strong utility involvement "west of the Mississippi," and that the Initiative has helped him to train staff in other U.S. markets, particularly on installation best practices.

Future Expectations and Needs

The suppliers did not expect many aesthetic changes for DHPs, but they did expect some technical and installations changes. A few suppliers noted that more models are coming out with wireless-compliant thermostats and auto programming modes. SEER ratings are still increasing to over 28 and more 0-degree models are coming out. One manufacturer said they might offer their very popular, low-ambient single head product as a multi-head product also.

Notably, three manufacturers reported that concealed, short-run/slim duct projects with ceiling mounted DHPs are increasing rapidly, because the fans are quieter and many households do not want to see indoor units. Many popular hotels are already using these configurations. One of the manufacturers will release a new product in 2014 with no wall-mounted DHPs. This system scales down large commercial heat pump systems and applies inverter-driven technology to traditional forced air ducted systems. The manufacturer believes that the new technology "will transform the ducted and ductless markets."

All of the suppliers expect their Northwest sales volumes to increase in the next few years, and three have developed forecasts to grow 20 to 30% annually over the next five years. Compared to other regions of the country (e.g., New England), the Northwest market is still very young with high, untapped potential. Some of the reasons given for expecting this growth include:

- Evidence of emerging market transformation – some manufacturers believe that non-incented installations comprise nearly 50% of their sales
- Public awareness of DHPs is growing
- Contractors are improving their sales techniques

- One manufacturer expects to release a lower priced "DIY" install product
- Some households will be attracted to units made in the U.S.
- Increasing new construction installations will help to mainstream the whole market
- Customers are very attracted to zonal heating and cooling

The primary barriers to growth were reported to be, 1) total installation costs that are still too high for some households (i.e., income levels) 2) lacking awareness of the technology and technical performance, and 3) indoor head aesthetics.

The suppliers generally thought that the region's long-term goal to have DHPs installed in 85% of homes with electric zonal heat is too optimistic without significant market interventions like very high utility rebates for lower income households or even direct (free) installations. Although more households appear to be buying DHPs without utility incentives, many buyers still require rebates, which suppliers feel will be required for the near future until DHPs acceptance grows further. That said, lower-income households (often with poor credit ratings) will always have difficulty purchasing DHPs, according to the suppliers.

Regarding "feasible" long-term installation rates, one supplier thought adoption might reach 50% before 20 years, and eventually cap out at 60%. Another supplier estimated that adoption would reach 35 to 50% in 20 years and did not speculate beyond that time horizon. This supplier also believed that new construction will migrate to larger variable refrigerant flow (VRF) systems with ducting, and that traditional ducted furnaces will be relatively inexpensive. Another supplier believed adoption could reach 50 to 75% in more than 10 years with very aggressive marketing by the Initiative and continuing utility rebates.

The interviewees gave the following suggestions for additional help from the Initiative:

- Continued assistance partnering manufacturers, distributors, contractors and local utilities to develop coordinated promotional campaigns
- Case studies and mailers for residential builders showing that indoor heads are not needed for each bedroom (i.e., two indoor units are sufficient), since many models "over-perform" and distribute heating/cooling beyond 30 feet
- More sales and design oriented classes for contractors, so they are less reliant on DHP suppliers
- Continued co-op marketing funding
- Monthly newsletters or quarterly calls/webinars for suppliers to discuss new marketing efforts and rebate changes in the regional markets

5.4 Manufactured Homes Manufacturer and Retailer Interviews

In the manufactured homes sector, we spoke with three individuals – a manufacturing plant sales manager, and two retail sales managers. All of the interviewees were in a sales role with their company and had worked with DHPs for two years or less. One retailer installed a DHP in their office just under two years ago for marketing purposes but will not start selling homes

with DHPs until they receive pricing information from manufacturers. This retailer was only able to speak to future plans rather than actual experience selling homes with DHPs.

Regarding their current marketing practices, one retailer points customers to the DHPs in two of their display units and explains the benefits and DHPs, and provides an informational flyer created by the Initiative. The manufacturer gives in-person demonstrations of DHPs in their display units and gives customers informational materials prepared by NEEA. The other retailer plans to give customers brochures to market their DHP homes. The target market for these three firms is 400 to 1,200 square foot residential homes with buyers who are around retirement age, energy conscious, and sometimes own a second home.

All firms promote similar benefits in their marketing messages to clients – energy and monetary savings, comfort, equipment quality, and rebates. Both homes retailers said NEEA's Initiative has influenced their marketing by directly providing marketing materials (such as flyers, funding display units, $1,000 credits to makers/distributors) or through training on DHPs. One retailer said future advertising funding from the Initiative would be very valuable.

The manufacturer and an active retailer primarily sell single-head systems, which are best for air distribution and offer a more "cohesive" airflow. According to the manufacturer and retailer, single heads are suitable for smaller homes and fit well into the manufactured homes market.

When asked about the impact of NEEA's Initiative on their sales, the manufacturer and active retailer stated that NEEA was essential in getting DHP information to the public and that they can attribute their recent sales increases to NEEA's work in the market. The retailer reported that their company had sold eight units with DHPs in the last year and a half (a high volume for them), and that 50% of all sales now have DHPs. The homes manufacturer reported that they have had "great customer feedback" from their homebuyers. Neither the manufacturer nor retailer reported problems meeting market demand.

Neither businesses that sell manufactured homes with DHP noted significant technical problems nor had DHPs returned due to technical failures. On a minor note, they sometimes have to adjust the outdoor unit placement for buyer aesthetic preferences, or install the exterior unit on-site if buyers are concerned about transporting the home with the unit on the rear hitch end. Currently the maker and retailer do not charge extra for these cases; the overall home price includes an average equipment/installation cost. The retailer estimated that DHPs add $5,000 to the cost of the homes, which includes a $500 markup (i.e., profit margin).

All three interviewees reported that the Initiative has helped to solidify their understanding of DHPs, develop a marketing strategy, and become more optimistic about the future of DHPs in the Northwest region. Moreover, all interviewees said customer interest in DHPs is increasing, particularly for smaller "park model" homes, and that sales are likely to increase too. While utility incentives will help drive this increase, they may not be a primary factor.

The interviewees cited cost as the highest barrier to DHP sales. Other barriers include older populations unfamiliar with and uninterested in the "new" technology, aesthetics, and the risk of DHP pipes freezing in especially cold climates.

5.5 Northwest Utility Interviews

Our team completed 24 interviews with utility representatives regarding their participation in NEEA's Initiative. The primary objectives of the utility interviews were to:

- Understand utility program offerings and promotions, and expected changes
- Identify utility program delivery challenges
- Understand satisfaction with the Initiative and if needs are adequately met
- Determine how NEEA can improve its assistance to utilities

Respondent Characteristics

The utilities in the sample included 13 that NEEA identified as high priority targets for interviews. We selected the remaining utilities to include a mix with significant participation increases or decreases from 2011 to 2012. The 24 utilities together account for about 67% of all DHPs installed through the Initiative in 2012. While the volume of installations among the sampled utilities increased from 3,767 in 2011 to 3,890 in 2012 – a 3.3% gain – the number of installations for the Initiative overall increased by 9% – from 4,833 to 5,289. Several of the recently enrolled utilities had zero or very few installations for both 2011 and 2012, having become more active in the program since the start of 2013.

Table 28: Utility Respondents by State and DHP Installations

	2012 Installations						No. of
State	< 50**	50-100	101-500	501-1000	> 1000	Total	Units
Washington	7	4	1	0	1	13	1,882
Oregon*	3	1	1	0	1	6	1,667
Idaho	1	0	1	0	0	2	145
Montana	2	0	1	0	0	3	196
Totals	**13**	**5**	**4**	**0**	**2**	**24**	**3,890**

* Oregon respondents include Energy Trust.
** Several Washington utilities were new participants and had installations until 2013.

According to the representatives we interviewed, the most common reasons for offering a DHP program are the suitability of the technology for customers with zonal or other electric heating and utility desires or regulatory obligations to provide multiple energy efficiency alternatives to customers. Several small utilities noted that BPA and NEEA's involvement makes their own program participation possible and gives credibility to their program offering.

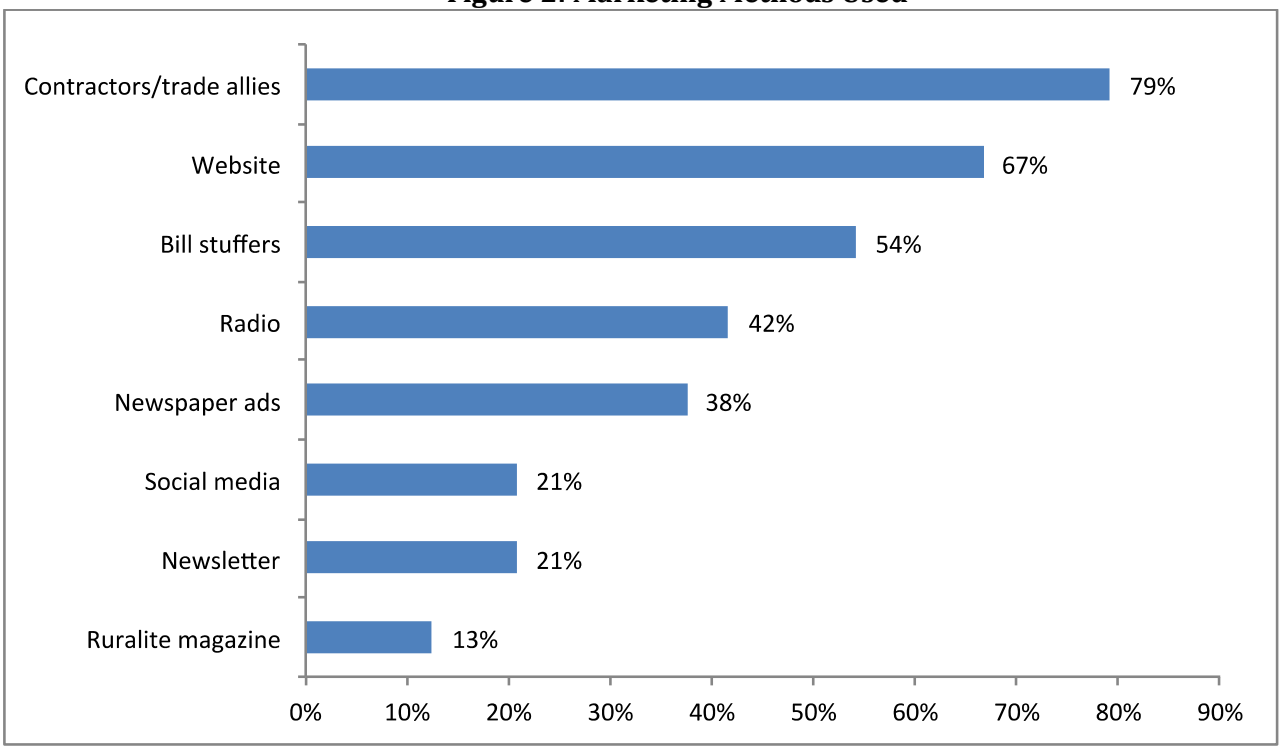
Target Markets

All of the utilities are targeting existing homes with forced air heating, with about half of the utilities specifying homes with baseboard or Cadet heating. Several representatives also perceived significant market opportunities in the manufactured homes and electric furnace segments. One utility representative noted that homes heated by poorly maintained ducted heat pumps are also a potential market for DHPs.

Marketing Methods and Messages

Evergreen asked the utility representatives to name the methods they use to promote their DHP program, with results shown in Figure 2. More than half of the representatives mentioned trade allies, the Internet, and bill inserts among their marketing methods. Five representatives (21%) mentioned social media (Twitter and Facebook), fewer than those citing more traditional media such as radio and newspaper ads.

Figure 2: Marketing Methods Used



Eight of the 24 utilities have a DHP display unit, and three representatives said they used it primarily to bring to home shows or other events. None of the units were fully operational, although three installed at utility offices were described as "plugged in" and blowing air. Reportedly, this has not affected the usefulness of the display units, since homeowners can see the size of the unit and the relatively unobtrusive installation.

Promotional spending had remained level over the past year for 16 utilities, with four utilities reporting an increase and four a decline. Twelve utility representatives cited contractors/trade allies as the most effective marketing method, while eight said that they had found customer testimonials and word of mouth most effective. All but one of the representatives said they do use the displacement theory to educate customers and contractors about DHPs, with most noting that customers are reassured by having a back-up system in place. One representative said that local building codes prohibit exclusive reliance on DHPs, and hoped that NEEA might help initiate a code change. The one representative not using the displacement theory believed most of the systems they installed (in Washington) relied exclusively on the DHP.

Nineteen utility representatives did not expect significant changes in their promotional efforts in the next year. Among the four who expect an increase in promotional spending, two mentioned the expansion of the program to include manufactured homes and resistance furnaces, while two said they would increase their use of specific marketing channels: one for newspaper ads and another for "door hangers that contractors can download and print, as well as behavioral ads on the web." The one representative who expected a decline in marketing said that their utility would be ending their program..

Current and Anticipated Rebate Levels

All but two of the utilities provide rebates for existing zonal heating, with rebate levels ranging from $750 to $2,670 (the latter specifying: not to exceed 70% of installed cost) and averaging just over $1,300. As noted above, one small utility was ending its program. The other utility had suspended all energy efficiency incentives because it had attained all its conservation goals for 2013 by the end of March. Even though this utility expects to have a DHP program available again later in the year, we did not include the pre-suspension rebate level ($500) in the summary of current rebates, below.

Table 29: Number of Utilities Offering Various Rebate Levels

Rebate Amount	Single Family Zonal Incentive	Single Family Furnace Incentive	Mftd. Home Zonal Incentive	Mftd. Home Furnace Incentive
> $2,500	1	0	0	0
$1,500	9	9	1	9
$1,001 - $1,499	5	4	0	2
$1,000	4	2	0	2
$501 - $999	3	2	2	3
None	2	7	21	8
No. of utilities	**24**	**24**	**24**	**24**

For utilities that receive energy efficiency funding from BPA, the rebate level is based on the incentive reimbursement amount provided by BPA, and most representatives said that their rebate levels and rebate availability would be directly determined by future BPA funding. Among the four utilities that reduced their rebates in 2012, one is using $80 of the $1,500 paid to customers last year to pay for inspections. Other utilities with lower rebates attributed the reductions to "wanting to make money go farther," "standardizing the rebate at $1,000 for both ducted and ductless systems," and the need to restructure programs to make them more cost effective.

Most representatives did not foresee their rebate offerings changing within the next two years, although almost half (10) said that BPA determines their rebate levels. One BPA-funded utility representative hoped the rebate would remain the same, because "changing the rebate amount frustrates both customers and contractors." Another two utilities said rebates might change depending on actual savings and on recommendations from the Regional Technical Forum (RTF), with one noting, "savings may be less than anticipated." One utility is considering a direct install program for low-income customers.

None of the utility representatives believe rebates will end in the near future, with many reiterating that their ability to offer incentives is wholly dependent on BPA's decision to keep funding them. One representative said they might consider eliminating rebates "in about three years" if the market matures sufficiently.

DHP rebate budgets range from less than one percent to about half of utility residential energy efficiency portfolios. When asked about their utility's long-term vision for DHPs, 20 of the 24 utility representatives said DHPs will remain a high priority for them, with several offering comments on the large remaining potential for DHPs, such as "80 to 85% of the market for DHPs is still untapped." One representative rated DHPs a medium-high priority because they "see duct sealing as a higher priority with a bigger target market." Another representative said

DHPs are a low priority because 85% of their customers are industrial, while one representative said they "would like to see more heat pump hot water heaters."

Financing

Just 10 of the 24 utilities offer financing for DHP purchases (primarily the larger utilities). Many smaller utilities do not have the staff resources or infrastructure to support a financing offer, and several had offered financing programs for other measures in the past and found them to be burdensome. Representatives of these smaller utilities stated that after the rebates, the out-of-pocket cost for DHPs was relatively small. Among those who offer financing, only four said loan repayment was available on the utility bill. Interest rates ranged from zero to 7.8 percent, with maximum loan amounts up to $7,500. The percentage of customers actually utilizing financing ranged from less than one percent to 70%. The utility with 70% participation offers variable interest rates ranging from three percent for five years to four percent for 10 years. Even some of the utilities offering 0 percent financing said customers rarely used it, because “the rebate is so good.”

Contractor Support

Twenty of the 24 utilities provide support to DHP installers, most frequently via an approved or preferred contractors list (14), training (5), advertising or co-op advertising (5) and website links (5). Most said their support was unchanged in the past year, but one noted that they were planning to add a co-op marketing program that would allow contractors to print door hanger promotional materials. The number of installers that utilities reported working with varied with the size of the territory, ranging from three to over 100.

Goals and Barriers

Only four of the representatives said they had failed to meet their 2012 installation goals, although a number of utilities did not have explicit goals, or had targets in combination with other utilities. Utilities that did not meet their goals attributed the shortfall to the economy (1), a single very active contractor going out of business (1) or goals that were overly ambitious (2). One representative reported that their installations had increased for the last three years in a row as they have trained more local contractors.

While most utilities did not change their goals for 2013, three had established higher goals and three had lower goals. Those with lower goals explained that they were being more realistic or that they had already captured “the low hanging fruit.” Among those with higher goals, one expected increased installations from newly eligible electric forced air furnace homes, and another expected installations to more than double due to increasing contractor referrals and newly eligible manufactured homes.

Only the Montana utilities noted any customer concerns regarding cold climate, and most felt that success stories and testimonials from successful DHP installations could overcome this concern. One Montana utility was more concerned about customers who use wood heating

and want to switch to DHPs, which would increase electricity use. Most utilities, however, saw the stagnant economy as a much more significant barrier to DHPs adoption, particularly in rural areas.

Inspections

Three utilities do not do any installation inspections, due to their long experience with DHPs. Among the other utilities, 12 inspect all installations, while the other nine inspect up to 20% of installations at random, with most saying they inspect about 10%. None of the representatives reported any problems with the inspections outcomes or process, and none needed additional assistance from NEEA.

Regional Initiative and Coordination

Following is a tabulation of who the utilities work with to administer their programs:

- 13 work mostly with Fluid (NEEA's PMC)
- 7 work mostly with BPA
- 3 work with Fluid and BPA
- 1 works with Fluid and NEEA

Of the 17 who work with Fluid, most (10) use their own database, while the other seven use Fluid's database, which all described as working well. The 18 utilities that report results to BPA include 16 that report monthly or as data is received, and two that report two to four times a year. Thirteen of those who provide data to BPA include detailed information such as name, address and DHP model, while the remaining five said they do not provide these data for confidentiality reasons. While most utility representatives said the reporting process is working well, two mentioned that BPA had been having problems with its system, and another described the process as "cumbersome."

Regarding webinar attendance, 18 of the 24 representatives (or other staff) regularly attend; the other six said they attended occasionally or were "too busy." The only suggestion for improving communications was that "NEEA and BPA should coordinate better on the weekly conservation e-mails."

Information and Support

Seventeen of the utility representatives said they had used the Initiative website in the past three months, with the number of visits ranging from "once or twice" to 20 times.

- All but one of those using the website said they had been able to find the information they needed, the exception being a utility manager who was unable to find information on the inclusion of forced air furnaces in the program.

- Primary information sought by utility staff from the website included: contractors' names or certification status (11), program forms and marketing materials (7) and general program information (4).
- Those who did not use the website said they typically get information through emails from program staff or phone calls.
- The only suggestion for improving the website came from previously mentioned respondent who wanted information on forced air furnace eligibility.

Representatives that had used the Initiative's technical resources and marketing support were highly satisfied; only three representatives had not used the technical resources and five had not used the marketing support. Those not using the Initiative resources tend to be the larger utilities; co-ops and other small utilities rely on this support, with all representatives saying they were very satisfied or satisfied with the technical and marketing support provided.

When asked what features of the Initiative had worked particularly well for them, most representatives described not individual features, but rather a package of features: a relatively simple, proven technology; moderate cost and significant energy savings; and, perhaps most important, a "turnkey package" that provides support and assistance enabling even small utilities to offer DHPs to their customers.

Regarding how NEEA might better serve them, most representatives reiterated their overall satisfaction and the few suggestions generally focused on getting more resources or finding other technologies that they could promote as successfully as DHPs. The only other specific suggestions were: 1) finding a way to extend the program to multi-family housing, 2) a request for a display unit and 3) asking manufacturers to offer units with heating set points below 60 degrees.

6 Unincented DHP Market Analysis

The phone survey with installation contractors included several questions regarding unincented DHP installations, as NEEA's ACE model uses this information to estimate energy savings for different applications. Commercial installations have increased to 48% from the 34% estimated previously by Research Into Action (memo to NEEA July 21, 2011), consistent with the trends described by interviewed manufacturers. The data also show that residential new construction comprises about one-fifth of the market for unincented DHPs.

Table 30: 2012 Unincented DHP Installations

Installation Application	Percentage (n=1,455 installs)
Total Unincented Installations	**100%**
Commercial	**48%**
Residential	**52%**
New Construction (single and multifamily)	21%
Single Family - In new, add-on space	29%
Single Family - In primary living space	48%
Displaced electric zonal	51%
Displaced gas heat	26%
Displaced electric furnace	10%
Displaced wood or pellet	3%
Displaced oil or kerosene	3%
Displaced other heat	2%
Don't know	5%
Multifamily - In primary living space	1%
Displaced electric zonal	43%
Displaced gas heat	14%
Displaced electric furnace	14%
Displaced wood or pellet	14%
Displaced oil or kerosene	0%
Displaced other heat	14%
Don't know	0%
Manufactured Homes - In primary living space	2%
Displaced electric zonal	46%
Displaced gas heat	0%
Displaced electric furnace	54%
Displaced wood or pellet	0%
Displaced oil or kerosene	0%
Displaced other heat	0%
Don't know	0%

7 Key Findings and Recommendations

Overall, NEEA's Northwest Ductless Heat Pump Initiative is continuing to perform well and make progress towards market transformation. In this section, we present some of the key findings from the evaluation activities, and recommendations for Initiative continuation and refinements.

Key Findings:

1. **Almost 5,300 DHPs were installed by utilities that participated in the Initiative in 2012, compared to approximately 4,800 in 2011.**

2. **Key DHP purchase drivers are a desire for energy efficiency and lower energy bills, lack of existing ductwork and/or poorly functioning heating equipment.**

3. **Households that have installed DHPs have high satisfaction on multiple DHP features – e.g., heating and cooling comfort, noise levels, appearance, and energy bill savings.** While 60% of participants had some concerns prior to purchasing their DHPs (e.g., general functionality, performance in cold weather, appearance), very few had any concerns after installing and using their new DHPs. The vast majority of participants (94%) use their new DHPs for primary heating.

4. **General population awareness of DHPs has increased significantly, from 34 percent in 2012 to 48 percent in 2013.** Households are learning about DHPs from a wide variety of sources, but primarily from word of mouth and friends and family. Households that installed DHPs through the Initiative indicated that utility materials (websites, advertising, displays), contractor information and recommendations from friends and family are key purchase influencers.

5. **The utilities are highly satisfied with the Initiative and the way it is currently being implemented, with few suggestions for improvement.**

6. **The utilities will continue offering rebates and DHPs will generally remain a high priority measure for them.**

7. **NEEA's Initiative has had significant market transformation impacts among DHP suppliers.** Manufacturers have designed new products to fit the Initiative, adopted NEEA's marketing messaging, developed new retail partnership channels and increased market share in areas where they have worked with NEEA and utilities on coordinated marketing and rebate campaigns.

8. **DHP suppliers and contractors expect sales to grow.** Most of the interviewed installers, manufacturers and distributors predict continued DHP market growth. DHP suppliers and installers have capacity to serve this expected growth. Twenty-six

percent of households without DHPs said they are "very" or "somewhat interested" in installing one and households are increasingly approaching heating/cooling contractors to discuss DHPs specifically.

9. **The share of concealed or short-run ducted units is increasing according to interviewed manufacturers.** This is because some customers prefer the lower fan noise levels from ceiling units, and some do not like the appearance of wall units.

10. **Commercial installations are accounting for a larger share of the DHP market.**

11. **Installations are increasing in both single and multifamily new construction.** This should help the single-family retrofits market, as DHPs gain visibility among the general public.

12. **The manufactured homes market has high, untapped potential, and the initial experience of market actors working with the Initiative has been very positive.**

13. **Manufacturers and distributors reported that the share of non-incented installations in increasing.** This finding shows that market transformation is occurring and that more households perceive that the benefits of DHPs outweigh the initial costs in an unsubsidized market.

14. **About half of the surveyed installers are not doing any marketing of DHPs.**

15. **Average residential install costs are about $4,000 and DHP suppliers do not expect them to decrease significantly.** Most surveyed households are getting two to three contractor bids during their purchase decisions. One manufacturer with relatively low market share hopes to launch a less-expensive DIY install product soon after piloting it in the northeastern states. However, other established brands have safety concerns about DIY installs and think this approach could damage brand reputations.

16. **Key barriers to sales growth are installation costs, improving but still lacking market understanding and aesthetics.**

17. **Long-term market adoption by 85 percent of households with zonal electric heat may be difficult achieve.** While the interviewed suppliers are optimistic that the market will continue to expand (some say very rapidly) and DHPs will gain high market share, they noted that there will always be many customers that cannot afford the initial out-of-pocket cost, even after rebates are applied, and household credit requirements for financing are expected to remain stringent.

Recommendations:

1. **Continue broad based, multi-media marketing to further increase public awareness.** Many of the interviewed market actors recognize that public awareness of DHPs is increasing, but noted that additional marketing and education is still needed to grow and solidify the market, which is still in a relatively early stage of development.

2. **Develop incentives to promote additional word of mouth marketing.** Many market actors and surveyed participants reported that recommendations from friends, family and acquaintances are particularly influential in the decision making process (even if DHP information is initially obtained from other sources). The Initiative should always be looking for ways to formalize and incentivize the referral process, to reinforce a growing "snowball effect."

3. **Encourage the utilities to retain their rebate levels for the near future, to enable lower income households to buy DHPs, particularly in the slow-moving economy.** The majority of those surveyed from DHP households reported that utility rebates were at least somewhat important in their purchase decisions. In the longer-term, deeper and more targeted incentives may be required to get the lowest income households to install DHPs.

4. **Facilitate more collaborative, targeted outreach efforts with local utilities.** According to Initiative staff and participating manufacturers, these efforts have been successful in generating short-term bursts of installations, which contribute to long-term word of mouth referrals and public awareness.

5. **Help contractors to develop marketing strategies and collateral.** Although some large manufacturers and distributors do this with selected contractors, it appears that at least half of regional installers are doing no marketing at all.

6. **Continue to target the manufactured homes market.** This market has high, untapped potential and multiple interviewees reported that DHPs are particularly suitable for replacing noisy and obtrusive furnaces in primary living areas.

Appendix A: Glossary

Air Conditioning, Heating and Refrigeration Institute (AHRI). A trade association that certifies the performance ratings of heating and cooling products using independent third party testing.

Air Handler. The portion of a heating and cooling system that forces air through a home's ductwork. Ductless systems have no ductwork, the air handler is most commonly called an Indoor Unit. The indoor unit return air is normally drawn through the top and front of the indoor unit, passed across the evaporator coil and is discharged through the bottom which has a motorized flap controlled by a remote control.

Annualized Fuel Utilization Efficiency (AFUE). A measure of a furnace's heating efficiency. Specifically, it is the ratio of annual output energy compared to annual input energy. The higher the AFUE percentage is, the more efficient the furnace. The minimum percentage established by the DOE for furnaces is 78%.

Airflow. Air volume measured in CFM (cubic feet per minute).

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.

Capacity. Refrigeration capacity by system usually measured in BTU/H or Tons for cooling. One Ton is equivalent to 12,000 Btu/H.

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).

Condenser Coil. Part of the outdoor portion of a heating or cooling system, that releases or collects heat from the outside air.

Cubic Feet per Minute (CFM). A measurement of air volume.

Damper. When used in ductwork, the damper is a movable plate that regulates airflow. Dampers are used to direct air to the areas that need it most. Typically used in zoning applications.

Ducted Split Systems. A system composed of an outdoor condensing unit connected by refrigerant pipes to a ducted type indoor evaporator unit (Fan Coil or Air Handler).

Ductwork. Hollow metal pipes used to transfer air throughout your house.

Electronic Air Cleaner. An electronic device that filters out large particles and bio-aerosols in indoor air.

Energy Efficiency Ratio (EER). Efficiency rating of air conditioning or heating units in cooling mode. It is calculated by dividing the system capacity output per hour by its power consumption (watts). The higher the EER, the more efficient the system.

Energy Guide Label. A large yellow tag affixed to major appliances and HVAC equipment such as central air conditioners, heat pumps, furnaces, water heaters and boilers that provides energy efficiency and operating cost information. The label is designed to help consumers compare the operating cost of similar models.

Energy Input Rating. The amount of input energy delivered at the burner of furnaces, water heaters and boilers, measured in British thermal units (Btus) per hour.

ENERGY STAR. A joint program of the US Environmental Protection Agency and the US Department of Energy. Energy Star qualified ductless systems are highly efficient products that are cost effective solutions to deliver heat or cool air directly into different zones in many residential or commercial applications.

Environmental Protection Agency (EPA). Federal agency that develops and enforces federal environmental regulations. The EPA oversees the nationwide ENERGY STAR program.

Evaporator Coil. Part of the heating or cooling system located indoors, that cools and dehumidifies the air by converting liquid refrigerant into gas.

FLUE. The passageways in heating equipment and vents through which combustion products pass to the outside atmosphere.

Heat Exchanger. The major part of the furnace that transfers heat into a home.

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

HSPF. Measurement of the heating efficiency of heat pumps. The higher the HSPF, the more efficient the heat pump.

Indoor Unit. The evaporator unit, which contains a heat exchanger coil, fan, air filters and remote signal receiver.

Inverter Technology. Compressors with inverter-driven technology reduce power consumption and thus save energy by varying the compressor speed to meet load requirements. The system operates at a more steady revolution, maintaining desired temperature more evenly for better comfort.

Load Calculation. Load calculations consider a variety of factors: location, orientation, construction materials (insulation, brick or siding, etc.), building size, etc. Heating and cooling needs are expressed in BTUs per hour or Btu/h. A "block load" looks at the whole building's requirements as one large room. A "room-by-room" load calculation refines the calculation to determine a room or zone's requirements.

Multi Zone 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.

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.

Scroll Compressor. A compressor that works in a circular motion, as opposed to up-and-down piston action.

SEER (Seasonal Energy Efficiency Ratio). Efficiency rating of air conditioners and heat pumps over the course of the cooling season. The higher the SEER, the more efficient the system.

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.

Upflow. When an air handler or furnace is installed in an upright position and circulates air through the side or bottom and out through the top. Typically used in basement, closet and attic installations.

Variable Speed Motor. A motor that automatically adjusts the flow of warm or cool air for improved comfort.

Ventilator. A system that exchanges stale, re-circulated indoor air with fresh, filtered outside air.

Venting System. A continuous open passageway from the flue collar or draft hood of a gas-burning appliance to the outside atmosphere for the purpose of removing products of combustion.

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: Summary of Evaluation Activities

The following table summarizes the main components of the MPERs that have been completed for the Northwest Ductless Heat Pump Project.

Evaluation Report Components

Analysis Component	MPER 1 (4Q 2011)	MPER 2 (3Q 2012)	MPER 3 (3Q 2013)
Market Characterization	√	√	√
Participants Phone Survey	√	√	√
General Population Phone Survey		√	√
Contractor/Installer Phone Survey	√		√
Contractor/Installer In-Depth Interviews		√	
Manufacturer/Distributor In-Depth Interviews	√	√	√
Utility In-Depth Interviews	√	√	√
Implementation Staff Interviews	√	√	√
Process Evaluation	√	√	√
Review of Cost Effectiveness Modeling	√	√	√

Table 31: Activities/Outputs Theory and Assumption Table

Link	Why will it happen?	How will we know it happened? – Activity Indicator	
		Indicator	Data Source
A	Engaging market actors for training and developing training activities for market actors (contractors, distributors, manufacturers) will result in the supply chain that is knowledgeable about DHP potential in electric homes and understands how to install and sell the displacement approach.	Number of installations and contractors participating in Initiative	Initiative tracking, MPER
B	Initiative provides product support via QA process and highlighting Best Practice Installation Techniques	Monthly QA reports	QA Database, MPER, Initiative Tracking
C	Marketing activities result in campaigns, PSA's PR, marketing templates for product channel and utility partners	PSAs will be present, market actors will support campaigns and adopt Initiative messaging, templates will be utilized	Marketing tracking, clipping services, MPER, Initiative tracking
D	Engage with utilities to participate in the regional NW Ductless Heat Pump Initiative creating plug and play opportunity for utility partners	Utilities offer DHP incentives and incorporate DHPs into Initiative offerings	Initiative tracking, Utility Participation list, MPER
E	Recruiting and engaging with market actors to explore partnerships and collaboration opportunity resulting in an understanding of the business potential of DHP technology in the NW	New partnerships created and increased DHP uptake	Initiative tracking
F	Develop minimum standard and testing procedure for DHPs sold in NW states	Specification and testing standard	Annual Initiative tracking

Table 32: Outcomes Theory and Assumption Table

Link	Why will it happen?	How will we know it happened? – Market Progress Indicator		
		What will you measure	What is your indicator?	Data Source
1	Trainings and QA efforts geared towards market actors highlight business benefits and potential of 1:1 application/displacement approach as a result Initiative approach is incorporated into supply chain and incorporates 1:1 application.	Supply chains approach to electrically heated homes. Manufacturer/distributor adoption of 1:1 application. Contractors selling 1:1 application.	Change in the supply chain's application of DHPs in residential electrically heated homes.	Initiative tracking & evaluation interviews of market actors
2	Product support highlights benefits of 1:1 application and influences supply chain to adopt Best Practice recommendations while highlighting the market potential for DHP technology	Number of Master Installers, contractors participating, and supply chains adoption of Initiative Best Practices	Change in the supply chain's application of DHPs in residential electrically heated homes.	Initiative tracking & evaluation survey of market actors
3	Quality installations, training and sales materials targeting electric homeowners highlighting DHP benefits will result in increase consumer adoption of DHPs	Consumer uptake	Increased consumer adoption of DHPs in electrically heated homes	Regional sales data, Initiative installation data, evaluation surveys of supply chain & consumers
4	Effective marketing efforts raise awareness of DHP technology resulting in increased adoption of DHPs	Consumer uptake, market actor perception and utility participation	Increased consumer adoption of DHPs in electrically heated homes	Regional sales data, survey of supply chain and DHP database
5	Incentives assist in customers overcoming first cost hurdle and result in increased consumer adoption of DHP technology	Consumer uptake and utility participation	Increased consumer adoption of DHPs in electrically heated homes	Initiative installation data, interviews with utility staff and consumers

6	Engaging with market based financing Initiatives will result in market actors understanding of the DHP potential in the NW market creating a business case for financing Initiatives	Financing Initiatives available for DHPS	Customers throughout NW region have access and utilize financing mechanism	Annual Initiative tracking and interviews with purchasers and market actors
7	Engaging with retailers highlighting DHP potential supporting existing product channel will result in DHPs being offered in retail stores	DHP placement in retail channels, product mix and sales strategy	DHP products available in retail channels	Annual Initiative Tracking, shelf surveys
8	Leveraging evaluation results and NW experience with DHP technology will help creating minimum standard resulting in NW states adoption of product standard for sale within the state	Document standards process through progress towards standard adoption	Progress through an established standard making process	State Standard documentation
9	Supply chain adopts 1:1 approach capitalizing on retrofit potential in electrically heated homes. Supply chain success leads to competition and additional actors adopting 1:1 approach.	Supply chain training and marketing material targeting electric homes and displacement theory, consumer uptake and supply chains attitude about DHP market potential in electric homes.	Change in the supply chain's application of DHPs in residential electrically heated homes.	Initiative tracking, surveys and evaluation of supply chain,
10	Increased consumer adoption drives demand resulting in supply chain adopting 1:1 approach in response to demand	Supply chains response to consumer adoption	Change in the supply chain's application of DHPs in residential electrically heated homes.	Initiative tracking, surveys and evaluation of supply chain
11	Consumers purchasing DHPS increases word of mouth and overall awareness of DHP product	Consumer awareness and uptake	Increased consumer awareness	Regional sales data, annual Initiative tracking and survey of consumers
12	Retailers offering DHPs increases visibility and availability of product and overall consumer awareness	Consumer awareness and uptake	Increased consumer awareness	Regional sales data, annual Initiative tracking and survey of consumers

13	Market actors offering financing options for DHPs addresses customers first cost hurdle increasing adoption	Consumer uptake	Increased in NW DHP residential sales	Regional sales data, Initiative installation data, interviews with market actors and consumers
14	State adopting standard will influence Federal Standards process creating minimum product efficiency ratings for DHPs	Progress towards Federal Standard	Progress through an established standard making process	Annual Initiative Tracking
15	Majority of supply chain adopts 1:1 approach resulting in marketing and selling benefits over existing electric resistance heat to NW customers. Supply chain understands the benefits and customers prefer the comfort of DHPs resulting in DHPs becoming the preferred technology in electric heated homes.	Supply chains response, behaviors and applications of DHPs	Increased NW DHP sales in electric homes	Regional Sales, survey of supply chain.
16	Increased consumer awareness of product potential and superiority over existing electric heat results in DHPs becoming preferred technology in electrically heated homes	Consumer uptake and response to DHP technology	Increased NW DHP sales in electric homes	Survey of consumers, regional sales, total Initiative installations.
17	DHPS as the preferred technology increases overall installations displacing electric resistance heat resulting in increased energy savings	Number of installations and their resulting energy savings	Energy Savings	Regional sales data, Initiative installation data, surveys/interviews with supply chain
18	More efficient product is sold as a result of Federal standard resulting in increased energy savings	Federal standard	Federal standard is adopted	Federal Standard Documentation

Appendix D: Survey Instruments/ Interview Guides

Included in this Appendix are:

1) DHP Installers Phone Survey Guide
2) DHPs Households Phone Survey
3) DHP Suppliers In-Depth Interview Guide
4) DHPs Utilities In-Depth Interview Guide

Installation Contractors Phone Survey Instrument

FINAL MAY 20, 2013

Key Objectives:

- Understand installation contractor perceptions of DHPs
- Understand contractor marketing practices
- Identify customer barriers to DHP sales
- Identify DHP sales trends (cooling-only units, customer inquiries, expected future sales)
- Determine DHP applications for non-incented installations
- Discern how NEEA can improve its assistance to contractors

Target Audience: 100 DHP installation contractor firms that have had interactions with the DHPs Project, including a mix of oriented and non-oriented firms. 135 other Northwest firms without known Project interactions.

Notes:

Sample Type = FL if in Fluid Data (have had interactions with Project, includes Oriented and not, Strata 1-4)
Sample Type = IU if in InfoUSA data (other NW contractors with no known interactions, Strata 5-12)

INTRODUCTION

[IF Sample Type = IU]

INTRO1:

Hi, my name is _____ calling from CIC Research on behalf of the Northwest Energy Efficiency Alliance, also known as NEEA (KNEE-AH) – and the Northwest Ductless Heat Pump Project. Does your firm sell residential HVAC equipment?

1 YES → CONTINUE
2 NO → THANK AND TERMINATE, RECORD AS NQ.INTRO1
8 DON'T KNOW →THANK AND TERMINATE, RECORD AS DK.INTRO1
9 REFUSED → THANK AND TERMINATE, RECORD AS RF.INTRO1

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.***

_____

If Needed: We obtained your contact information from a company that provides industry data, for a fee, to support research like ours.

(Note: If they say, "we don't install ductless heat pumps or mini-splits" or "we only distribute/wholesale" then terminate.)

1 CORRECT PERSON IS AVAILABLE → CONTINUE
2 CORRECT PERSON **IS NOT** AVAILABLE → SCHEDULE CALL BACK

[IF Sample Type = FL]

INTRO2:

Hi, my name is _____ calling from CIC Research on behalf of the Northwest Energy Efficiency Alliance, also known as NEEA (KNEE-AH) – and the Northwest Ductless Heat Pump Project. 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.*** **_____**

1 CORRECT PERSON IS AVAILABLE → CONTINUE
2 CORRECT PERSON **IS NOT** AVAILABLE → SCHEDULE CALL BACK

ALL, when right person is on the line:

INTRO3:
Hi, my name is _____ calling from CIC Research on behalf of the NEEA (KNEE-AH). NEEA is conducting an evaluation of the Northwest Ductless Heat Pump Project. I would like to ask about your firm's experiences with ductless heat pumps. Is this a good time? ***[IF ASKED: TELL RESPONDENT IT WILL TAKE ABOUT 15 MINUTES DEPENDING ON THEIR ANSWERS]***

1 YES → CONTINUE
2 NO → SCHEDULE CALL BACK
9 REFUSED → THANK AND TERMINATE, RECORD AS RF.INTRO3

INSTALLER BACKGROUND

Q 1. [IF Sample Type = IU] Does your company actually install ductless heat pumps, also known as DHPs or mini-splits, or do you just supply them for others to install?

1 YES, DO INSTALLS → CONTINUE
2 NO → THANK AND TERMINATE, RECORD AS NQ.Q1
8 DON'T KNOW → THANK AND TERMINATE, RECORD AS DK.Q1
9 REFUSED → THANK AND TERMINATE, RECORD AS RF.Q1

Q 2. [IF Sample Type = IU] Most of the electric utilities in this region offer incentives for qualifying residential ductless heat pumps and participate in the Northwest Ductless Heat Pump Project. Are you familiar with this Initiative?

1 YES
2 NO
8 DON'T KNOW
9 REFUSED

Q 3. Before we go on, let me first tell you that throughout this interview I'll refer to ductless heat pumps as DHPs. Which DHP brands does your firm currently offer to customers? (DO NOT READ LIST, ACCEPT MULTIPLE ANSWERS)

00 NONE
01 COMFORT AIRE
02 DAIKIN
03 FRIEDRICH
04 FUJITSU
05 LENNOX
06 LG
07 MITSUBISHI
08 PANASONIC
09 QUIETSIDE
10 SAMSUNG
11 SANYO
12 TOSHIBA-CARRIER
13 YORK
77 OTHER (SPECIFY): _____
88 DON'T KNOW
99 REFUSED

Q 4. Are you planning to offer any other DHP brands in the next 12 months?

(IF YES:) Which brands? (DO NOT READ LIST, ACCEPT MULTIPLE ANSWERS)

00 NONE
01 COMFORT AIRE
02 DAIKIN
03 FRIEDRICH
04 FUJITSU
05 LENNOX
06 LG
07 MITSUBISHI
08 PANASONIC
09 QUIETSIDE
10 SAMSUNG

11 SANYO
12 TOSHIBA-CARRIER
13 YORK
77 OTHER (SPECIFY): _____
88 DON'T KNOW
99 REFUSED

Q 5. How many people are employed by your firm at this location?

[ONLY IF NEEDED:] Please count part time staff as .5. [BEFORE ACCEPTING A DON'T KNOW/REFUSED ASK FOR THE RESPONDENT'S BEST ESTIMATE. ROUND UP TO WHOLE NUMBER]

____ 88888=DK 9999=REFUSED

Q 6. [IF STRATA = 3 THRU 12] Has anyone at your company attended a Contractor Orientation session for the Northwest Ductless Heat Pump Project? [IF NECESSARY: This could be either in person or via a webinar]

1 YES
2 NO
8 DON'T KNOW
9 REFUSED

Q 7. About how many of your company's staff have received manufacturer training on ductless heat pumps? (IF DK or REF, ASK:) Can you just give me your best estimate?

____ 8888=DON'T KNOW 9999=REFUSED

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

1 YES
2 NO
8 DON'T KNOW
9 REFUSED

Q 9. In what states does your firm install residential HVAC equipment? [MARK all that apply]

1 Washington
2 Oregon

3 Idaho
4 Montana
8 DON'T KNOW → SKIP TO Q 14
9 REFUSED → SKIP TO Q 14

Q 10. [IF Q 9 =1 ASK:] In which Washington counties do you do the majority of your residential HVAC work? (DO NOT READ, ACCEPT UP TO FIVE, PROMPT FOR TOP FIVE IF WORKING IN MANY AREAS)

53001 ADAMS COUNTY
53003 ASOTIN COUNTY
53005 BENTON COUNTY
53007 CHELAN COUNTY
53009 CLALLAM COUNTY
53011 CLARK COUNTY
53013 COLUMBIA COUNTY
53015 COWLITZ COUNTY
53017 DOUGLAS COUNTY
53019 FERRY COUNTY
53021 FRANKLIN COUNTY
53023 GARFIELD COUNTY
53025 GRANT COUNTY
53027 GRAYS HARBOR COUNTY
53029 ISLAND COUNTY
53031 JEFFERSON COUNTY
53033 KING COUNTY
53035 KITSAP COUNTY
53037 KITTITAS COUNTY
53039 KLICKITAT COUNTY
53041 LEWIS COUNTY
53043 LINCOLN COUNTY
53045 MASON COUNTY
53047 OKANOGAN COUNTY
53049 PACIFIC COUNTY
53051 PEND OREILLE COUNTY
53053 PIERCE COUNTY
53055 SAN JUAN COUNTY
53057 SKAGIT COUNTY
53059 SKAMANIA COUNTY
53061 SNOHOMISH COUNTY
53063 SPOKANE COUNTY
53065 STEVENS COUNTY
53067 THURSTON COUNTY
53069 WAHKIAKUM COUNTY
53071 WALLA WALLA COUNTY
53073 WHATCOM COUNTY
53075 WHITMAN COUNTY
53077 YAKIMA COUNTY
88888 DON'T KNOW
99999 REFUSED

Q 11. [IF Q 9 =2 ASK:] In which Oregon counties do you do the majority of your residential HVAC work? (DO NOT READ, ACCEPT UP TO FIVE, PROMPT FOR TOP FIVE IF WORKING IN MANY AREAS)

41001 BAKER COUNTY
41003 BENTON COUNTY
41005 CLACKAMAS COUNTY
41007 CLATSOP COUNTY
41009 COLUMBIA COUNTY
41011 COOS COUNTY
41013 CROOK COUNTY
41015 CURRY COUNTY
41017 DESCHUTES COUNTY
41019 DOUGLAS COUNTY
41021 GILLIAM COUNTY
41023 GRANT COUNTY

41025 HARNEY COUNTY
41027 HOOD RIVER COUNTY
41029 JACKSON COUNTY
41031 JEFFERSON COUNTY
41033 JOSEPHINE COUNTY
41035 KLAMATH COUNTY
41037 LAKE COUNTY
41039 LANE COUNTY
41041 LINCOLN COUNTY
41043 LINN COUNTY
41045 MALHEUR COUNTY
41047 MARION COUNTY
41049 MORROW COUNTY
41051 MULTNOMAH COUNTY
41053 POLK COUNTY
41055 SHERMAN COUNTY
41057 TILLAMOOK COUNTY
41059 UMATILLA COUNTY
41061 UNION COUNTY
41063 WALLOWA COUNTY
41065 WASCO COUNTY
41067 WASHINGTON COUNTY
41069 WHEELER COUNTY
41071 YAMHILL COUNTY
88888 DON'T KNOW
99999 REFUSED

Q 12. [IF Q 9 =3 ASK:] In which Idaho counties do you do the majority of your residential HVAC work? (DO NOT READ, ACCEPT UP TO FIVE, PROMPT FOR TOP FIVE IF WORKING IN MANY AREAS)

16001 ADA COUNTY
16003 ADAMS COUNTY
16005 BANNOCK COUNTY
16007 BEAR LAKE COUNTY
16009 BENEWAH COUNTY
16011 BINGHAM COUNTY
16013 BLAINE COUNTY
16015 BOISE COUNTY
16017 BONNER COUNTY
16019 BONNEVILLE COUNTY
16021 BOUNDARY COUNTY
16023 BUTTE COUNTY
16025 CAMAS COUNTY
16027 CANYON COUNTY
16029 CARIBOU COUNTY
16031 CASSIA COUNTY
16033 CLARK COUNTY
16035 CLEARWATER COUNTY
16037 CUSTER COUNTY
16039 ELMORE COUNTY
16041 FRANKLIN COUNTY
16043 FREMONT COUNTY
16045 GEM COUNTY
16047 GOODING COUNTY
16049 IDAHO COUNTY
16051 JEFFERSON COUNTY
16053 JEROME COUNTY
16055 KOOTENAI COUNTY
16057 LATAH COUNTY
16059 LEMHI COUNTY
16061 LEWIS COUNTY
16063 LINCOLN COUNTY
16065 MADISON COUNTY
16067 MINIDOKA COUNTY
16069 NEZ PERCE COUNTY
16071 ONEIDA COUNTY
16073 OWYHEE COUNTY
16075 PAYETTE COUNTY
16077 POWER COUNTY
16079 SHOSHONE COUNTY
16081 TETON COUNTY
16083 TWIN FALLS COUNTY
16085 VALLEY COUNTY
16087 WASHINGTON COUNTY
88888 DON'T KNOW
99999 REFUSED

Q 13. [IF Q 9 = 4 ASK:] In which Montana counties do you do the majority of your residential HVAC work? (DO NOT READ, ACCEPT UP TO FIVE, PROMPT FOR TOP FIVE IF WORKING IN MANY AREAS)

30001 BEAVERHEAD COUNTY
30003 BIG HORN COUNTY
30005 BLAINE COUNTY
30007 BROADWATER COUNTY
30009 CARBON COUNTY
30011 CARTER COUNTY
30013 CASCADE COUNTY
30015 CHOUTEAU COUNTY
30017 CUSTER COUNTY
30019 DANIELS COUNTY
30021 DAWSON COUNTY
30023 DEER LODGE COUNTY
30025 FALLON COUNTY
30027 FERGUS COUNTY
30029 FLATHEAD COUNTY
30031 GALLATIN COUNTY
30033 GARFIELD COUNTY
30035 GLACIER COUNTY
30037 GOLDEN VALLEY COUNTY
30039 GRANITE COUNTY
30041 HILL COUNTY
30043 JEFFERSON COUNTY
30045 JUDITH BASIN COUNTY
30047 LAKE COUNTY
30049 LEWIS AND CLARK COUNTY
30051 LIBERTY COUNTY
30053 LINCOLN COUNTY
30055 MCCONE COUNTY
30057 MADISON COUNTY
30059 MEAGHER COUNTY
30061 MINERAL COUNTY
30063 MISSOULA COUNTY
30065 MUSSELSHELL COUNTY
30067 PARK COUNTY
30069 PETROLEUM COUNTY
30071 PHILLIPS COUNTY
30073 PONDERA COUNTY
30075 POWDER RIVER COUNTY
30077 POWELL COUNTY
30079 PRAIRIE COUNTY
30081 RAVALLI COUNTY
30083 RICHLAND COUNTY
30085 ROOSEVELT COUNTY
30087 ROSEBUD COUNTY
30089 SANDERS COUNTY
30091 SHERIDAN COUNTY
30093 SILVER BOW COUNTY
30095 STILLWATER COUNTY
30097 SWEET GRASS COUNTY
30099 TETON COUNTY
30101 TOOLE COUNTY
30103 TREASURE COUNTY
30105 VALLEY COUNTY
30107 WHEATLAND COUNTY
30109 WIBAUX COUNTY
30111 YELLOWSTONE COUNTY
88888 DON'T KNOW
99999 REFUSED

Q 14. What percentage of your customers who have electric heat have a central thermostat?

____% 888=DON'T KNOW 999=REFUSED

DHPs EXPERIENCE

Next, I'd like to ask about your firm's experiences with DHPs.

Q 15. About how many total DHPs has your firm ever installed in residential homes?

[IF DK/REF, ASK:] Can I get your best estimate?

TotResDHPs: ____ 8888=DON'T KNOW 9999=REFUSED

Q 16. [ASK IF Q 15 = 8888 OR 9999] Do you think it's ... [READ CHOICES]

Range:

00 NONE
01 1 TO 4
02 5 TO 10
03 11 TO 25
04 26 TO 50
05 51 TO 75
06 76 TO 100
07 101 TO 150
08 151 TO 200
09 OVER 200
88 DON'T KNOW
99 REFUSED

If Q 15 **or** Q 16 **> 0 set RESexpFlag = YES and CONTINUE; ELSE GO TO** Q 45

Q16a. (INTERVIEWER RECORD:) Does this respondent sell ONLY to apartment building owners?

Yes (CONTINUE THROUGH Q45, THEN TERMINATE. IT'S A COMPLETE)

No (CONTINUE WITH ENTIRE SURVEY)

Q 17. In what year did your company install its first residential DHP?

Record INSTALLSTART: ____ as YYYY, or 8888=DON'T KNOW, 9999=REFUSED

Q 18. 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?

[IF NEEDED:] 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".

[IF DK/REF, ASK:] Can I get your best estimate?

Record InsCost: ____ 8888=DON'T KNOW 9999=REFUSED

Q 19. How many of your total residential DHP installations were completed just in the year 2012?

[TRY TO GET THEM TO BE AS SPECIFIC AS POSSIBLE. IF DK/REFUSED ASK:] Can I get your best estimate?][PROGRAMMER: DISPLAY ANSWER TO Q 15/Q16 FOR REFERENCE]

Record Tot2012DHPs: ____ 8888=DON'T KNOW 9999=REFUSED

Q 20. [ASK IF Q 19 = 8888 OR 9999] Do you think it's . . . [READ CHOICES]

Range:

00 NONE
01 1 TO 4
02 5 TO 10
03 11 TO 25
04 26 TO 50
05 51 TO 75
06 76 TO 100
07 101 TO 150
08 151 TO 200
09 OVER 200
88 DON'T KNOW
99 REFUSED

If Q 19 **OR** Q 20 **> 0, set 2012Flag = YES AND CONTINUE; ELSE GO TO Q 45**

Q 21. (IF 2012Flag = Y) How many of those [# FROM Q 19/Q 20] DHP installations in 2012 received utility incentives and how many did not?

Record # of Incented installations (Exact or estimated number): ____ 8888=DON'T KNOW 9999=REFUSED

Record # of Non-incented installations (Exact or estimated number): ____ 8888=DON'T KNOW 9999=REFUSED

[IF Either DK/REF, ASK:] Can I get your best estimate?

Q 22. [ASK IF # Incented installations = 8888 OR 9999] Do you think it's . . . [READ CHOICES]

Range:

00 NONE
01 1 TO 4
02 5 TO 10
03 11 TO 25
04 26 TO 50
05 51 TO 75
06 76 TO 100
07 101 TO 150
08 151 TO 200
09 OVER 200
88 DON'T KNOW
99 REFUSED

Q 23. [ASK IF # Non-incented installations = 8888 OR 9999] Do you think it's ... [READ CHOICES]

Range:

00 NONE
01 1 TO 4
02 5 TO 10
03 11 TO 25
04 26 TO 50
05 51 TO 75
06 76 TO 100
07 101 TO 150
08 151 TO 200
09 OVER 200
88 DON'T KNOW
99 REFUSED

Q 24. (IF #NON-INCENTED INSTALLS > 0) Why did some installations not get incentives through a utility? [READ LIST IF NEEDED; PROBE TO CODE; MARK 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 IS NO LOCAL DHP PROGRAM/UTILITY INCENTIVES
5 DISLIKED UTILITY PROGRAM REQUIREMENTS
6 OTHER 1 (PLEASE SPECIFY) _____
7 OTHER 2 (PLEASE SPECIFY) _____
8 DON'T KNOW
9 REFUSED

CONTINUE IF # Non-incented installations or Q 23 **> 0 (they had non-incented residential installations in 2012); Else Go To** Q 45

Now I have some questions specifically about your 2012 DHP installations that did not receive utility incentives.

Q 25. How many of your (#Non-incented/Q 23) 2012 non-incented, residential units were in the following types of projects:

[BEFORE ACCEPTING A DON'T KNOW/REFUSED, ASK FOR THE RESPONDENT'S BEST ESTIMATE]

Type	Number	Don't Know	Refused
A. Newly built single or multifamily homes?	**RESNC#**	**8888**	**9999**
B. Newly heated areas of single-family home – like new additions, garages or bonus room with no space conditioning?	**SFRNEWSPC**	**8888**	**9999**
C. Single-family home retrofits?	**SFRRETS#**	**8888**	**9999**
D. Multifamily home retrofits?	**MFRRETS#**	**8888**	**9999**
E. Manufactured home retrofits?	**MANURETS#**	**8888**	**9999**

Q 26. NOT USED

Q 27. NOT USED

Q 28. (IF SFRRETS #> 0) How many of your [SFRRETS #] single-family retrofit installs <u>supplemented</u> another system?

Record SFRSUPP#: _____ 8888=DON'T KNOW 9999=REFUSED

Q 29. (IF SFRSUPP# (Q 28) > 0) Of these (Q 28) supplemental applications in single-family retrofits, how many had the following heating types in the primary living space? [READ LIST; PROBE UNTIL NUMBERS TOTAL TO SFRSUPP#].

1 ELECTRIC RESISTANCE ZONAL HEAT (BASEBOARDS, CADET-STYLE, CEILING CABLE)#
2 GAS HEAT#
3 ELECTRIC FORCED AIR FURNACE#
4 WOOD OR PELLET#
5 OIL/KEROSENE HEAT#
6. OTHER (SPECIFY) _____
8 DON'T KNOW
9 REFUSED

Q 30. (IF MFRRETS#> 0) How many of your [MFRRETS#] multi-family installs <u>supplemented</u> another system?

Record MFRSUPP#: _____ 8888=DON'T KNOW 9999=REFUSED

Q 31. (IF MFRSUPP# (
Q 30) > 0) Of these supplemental applications in multi-family homes, how many had the following heating types in the primary living space? [READ LIST; PROBE UNTIL NUMBERS TOTAL TO MFRSUPP#].

1 ELECTRIC RESISTANCE ZONAL HEAT (BASEBOARDS, CADET-STYLE, CEILING CABLE)#
2 GAS HEAT#
3 ELECTRIC FORCED AIR FURNACE#
4 WOOD OR PELLET#
5 OIL/KEROSENE HEAT#
6. OTHER (SPECIFY) _____
8 DON'T KNOW
9 REFUSED

Q 32. NOT USED

Q 33. (IF MANURETS# (Q 32) > 0) How many of your [MANURETS#] manufactured home installs <u>supplemented</u> another system?

Record MANUSUPP#: _____ 8888=DON'T KNOW 9999=REFUSED

Q 34. (IF MANUSUPP# (Q 33)> 0) Of these (Q 33) supplemental applications in manufactured homes, how many had the following heating types in the primary living space? [READ LIST; PROBE UNTIL NUMBERS TOTAL TO MANUSUPP#].

1 ELECTRIC RESISTANCE ZONAL HEAT (BASEBOARDS, CADET-STYLE, CEILING CABLE)#
2 GAS HEAT#
3 ELECTRIC FORCED AIR FURNACE#
4 WOOD OR PELLET#
5 OIL/KEROSENE HEAT#
6 OTHER (SPECIFY) _____
8 DON'T KNOW
9 REFUSED

Q 35. About how many residential-size DHPs – units of 3 tons or less – did your firm install in commercial establishments in 2012?

[IF DK/REF, ASK:] Can I get your best estimate?

[IF NECESSARY:] Examples of a residential DHP installation in a commercial establishment would be server rooms in small offices, and small businesses such as restaurants or cafes

Exact or estimated number: _____ 8888=DON'T KNOW 9999=REFUSE

Q 36. [ASK IF Q 35 =8888 OR 9999] Do you think it's . . . [READ CHOICES]

Range:

00 NONE
01 1 TO 4
02 5 TO 10
03 11 TO 25
04 26 TO 50
05 51 TO 75
06 76 TO 100
07 101 TO 150
08 151 TO 200
09 OVER 200
88 DON'T KNOW
99 REFUSED

Q 37. NOT USED

Q 38. What percent of your 2012 residential installations were of the "short run" or "concealed duct" type? [BEFORE ACCEPTING A DON'T KNOW/REFUSED ASK FOR THE RESPONDENT'S BEST ESTIMATE]

____% 888=DON'T KNOW 999=REFUSED

[IF NEEDED:] Some manufacturers offer DHP units that allow a short run of ductwork to be connected to a concealed indoor unit. They offer similar features to a true "ductless" heat pump, but incorporate the use of small ducts to distribute hot and cold air. These units are typically called "short run ducted" or "concealed duct" systems. (Did you install any of those in 2012?)

Q 39. How many residential cooling-only DHPs did you sell in 2012?

[IF DK/REF, ASK:] Can I get your best estimate?

Exact or estimated number: _____ 8888=DON'T KNOW 9999=REFUSED

Q 40. [ASK IF Q 39 =8888 OR 9999] Do you think it's . . . [READ CHOICES]

Range:

00	NONE
01	1 TO 4
02	5 TO 10
03	11 TO 25
04	26 TO 50
05	51 TO 75
06	76 TO 100
07	101 TO 150
08	151 TO 200
09	OVER 200
88	DON'T KNOW
99	REFUSED

Q 41. (If Q 39 or Q 40 > 0) What reasons do customers have for wanting cooling-only units rather than heating <u>and</u> cooling units?

Record Response: _____ or 8888=DON'T KNOW 9999=REFUSED

Q 42. (If Q 39 or Q 40 > 0) Have your sales of cooling-only DHPs increased in the past 12 months, compared to earlier years?

1 YES

2 NO
8 DON'T KNOW
9 REFUSED

Q 43. NOT USED

Q 44. Overall, what percentage of your company's non-incented residential installations are one-to-one systems, versus a multi-headed system?

[IF NEEDED: ONE TO ONE SYSTEMS have one outdoor unit (compressor) and one indoor unit (air handler). A MULTIPLE HEADED SYSTEM HAS MULTIPLE INDOOR UNITS or "HEADS".]

[IF DK/REF, ASK:] Can I get your best estimate?

_____%ONE2ONE 888=DON'T KNOW 999=REFUSED

Q 45. Compared to your total 2012 sales of residential DHPs, do you think your sales in the next 2 years will (READ LIST):

5 INCREASE SIGNIFICANTLY
4 INCREASE SOMEWHAT
3 REMAIN ABOUT THE SAME AS 2012
2 DECREASE SOMEWHAT
1 DECREASE SIGINIFICANTLY
8 DON'T KNOW
9 REFUSED

Q 46. (IF Q 45 = 1,2,4 or 5) Why do you say that? (DO NOT READ)

(RECORD ANSWER; PROBE WELL) _____
888 DON'T KNOW
999 REFUSED

Q 47. (IF Q 45 = 1 or 2) Do you expect increases in one-to-one systems, increases in multi-headed systems, or increases in both?

1 ONE TO ONE
2 MULTI
3 BOTH
8 DON'T KNOW
9 REFUSED

Q 48. Have you recommended DHPs to any of your residential customers?

1 YES → CONTINUE
2 NO → SKIP TO Q 51
8 DON'T KNOW → SKIP TO Q 52
9 REFUSED → SKIP TO Q 52

Q 49. Which of the following applications have you recommended them for? (READ AND RECORD YES OR NO FOR EACH ONE)

		YES	NO	DON'T KNOW	REFUSED
a.	Manufactured homes	1	2	8	9
b.	Multifamily homes	1	2	8	9
c.	Newly constructed homes	1	2	8	9
d.	Spaces like basements, in-laws units, garages – spaces that were previously unheated or are new additions to existing homes	1	2	8	9
e.	Homes with zonal electric heat	1	2	8	9
f.	Homes with wood heat	1	2	8	9
g.	Homes with gas heat	1	2	8	9
h.	Homes with oil heat	1	2	8	9
i.	Commercial spaces	1	2	8	9
j.	Anything else? [IF YES, PLEASE SPECIFY _____]	1	2	8	9

SKIP TO Q 52

Q 50. NOT USED

Q 51. Why have you not recommended DHPs to any of your residential customers? [DO NOT READ. PROBE TO CODE. CHECK ALL THAT APPLY]

01 COST
02 APPEARANCE
03 LACK OF INTEREST
04 UNFAMILIAR WITH THE TECHNOLOGY
05 FAMILIAR BUT LACK CONFIDENCE IN THE TECHNOLOGY - GENERALLY
06 DON'T PERFORM WELL ENOUGH IN COLD CLIMATE
07 ANOTHER TECHNOLOGY IS BETTER SUITED TO THEIR NEEDS
08 EXISTING HEATING/COOLING/HVAC EQUIPMENT STILL WORKING
08 OTHER (PLEASE SPECIFY): _____
88 DON'T KNOW
99 REFUSED

Q 52. Do you plan to recommend DHPs to your residential customers going forward?

1 YES
2 NO
8 DON'T KNOW
9 REFUSED

Q 53. Briefly, what advantages do you think DHPs offer? [DO NOT READ, CHECK ALL THAT APPLY]

01 MORE EFFICIENT/LOWER OPERATING COSTS THAN OTHER HEATING/COOLING TYPES
02 LOWER INSTALLATION COSTS THAN OTHER HEATING/COOLING TYPES
03 ABILITY TO HEAT **AND** COOL
04 EASY TO OPERATE
05 DON'T NEED FURNACE/CENTRAL AC/DUCTS
06 SAVE ENERGY
07 ZONAL APPLICATIONS/CAN HEAT OR COOL ONE ROOM
08 IMPROVED AIR QUALITY/FILTRATION
67 OTHER (SPECIFY): _____
88 DON'T KNOW
99 REFUSED

Q 54. What are the disadvantages of DHPs? [DO NOT READ, CHECK ALL THAT APPLY]

1 NONE
2 COST – GENERAL
3 COST TO HEAT/COOL MULTIPLE ROOMS OR WHOLE HOME
4 APPEARANCE
5 HARD TO LOCATE/PLACE INDOOR UNITS
6 UNFAMILIAR TECHNOLOGY
7 DON'T WORK WELL IN COLD WEATHER
8 ARE DESIGNED TO HEAT/COOL ONLY ONE ROOM
9 NOISE
10 OTHER (SPECIFY): _____
88 DON'T KNOW
99 REFUSED

MARKETING AND OUTREACH

Now I have some questions about your company's marketing.

Q 55. NOT USED

Q 56. (If RESexpFlag = Y) About what percentage of your DHP purchasers came to you seeking a DHP, and what percentage came to you seeking to improve their heating or cooling, but didn't specifically request a bid for a DHP? [PERCENTAGES MUST ADD UP TO 100%]

a. Asked for DHP ___%
b. Didn't specifically request DHP ___%

888 DON'T KNOW
999 REFUSED

Q 57. (If ASKED FOR DPH % > 0) Has the percentage specifically asking for DHPs been higher in the past 12 months, compared to years past?

1 YES
2 NO
8 DON'T KNOW
9 REFUSED

Q 58. What types of DHP marketing, if any, has your company done? [DO NOT READ, ACCEPT MULTIPLES]

01 NONE – GO TO Q 60
02 PRINT- FLIERS
03 PRINT – NEWSPAPER ADS
04 PRINT – MAGAZINE AD/ARTICLE
05 RADIO
06 TV
07 COMPANY WEBPAGE
08 SOCIAL MEDIA
09 HOME/TRADE SHOWS
9 PHONE CALLS
10 EMAILS
09 OTHER (SPECIFY): _____
88 DON'T KNOW– GO TO Q 60
99 REFUSED– GO TO Q 60

Q 59. Who does your company target in its marketing? (DO NOT READ; ACCEPT MULTIPLES)

Record TARGETS: _____

8 DON'T KNOW
9 REFUSED

Q 60. When you want to introduce customers who are not familiar with the technology to DHPs, how many of the following marketing tools do you use? How about…[READ AND MARK YES OR NO FOR EACH ONE]

		Yes	No	DK	Ref
1	Marketing materials distributed by the Northwest Ductless Project	1	2	8	9
2	Marketing materials your firm created	1	2	8	9
3	Materials your supplier or manufacturer created	1	2	8	9

4	Talking to them	1	2	8	9
5	Showing them a display unit	1	2	8	9
6	Or something else (SPECIFY) _____	1	2	8	9

Q 61. Which of these other types of support, if any, would be beneficial to you? Do you need ….? [CHECK ALL THAT APPLY, READ LIST]

		Yes	No	DK	Ref
1	ADDITIONAL TECHNICAL SERVICE SUPPORT FROM DISTRIBUTORS	1	2	8	9
2	ADDITIONAL MARKETING MATERIALS/RESOURCES	1	2	8	9
3	ADDITIONAL SUPPORT FROM MANUFACTURERS	1	2	8	9
4	OTHER (SPECIFY:)_____	1	2	8	9
5	NONE	1	2	8	9

Q 62. What are the key reasons your customers are interested in DHPs? [DO NOT READ; PROBE TO CODE; MARK ALL THAT APPLY]

01 TO REPLACE EXISTING UNSATISFACTORY/FAILING EQUIPMENT
02 DON'T NEED DUCTS/FURNACE/CENTRAL AC
03 CAN HEAT/COOL A SPACE NOT SERVED BY THEIR EXISTING HEAT
04 TO ADD COOLING (ONLY) TO A SPACE
05 TO ADD COOLING (ONLY) TO THE WHOLE HOUSE
06 ENERGY EFFICIENCY/LOWER HEATING COSTS/LOWER ENERGY BILLS
07 WANT THE MOST CURRENT TECHNOLOGY
08 ZONAL CONTROL
09 AVAILABLE REBATES
10 AFFORDABILITY
67 OTHER (SPECIFY:)_____
88 DON'T KNOW
99 REFUSED

Q 63. NOT USED

Q 64. NOT USED

Q 65. What are the primary barriers to DHP sales among customers that are aware of them? [DO NOT READ; PROBE TO CODE; MARK ALL THAT APPLY]

0 NONE
1 APPEARANCE
2 COST TOO HIGH

3 EFFECTIVENESS (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 (REASON NOT STATED)
67 OTHER (SPECIFY:)_____
88 DON'T KNOW
99 REFUSED

66. 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
7 (DO NOT READ) REBATES NOT AVAILABLE IN MY SERVICE AREAS
8 DON'T KNOW
9 REFUSED

Q 67. Is financing for DHPs available through utilities in your service area?

1 YES
2 NO
8 DON'T KNOW
9 REFUSED

Q 68. (IF Q 67 = YES) How important would you say that this utility financing is to residential DHP sales? Would you say it is:

5 EXTREMELY IMPORTANT
4 VERY IMPORTANT
3 SOMEWHAT IMPORTANT
2 NOT VERY IMPORTANT
1 NOT AT ALL IMPORTANT
8 DON'T KNOW
9 REFUSED

CONTINUE IF SAMPLE TYPE = FL OR Q 2 **= YES (FAMILIAR WITH PROJECT)**
ELSE SKIP TO *CLOSING* SECTION

PROJECT SERVICES

Q 69. (If Q 6 = NO) Earlier you said that no one from your company had attended a Contractor Orientation session on DHPs. How likely do you think it is that you will have someone attend in the next 12 months? Would you say it is:

5 EXTREMELY LIKELY
4 VERY LIKELY
3 SOMEWHAT LIKELY
2 NOT VERY LIKELY
1 NOT AT ALL LIKELY
8 DON'T KNOW
9 REFUSED

Q 70. (IF Q 69 = 1 or 2) Why are staff not likely to attend an Orientation session? [DO NOT READ; probe to code; mark all that apply]

1 TOO BUSY
2 NOT LOCAL
3 NOT NEEDED TO INSTALL DHPS
4 HEARD ORIENTATION NOT USEFUL
5 LOW CUSTOMER INTEREST IN DHPS
6 TOO EXPENSIVE/DON'T WANT TO INCUR COSTS
7 OTHER 1, PLEASE SPECIFY:_____
8 OTHER 2, PLEASE SPECIFY:_____
9 DON'T KNOW
10 REFUSED

Q 71. Have you visited the Northwest Ductless Heat Pump Project website? [Note: the address is goingductless.com]

1 YES → CONTINUE
2 NO → SKIP TO Q 73
8 DON'T KNOW → SKIP TO Q 73
9 REFUSED → SKIP TO Q 73

Q 72. 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
8 DON'T KNOW

9 REFUSED

Q 73. Have you contacted Northwest Ductless staff?

1 YES → CONTINUE
2 NO → SKIP TO Q 76
8 DON'T KNOW → SKIP TO Q 76
9 REFUSED → SKIP TO Q 76

Q 74. Regarding what issues or questions? [DO NOT READ; probe to code; mark all that apply]

1 DHP EQUIPMENT ELIGIBILITY
2 UTILITY REBATES
3 MARKETING/PROMOTIONAL ASSISTANCE
4 MASTER INSTALLER ELIGIBILITY
5 TECHNICAL INSTALLATION/BEST PRACTICES
6 OTHER 1, PLEASE SPECIFY:_____
7 OTHER 2, PLEASE SPECIFY:_____
8 DON'T KNOW
9 REFUSED

Q 75. How responsive was 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
8 DON'T KNOW
9 REFUSED

Q 76. NOT USED

Q 77. NOT USED

Q 78. Is there any marketing or technical support that the Initiative could provide that might help you to increase the number of DHPs you sell? [PROBE:] Specifically, are there any resources that the Initiative could provide?

1 YES
2 NO
8 DON'T KNOW
9 REFUSED

(IF YES, ASK:) What support or resources do you need: _____

Q 79. Have you heard of the Northwest Ductless Heat Pump Project's "displacement not replacement" approach to DHP installations?

1 YES → CONTINUE
2 NO → SKIP TO Q 81
8 DON'T KNOW → SKIP TO Q 81
9 REFUSED → SKIP TO Q 81

Q 80. Would you say that your staff has a good understanding of what the Project intends by "displacement not replacement", a fair understanding, or a poor understanding?

3 Good understanding
2 Fair understanding
1 Poor understanding
8 DON'T KNOW
9 REFUSED

Q 81. Would you like to offer any comments, either positive or negative, about the Northwest Ductless Heat Pump Project or the ductless heat pump technology?

_____

_____

_____

CLOSING

VERIFY1. (IF WE ALREADY HAVE A NAME) Those are all the questions I have. In case we need to clarify any of your responses later on, can I verify that your name is _____ and that I reached you at _____.

VERIFY2. (IF THERE IS NO NAME) Those are all the questions I have. In case we need to clarify any of your responses later on, may I please have your name?

_____

Thank you very much for helping us with this important study! Have a good day/evening.

DHPs Households Phone Surveys

FINAL 6/4/13

Key Objectives:

- Assess awareness of DHPs and interest in future purchases
- Identify installation barriers
- Understand DHPs usage and satisfaction
- Understand financing patterns

Target Audience: 100 DHP participants in Q3 2011- Q1 2012 from Fluid's database, and 200 general population households with homes heated by electricity, wood, kerosene or oil.

NOTES:
SAMPTYPE = FL if a participant from Fluid database
SAMPTYPE = GP if from general population (SSI)

Hello, my name is _____ calling from CIC Research on behalf of the Northwest Energy Efficiency Alliance, or NEEA.

(Read if Necessary) NEEA is a non-profit organization that works to accelerate the innovation and adoption of energy-efficient products, services and practices in the Northwest region. NEEA is supported by, and works in collaboration with, the Bonneville Power Administration and over 100 Northwest utilities on behalf of more than 12 million energy consumers.

For SAMPTYPE FL: May I speak to _____? (REPEAT INTRO BEFORE CONTINUING IF NEW PERSON COMES TO THE PHONE) I am calling today to conduct an evaluation of the Northwest Ductless Heat Pump Project. They'd like to get your feedback on ductless heat pumps and use your experiences to help improve the program. Is now a good time?

For SAMPTYPE GP: May I speak to the person most familiar with your home's heating and cooling equipment? (REPEAT INTRO BEFORE CONTINUING IF NEW PERSON COMES TO THE PHONE) I am calling today to conduct an evaluation of a program about energy savings and home heating. NEEA wants to learn about your household's heating system and use your experiences and preferences to help improve the program. I assure you that I am not selling anything and you will not be re-contacted as a result of participating in our survey. The survey only takes a few minutes and will help NEEA (and your local utility) to make its programs better for customers. All of your answers will be kept strictly confidential. Is now a good time?

SCREENS for GP Sample:

SCREEN1: First, is your home a single family home, or it physically attached to other units?

1) Yes, single family home [CONTINUE]
2) No, attached to other units [TERMINATE]
88) Refused [TERMINATE]
99) Don't know [TERMINATE]

SCREEN2: What kind of fuel is used by your home's primary heating system? Is it . . . (READ)

1) Electricity [CONTINUE]
2) Kerosene or oil [CONTINUE]
3) Wood/Wood Pellet [CONTINUE]
4) Propane Gas [CONTINUE]
5) Natural gas from a utility [TERMINATE]
6) Something else? [TERMINATE]
88) Refused [TERMINATE]
99) Don't know [TERMINATE]

<u>SCREEN for Fluid Sample:</u>

SCREEN3: Our records indicate that you installed a ductless heat pump in your home in 2011 or 2012. 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]

<u>SCREEN for ALL:</u>

SCREEN4: Do you own your home, or do you rent it?

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

SCREEN 5: Do you live in this home at least 2 months out of the year?

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

Terminate: Thank you for your time. 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

Q1. (If SAMPTYPE = GP) Before this call, had you ever seen or heard about ductless heat pumps?

[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
2) Yes - aided
3) No (Go to **Q15**)
4) Don't know (Go to **Q15**)

Q2. (If SAMPTYPE = GP) Have you ever seen a ductless heat pump in person?

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

Q3. How did you first hear about ductless heat pumps? [DO NOT READ CHOICES; CHOOSE ONE, THE FIRST PLACE THEY HEARD OF IT. IF "UTILITY" OR "NEWSPAPER," BE SURE TO PROBE FOR WHICH OF THE UTILITY OR NEWPAPER CHOICES BELOW]

1) Friend or acquaintance had one

2) Utility print advertising, bill stuffer
3) Utility website
4) Utility display
5) Newspaper ad
6) Newspaper story
16) Home show
7) Television ad
8) Social media
9) Materials or information from contractor/installer
10) Internet research
11) Internet advertising
12) Retail store display or promotion
13) Saw one installed or used one in foreign country
14) There is one in my home – someone else installed it (TERMINATE)
15) Other (SPECIFY): _____

Q4. Did you hear about it anywhere else? Or learn more about it from another source? (DO NOT READ CHOICES, ACCEPT MULTIPLES. IF "UTILITY" OR "NEWSPAPER," BE SURE TO PROBE FOR WHICH OF THE UTILITY OR NEWPAPER CHOICES BELOW)

1) Friend or acquaintance had one
2) Utility print advertising, bill stuffer
3) Utility website
4) Utility display
5) Newspaper ad
6) Newspaper story
16) Home Show
7) Television ad
8) Social media
9) Materials from contractor/installer
10) Internet research
11) Internet advertising
12) Retailer display or promotion
13) Saw one installed or used one in foreign country
14) There is one in my home – someone else installed it (TERMINATE)
15) Other (SPECIFY): _____

If SAMPTYPE = FL, Go To Q8

Q5. Do you currently have a ductless heat pump in your home?

1) Yes
2) No (Go To **Q9**)
3) Don't know (Go To **Q9**)

Q6. In what year did you install it?

Record GP INSTALL YEAR_____

1) Don't know – someone else installed it (TERMINATE)
2) Don't know

Q7. Did you receive a rebate for your ductless heat pump from your utility company?

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

Q8. 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)

PROGRAMMER NOTE: ADD INFLUENTIAL SOURCES MENTIONED BELOW TO Q4 IF NOT ALREADY RECORDED FOR Q3 OR Q4.

1) Friend or acquaintance had one
2) Utility print advertising, bill stuffer
3) Utility website
4) Utility display
5) Newspaper ad
6) Newspaper story
16) Home Show
7) Television ad
8) Social media
9) Materials or information from contractor/installer
10) Internet research
11) Internet advertising
12) Retailer display or promotion
13) Seeing/using one in foreign country
14) Other: _____

GO TO MOTIVATIONS BATTERY (Q32)

Q9. Have you ever considered installing a ductless heat pump in your home?

1) Yes
2) No (Go To **Q12**)
3) Don't know (Go To **Q12**)

Q10. What was the primary reason you chose not to install one? (DO NOT READ; ACCEPT ONE ANSWER ONLY)

1) Existing equipment works fine
2) Can't find a local installer
3) Doesn't work in my climate
4) Aesthetics/they are ugly
5) They cost too much
6) Maintenance hassles
7) Don't believe savings claims
8) Other, specify_____
9) Don't know

Q11. Were there other reasons why you chose not to install a ductless heat pump? (DO NOT READ, ACCEPT MULTIPLES)

1) Existing equipment works fine
2) Can't find a local installer
3) Doesn't work in my climate
4) Aesthetics/they are ugly
5) They cost too much
6) Maintenance hassles
7) Don't believe savings claims
8) Other, specify
9) Don't know

Q12. 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 (go to **Q14**)
3) Don't know (go to **Q14**)

Q13. (If Q12 = YES) Can you tell me the amount of your utility's rebate for ductless heat pumps? (If not sure: Can I get your best guess?)

1) Yes – GET AMOUNT (code $0 for "none offered")
2) No/Don't know

Q14. Were you aware that there are banks in the Northwest that offer specialized financing for homeowners that want to install a ductless heat pump?

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

Q15. Now I'd like to tell you a little more about ductless heat pumps.

- **The average cost of an installed ductless heat pump for one indoor heating/cooling zone is between $3,000 and $5,000, and rebates of $800 to $1,500 are often available. A zone is a distinct area of your home where the heating/cooling can be controlled independently, so you don't always have to heat or cool your whole house. Many homes in the Northwest only require one zone.**
- **Ductless heat pumps are easy to maintain. Most homeowners can do the maintenance themselves, without having to hire anyone.**
- **Maintenance only requires cleaning the filters and coils occasionally.**
- **Compared to ducted systems, ductless heat pumps can reduce allergens in the home.**
- **Ductless heat pumps use 25% to 50% less energy than other electric heating systems.**

How interested would you be in installing a ductless heat pump system in your home? Would you say you are: (READ)

4) Very interested (GO TO **Q17**)
3) Somewhat interested (GO TO **Q17**)
2) Not too interested (CONTINUE)
1) Not at all interested (CONTINUE)
99) Don't know (GO TO Finance Options Battery)

Q16. Why do you say that?

RECORD RESPONSE: _____ (TRY TO POST CODE)

GO TO Finance Options Battery (Q22)

Q17. What benefits of ductless heat pumps are especially attractive to you? (DO NOT READ, ACCEPT MULTIPLES)

1) Improved home comfort levels
2) Improved control over heating/cooling
3) New cooling capability
4) Lower utility bills/energy cost savings
5) New equipment
6) More efficient equipment
7) Is good for environment
8) Reduced allergens

9) Other (SPECIFY) _____
10) Don't know

Q 18. Have you heard of any brands that make ductless heat pumps?

1) Yes
2) No (GO TO **Q21**)
3) Don't know (GO TO **Q21**)

Q19. What ductless heat pump brands have you heard of? (DO NOT READ, ACCEPT MULTIPLES)

1) Comfort Aire
2) Daikin
3) Fujitsu
4) LG
5) Mitsubishi
6) Panasonic
7) Samsung
8) Sanyo
9) Toshiba-Carrier
10) Other (SPECIFY) _____
11) Don't know

Q20. What ductless heat pump brands would you consider buying? (DO NOT READ, ACCEPT MULTIPLES)

1) Comfort Aire
2) Daikin
3) Fujitsu
4) LG
5) Mitsubishi
6) Panasonic
7) Samsung
8) Sanyo
9) Toshiba-Carrier
10) Other (SPECIFY) _____
11) Don't know

Q21. Would you consider buying a ductless heat pump made by: (READ BRANDS BELOW NOT ALREADY MENTIONED FOR Q20, RANDOMIZE)

NOTE: For each record YES, NO or DON'T KNOW

	Yes	No	DK
1) Comfort Aire	1	2	9
2) Daikin	1	2	9
3) Fujitsu	1	2	9
4) LG	1	2	9
5) Mitsubishi	1	2	9
6) Panasonic	1	2	9
7) Samsung	1	2	9
8) Sanyo	1	2	9
9) Toshiba-Carrier	1	2	9

Finance Options Battery

Let me remind you we're not selling anything and you will not be re-contacted later on because of any answers you've given on this survey. We just want to get people's opinions about a couple of potential financing options. Option A would be a rebate and bank loan to purchase a $4,000 ductless heat pump system. For Option A, the customer would receive a $1,000 rebate from their utility and bank financing at 8% interest for the remaining $3,000.

Q22. (If Q15 = 3, 4 or Don't Know) If bank financing and a utility rebate like this were available in your area, how interested would you be in using it to finance a ductless heat pump purchase and installation?

4) Very interested
3) Somewhat interested
2) Not too interested
1) Not at all interested
99) Don't know

Q23. (If Q15 = 1 or 2) Even though you aren't interested in installing a ductless heat pump, we still want your opinions about this option. If bank financing and a utility rebate like this were available in your area, would this increase your interest in getting a ductless heat pump?

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

Here's a different option I'd like your opinion on. In Option B, a person could take out a loan from their utility at 2% interest to buy the same $4,000 ductless heat pump system. He or she would purchase the equipment with no down payment, but get no rebate. The utility company would apply the energy savings towards the loan payback, so energy bills would remain the

same as they were before the ductless heat pump was installed, until the $4,000 loan is paid off, and then the bills would go down.

Q24. (If Q15 = 3, 4 or Don't Know) If utility financing like this were available in your area, how interested would you be in using it to finance a ductless heat pump purchase and installation?

4) Very interested
3) Somewhat interested
2) Not too interested
1) Not at all interested
99) Don't know

Q25. (If Q15 = 1 or 2) Even though you aren't interested in installing a ductless heat pump, if utility financing like this were available, would this increase your interest in getting one?

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

Q26. (If Q15 = 3 or 4) Which of these reasons – if any – would make you much more likely to buy a new ductless heat pump? (READ EACH ITEM AND GET A YES OR NO BEFORE CONTINUING TO NEXT ITEM; RANDOMIZE)

	Yes	No	DK
1) The cost of **ductless heat pumps** declines	1	2	9
2) Your current heating or cooling equipment fails	1	2	9
3) A special promotion is offered by a contractor or retail business	1	2	9
4) Your household finances improve	1	2	9
5) Your local utility rebate increases	1	2	9
6) The performance of **ductless heat pumps** improves	1	2	9
7) Some other reason (GET DETAILS) _____ _____	1	2	9

Q27. (If Q26 = NONE) Is there any combination of these things that would make you much more likely to buy a ductless heat pump for your home?

1) Yes (READ OPTIONS ABOVE AND RECORD WHICH COMBINATION OF CHANGES)
2) No
3) Don't know

Q28. Is there anything in particular about ductless heat pumps that you wish you knew more about?

1) Yes (What would that be? RECORD DETAILS)_____
2) No
3) Don't know

Q29. Where would you go if you wanted more information about DHPs? (NOTE: If they say "contractor" or "installer" ask them to specify HVAC or Electrical) (DO NOT READ; MULTIPLES OK)

1) Utility
2) HVAC contractor
3) Electrical contractor
4) Northwest Ductless Heat Pump Project
5) Manufacturer
6) Friends/family I trust
7) Internet/online
8) Other (SPECIFY)_____
9) Don't know

Q30. (IF SCREEN2 = ELECTRICITY) How often do you review your electric bill? Would you say it is:

1) Each month/most months
2) Every couple of months
3) Quarterly
4) Twice each year
5) Once a year
6) Never
7) Other
8) Don't know

Q 31. Lastly, what heating and cooling source(s) do you have in your home? [DO NOT READ LIST UNLESS NECESSARY; DO NOT LIST "FANS"; CHECK ALL THAT APPLY—PROBE "ANYTHING ELSE?"; If NECESSARY, GET A FUEL TYPE FOR EACH TYPE OF HEAT/COOLING MENTIONED; DO ASK C; IF ONLY ONE ANSWER IN A AND FUEL IS THE SAME AS S2, AUTOCODE IN C AND DO NOT ASK. OTHERWISE ASK BOTH C AND D – THE ANSWERS IN C AND D CAN BE THE SAME.)

	A. Type of heat/cooling	B. Fuel (e.g., electric, gas)	C. What is your home's primary type of heating?	D. What is your home's primary type of cooling?

Forced Air Furnace				
Baseboards				
Wall Heaters				
Electric radiant heat				
Wood heat				
Ductless heat pump				
Space Heaters				
Kerosene or oil				
Propane				
Heat Pump (not ductless)				
Central/whole house AC				
Window Air Conditioner				
Portable Air Conditioner (not fan)				
Evaporative/Swamp Cooler				
None				
Other_____				

GO TO DEMOGRAPHICS BATTERY (Q73)

Motivations Battery

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

Q32. What initially interested you in the ductless heat pump? [DO NOT READ, PROBE TO CODE, CHECK ALL THAT APPLY]

1) Needed heating/AC, had no ducts
2) Needed additional or supplemental heating/AC
3) Existing heating was not working well enough
4) Existing heating was broken
5) Wanted to add cooling
6) Wanted to be more energy efficient
7) Not comfortable in home/wanted to improve home comfort
8) Other, (please specify)_____

Q33. 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 5 is very important:

How important was…	1	2	3	4	5

A. The comfort potential offered by the ductless heat pump					
B. The cost of the ductless heat pump, including any incentives or rebates					
C. The potentially cheaper operating costs of the ductless heat pump compared to your previous heating/cooling system					
D. The cooling capability of the ductless heat pump					

Q34. NOT USED

Q35. 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 provided materials
3) Spoke to the 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) Home Show
8) Retail store salesperson
9) Other, please specify: _____

Q36. 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 Q37 FOR THIS ITEM)
2) Appearance
3) Capability/functionality – general
4) Capability/functionality – cold weather
5) Cost (DO NOT ASK Q37 FOR THIS ITEM)
6) Noise
7) Maintenance needs
8) Equipment warranty
9) Manufacturer customer service/support
10) Other, please specify:_____

Q37. [ASK FOR EACH ITEM MENTIONED IN Q36:] Now that you have it installed, is (Q36 ANSWER) a problem? _____

(IF Q7= NO, SKIP TO Q41)

Q38. What was the amount of the rebate or incentive you received <u>from your local utility</u>? Your best guess is fine. (NOTE: WE'RE ONLY INTERESTED IN REBATES/INCENTIVES *FROM THEIR LOCAL UTILITY*, <u>NOT</u> REBATES/INCENTIVES/TAX CREDITS FROM OTHER SOURCES.)

Record REBATE _____

(IF **Q38** = 0 (FREE), SKIP TO **Q45**)

Q39. (IF STILL DON'T KNOW, SAY:) Would you say it was:

1) Under $500
2) $500 to $1000, or
3) More than $1000
4) Don't know

Q40. (IF REBATE AMOUNT/RANGE GIVEN) 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
99) Don't know

Q41. Did you use a loan from any of the following sources to pay for your ductless heat pump? [READ, ALLOW MULTIPLES]

1) Local bank or credit union
2) Utility company
3) Installation contractor
4) Other, specify_____
5) No, did not use a loan
6) Don't know

Q42. Whose idea was it to install a ductless heat pump – someone in your home, a contractor you were already working with or someone else?

1) Someone in home
2) Contractor
3) Other: _____
4) Don't know

Q43. (If Q42= 1 or 3) How many different installation contractors did you get cost estimates from?

1) 1
2) 2
3) 3
4) 4
5) More than 4
6) Installed it myself
7) Installation arranged & paid for by another party/program
8) Don't know
9) Refused

Q44. 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) Other_____
13) Don't know

Q45. What heat sources did you have before you installed the ductless heat pump? [DO NOT READ LIST UNLESS NECESSARY; CHECK ALL THAT APPLY—PROBE "ANYTHING ELSE?"; IF APPROPRIATE, GET FUEL (B) FOR EACH HEAT TYPE; DO ASK C FOR EACH HEAT TYPE IN "A." ITEMS D AND E ARE BOTH ONE ANSWER ONLY)

	A. Type of heat	B. Fuel	C. Do you still	E. Before the DHP, what was	F. What is your primary heat

	equipment		use it?	your primary heat?	now?
Forced Air Furnace					
Baseboards					
Wall Heaters					
Electric radiant heat					
Wood heat					
ductless heat pump					
Space Heaters					
Kerosene or oil					
Propane					
Other					

Q46. [IF THEY USED WOOD] About how much wood did you typically use in a season?
_____ cords OR _____ pounds of pellets

Q47. Did you have any cooling equipment before you purchased the ductless heat pump? What kind? [DO NOT READ; CHECK ALL THAT APPLY; DON'T RECORD "FANS."]

1) None
2) Window/Room AC
3) Central/Full house AC
4) Portable AC (and not Window AC)
5) Evaporative/Swamp cooler
6) Other:_____

Q48. [IF Q47 > 1] Do you still use this other cooling equipment? (For each **Q47** record)

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

Q49. 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

Q50. (If Q49 = 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
14) Other (SPECIFY) _____
15) Don't know

DHP Experience Battery

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

Q51. We understand that you had [# Indoor Units – from sample data] ductless heat pumps installed inside your house. Is this correct?

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

Q52_1. (If Q51 = NO) How many ductless heat pump units do you have installed inside your house?

_____

Q52_2. In which room in your house is that/each of those unit(s) installed? (READ ROOMS IF NECESSARY)

	#
1) Kitchen (with or without dining area)	
2) Dining room (formal)	
3) Family room	
4) A Bathroom	
5) A Bedroom	
6) Office or study	

7) Entertainment or rec room	
8) Garage	
9) Detached living unit (e.g., "accessory " or "grandparents unit")	
10) Basement	
11) Living room	

Q53. NOT USED

Q54. Since it was installed, have you used the ductless heat pump for: (READ CHOICES)

1) Heating
2) Cooling, or
3) Both

Q55. Has the ductless heat pump ever been unable to meet your heating or cooling needs?

1) Yes, heating
2) Yes, cooling
3) Yes, both
4) No

(IF ANY YES:) Please describe the problems you have experienced. (RECORD DETAILS)_____

Q56. NOT USED

Q57. When you purchased your ductless heat pump, what was the coldest outside air temperature you expected it to perform well at?

Record COLDEST TEMP in Fahrenheit degrees _____, or 99. Don't know/had no expectation

Q58. (IF COLDEST TEMP GIVEN) And where did you get that information? (DO NOT READ, ALLOW MULTIPLES)

1) Manufacturer product literature/owner's manual
2) Print information from installer (not produced by manufacturer)
3) Conversation with installer
4) Information from utility
5) Information from retail store
6) Experience of friends or family
7) Internet information

8) Other; Specify_____
9) Don't know

Q59. NOT USED

Q60. How many times, if ever, have you or someone else cleaned the filter in your ductless heat pump?

1) Never cleaned
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

Q61. (If Q60 = 1) Why haven't you cleaned the filter? (DO NOT READ, ACCEPT MULTIPLES)

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

Q62. Did you receive a homeowner operations guide for the ductless heat pump from your installation contractor?

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

Q63. (IF Q62 = YES) Have you ever referred to the guide after the unit was initially installed?

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

Q64. 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
3) Mixed
4) Don't know

Q65. (IF Q64 = AUTOMATIC) 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

Satisfaction Battery

Q66. Please rate your satisfaction with the following aspects 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	9
B. your Electricity bill since installing the ductless heat pump	1	2	3	4	5	9
C. the heating	1	2	3	4	5	9
D. the cooling	1	2	3	4	5	9
E. the Maintenance required	1	2	3	4	5	9
F. the Appearance of the indoor unit	1	2	3	4	5	9
G. And what is your overall satisfaction rating?	1	2	3	4	5	9

Q67. 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

Q68. (IF Q67 = YES) How long after you installed it would you say you stopped noticing it, in terms of days, weeks or months?

Record answer: _____

99) Don't Know

Q69. NOT USED

Q70. Have you, or would you, recommend the ductless heat pump to a friend, colleague or family member?

1) Yes, have
2) Yes, would
3) No
4) Don't know

Q71. [IF Q70 = 1 or 2] What are some of the reasons you recommend it? (DO NOT READ, ACCEPT MULTIPLES)

1) Lower energy bills
9. Energy efficiency
10. It's quiet
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
97) Other, please specify:_____

Q72. Thinking back over the entire experience with your DHP and the buying process - is there anything you would change?

1. Yes (SPECIFY) _____
2. No

Demographics Battery

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

Q73. 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

Q74. NOT USED

Q75. I'm going to read a list of energy efficient equipment you may have installed in your home. Think about the last two years. In the last two years, have you installed…..? (READ EACH ITEM AND GET A "YES" OR "NO" BEFORE READING THE NEXT ITEM; ACCEPT MULTIPLES)

	Yes	No	DK
1) Compact fluorescent lights, or CFLs	1	2	9
2) Efficient fluorescent tube lighting such as T8s or T5s	1	2	9
3) LED lighting	1	2	9
4) Insulation	1	2	9
5) An energy efficient water heater	1	2	9
6) An energy efficient clothes washer	1	2	9
7) An energy efficient clothes dryer	1	2	9
8) An energy efficient refrigerator or freezer	1	2	9
9) An energy efficient dishwasher	1	2	9
10) An energy efficient furnace	1	2	9

Q76. Now I'd like you to think about how quickly you, personally, 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
8. Don't know
9. Refused

Q77. What year was your home built?

ENTER HOMEYEAR: _____

If not sure, would you say:

1) 2006 or later
2) 2000 - 2005
3) 1990 - 1999
4) 1980 - 1989

5) 1970 – 1979
6) 1960 - 1969
7) earlier than 1960
88) Refused
99) Don't know

Q78. How old are you?

RECORD [RESPOND AGE]_____

8888) Refused
9999) Don't know

Q79. (IF Q78 = REFUSED) Could you please tell me which of the following categories includes your age? (READ LIST)

1) 18 to 24
2) 25 to 34
3) 35 to 44
4) 45 to 54
5) 55 to 64
6) 65 and over
88) Refused
99) Don't know

Q80. Which of the following best describes your educational background?

1) Less than high school,
2) High school or GED
3) Some college
4) Technical College (2 year degree)
5) 4 Year college
6) Graduate degree
88) Refused
99) Don't know

Q81. Which of the following categories best represents your approximate annual household income from all sources in 2012, before taxes?

1) < 40,000
2) Between 40 and 60,000
3) Between 60 and 80,000
4) Between 80 and 120,000
5) Over 120,000
88) Refused

99) Don't know

Q82. Which of the following ethnicities would you say describe you? Please tell me all that apply. (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
7) Other, Specify _____
88) Refused
99) Don't know

Q83. For verification purposes only, may I have your name?

1) Name: _____
88) Refused
99) Don't know

Q84. [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!

DHP Suppliers In-Depth Interview Guide

FINAL May 16, 2013

Objectives:

- Understand marketing and business practices
- Assess past and planned interactions with Project
- Identify expected market trends
- Identify desired assistance
-

Target Audience: Residential DHP manufacturers, distributors, retailers and producers/distributors of manufactured homes that are "DHP-ready". Up to 20 total interviews.

Hi, this is _____ with Evergreen Economics, an energy program evaluation firm based in Portland, Oregon. We're calling on behalf of the Northwest Energy Efficiency Alliance (NEEA) and the Northwest Ductless Heat Pump Project. Please know that this is not a sales call.

(Manufactured Homes Only) NEEA has asked us to speak with makers and retailers of manufactured homes with ductless heat pumps (DHPs) installed, or ready for installation, so NEEA can potentially adjust and improve its Project to be successful for both customers and suppliers.

(Others) NEEA has asked us to speak with ductless heat pump (DHP) manufacturers, distributors and retailers to learn more about the DHPs market, so NEEA can potentially adjust and improve its Project to be successful for both customers and suppliers.

Anything you tell us will be kept confidential.

Is now a good time to talk about the Project, or can we schedule a time to talk for 30-60 minutes?

Interviewee Role

1) First, can you please describe your role at your company?
    a. How long have you been involved with DHPs?

Marketing

2) (Manufactured Homes) How does your company market manufactured homes that are DHP-ready, or have DHPs already installed? [PROBE: presentations, internet/website, TV, radio, newspaper, social media, in-store promotions, trade magazines]

3) (Others) How does your company currently market DHPs for the residential market? [PROBE: presentations, internet/website, TV, radio, newspaper, social media, in-store promotions, trade magazines]

4) Who is your target market? (E.g., residential segments, distributors, installers)

5) And what are your key marketing messages? (PROBE for: energy savings, comfort, monetary savings, rebates, etc.)

    a. (Manufactured Homes) Probe to see if DHPs marketing different than for other manufactured homes.

6) 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]

    b. Why did you make these changes?

7) Has NEEA's Project influenced your marketing efforts in any way? [Probe to see if more marketing focused in NW due to rebates, if focusing more on specific home types (e.g., forced air), new messages, etc.)

8) What types of marketing support have you received from NEEA's 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? If YES: Please explain.

9) Have there been any times when the messaging or marketing efforts of the NW Ductless Project and/or Northwest utilities has conflicted with the marketing or messaging efforts of your company?

    a. If YES: What have you done to resolve the issue?

10) (Manufactured Homes Only) For the Pacific Northwest, are your company's manufactured homes primarily fitted for multi-headed DHP systems for whole home heating and cooling, or single-head configurations to serve the primary living space? Why is that?

11) (Others) For the Pacific Northwest, does your company's DHP marketing primarily promote multi-headed DHP units for whole house solutions, or one-to-one configurations to displace zonal electric heat? Why is that?

12) [MANUFACTURERS AND MANUFACTURER REPS ONLY]: What is your company's position on 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 CONSIDERING] What are the potential advantages/disadvantages of working with retailers to sell DHPs?

c. [IF NOT CONSIDERING] Why don't you want to work with retailers on DHPs?

* [B and C, 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?]

Sales

13) (Distributors and Retailers) How many DHP models do you have in stock? And how many of these models qualify for 2013 NW Ductless Heat Pump Project incentives?

14) (Distributors and Retailers) What models do you have that *don't* qualify? Why don't these models qualify?

15) (NOT Manufactured Homes) What are your most popular DHP models? Why are these sales highest?

16) (NOT Manufactured Homes) Has the market share of any of the DHP brands you make/offer changed significantly in the past year? How so? [PROBE FOR NUMERICAL ESTIMATES, by functionality (e.g., heating/cooling v. cooling only]

17) What impact has NEEA's Project had on your sales of [residential DHPs]/[manufactured homes]? Has the Project impacted the types or number of [DHP units]/[manufactured homes] that you…

i. [MANUFACTURERS and REPS] manufacturer/distribute? [PROBE TO GET NUMERICAL ESTIMATES]

ii. [DISTRIBUTORS/RETAILERS] keep in stock? PROBE TO GET NUMERICAL ESTIMATES]

iii. [MANUFACTURED HOMES MAKERS and SELLERS] produce/sell? PROBE TO GET NUMERICAL ESTIMATES]

18) What challenges, if any, have you experienced in meeting demand?

19) In the past year, has the impact of the Project on your [residential DHP sales]/[manufactured homes sales] increased, decreased, or stayed the same? Why is that?

20) How have federal tax credits influenced your DHP business, if at all?

21) (Manufacturers) How does your company accommodate do-it-yourself (DIY) installs in other countries, which have different plug-and-play technology?
    a. How might NEEA address a potential DIY market if DHPs end up in more retailers in the future?
22) (Manufacturers) What would likely be an acceptable rate of return for your company if DHPs installs become DIY in the US?

Interactions with Installers

23) (NOT Manufactured Homes) Do you rely on installation contractors to market residential DHPs?

    a. If YES: How do you work with contractors, to ensure that they use appropriate messaging?

24) (Manufacturers and Distributors) What technical training do you provide to installers?

25) Are there any technical issues that DHP installers have more difficulties with?

26) (Manufacturers and Distributors) What are the average installation costs for a 1:1 system outside of the Pacific Northwest?
    a. And how do installation costs in the Northwest compare?

27) (Manufacturers and Distributors) Do you see any evidence that utility rebates result in higher prices charged to consumers for DHPs?

    a. If YES: Why do you say that?

28) (Distributors only): Would you sell DHPs to non-HVAC technicians, such as electricians with a refrigerant license?
    a. If NO: Why not?
    b. Do you think a strategy like this could improve market adoption? Why do you say that?

Commercial Sales and Other Home Types (MANUFACTURED HOMES SKIP THIS BATTERY)

29) About how many of your DHPs have been installed in small commercial businesses less than 5,000 square feet in the last 12 months?

    a. What percent of your total DHPs sales does this represent?

    b. Have these installations increased or decreased in the past 12 months?

30) In your residential sales, do you sell DHPs that are used in manufactured homes?
    a. If YES: How common is this – could you estimate a percentage of your residential sales?

31) Do you sell DHPs that are used in new homes?
    a. If YES: How common is this – could you estimate a percentage?

32) And about what percentage go into attached multifamily housing units?

33) Are there any significant barriers preventing DHPs from being used in manufactured, new or multifamily homes?
    a. If YES: please describe these barriers.

34) Have any of your DHPs been returned due to technical failures?
    a. If YES: Get details on percentage and typical models, reasons

Interactions with Project

35) What involvement have you had with the NW Ductless Heat Pump Project in the past year? (Probe on interactions with Northwest utilities, project staff and installers.]

36) Did you have any project-related challenges in 2012? [Probe on rebates eligibility, NEEA/Fluid delivery, installer activities, and equipment issues.]

37) How has the Project influenced your view of the DHP market in the Northwest?

38) Do you plan to assist the project in any way in 2013? (Probe on technology training, marketing, funding, etc.)?

Future Expectations

Let's conclude by talking about the current and future states of the DHP market.

39) What technological trends are you seeing with DHPs?

    a. Are there any new developments with DHPs in cold climate applications?

40) (Makers) Is your company planning any aesthetics changes for inverter driven DHPs?

41) Do you think the price of DHP installations will change in the next 2 years? If so, how?

42) What are your expectations for the future regarding your company's [DHP sales]/[manufactured homes 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]/[manufactured homes with DHPs]?

43) (NOT Manufactured Homes) Are there any new or growing market segments for DHPs? [New construction, remodels, manufactured housing, etc.]

44) Are any specific applications for DHPs becoming more popular? [E.g., cooling, converting spaces]

45) (Manufactured Homes) Do DHP-ready homes constitute a strong market for you? How do they compare with other manufactured homes?

46) (Others) How do DHPs compare with other heating and cooling products that you manufacture/carry – do they constitute a strong market for you?

47) What are the primary market barriers to increased [residential DHP sales]/[sales of homes that are DHP-ready]? (Probe on out of pocket cost, economy status, customer awareness, focus on commercial market, etc.)

48) (Manufacturers and Distributors) NEEA has a long-term goal to have DHPs installed in 85 percent of single-family, zonal heat homes in the Northwest. Currently DHPs have a market share of about 5 percent in this market, and market share has increased about 1 percent annually in recent years.

a. In your opinion, what things need to occur to achieve this 85 percent goal?

b. When do you think this saturation level might realistically occur?

49) [NOT Manufactured Homes, IF NEEDED] In the Pacific Northwest, what proportion of your DHP sales do you expect will be multi-headed DHP units for whole house solutions – (one or more outdoor units with multiple indoor heads) vs. "one-to-one" configurations (to displace zonal electric heat)?

50) Lastly, do you have any other thoughts or comments about DHPs in general, the market, or NEEA's Project?

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

Utilities In-Depth Interview Guide

FINAL May 13, 2013

Objectives:

- Understand utility program offerings and promotions, expected changes and long-term vision for DHPs
- Identify utility program delivery challenges
- Understand satisfaction with NEEA's Project and if needs are adequately met
- Determine how NEEA can improve its assistance to utilities

Target Audience: 20 utilities that participate in the Project, including a mix of very active and less active utilities (defined by number of rebates paid out).

Hi, this is _____ working with Evergreen Economics, an energy program evaluation firm in Portland, Oregon. My company is evaluating the Northwest Ductless Heat Pumps Project for the Northwest Energy Efficiency Alliance (NEEA). Right now we're interviewing a group of utility contacts to better understand how well the Project is going, and to gather feedback on how it might be improved.

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

First I'm going to ask you some questions about your own utility's DHPs program. Then I'll ask you some questions about NEEA's Northwest DHP Project.

1) To start off, why is your utility participating in the Northwest DHPs Project?

2) Which methods do you use to promote your DHPs program? Probe for:

   Direct mailings
   Newspaper ads
   TV/Radio
   Social media
   Internet
   Other

3) Do you have a DHP display unit?

a) If so, where is it located? Is it functional, or just a display? Permanently installed?

4) What types of customer homes are you targeting?

5) What marketing media and/or messages have been most effective in persuading customers to buy DHPs?

6) Do you use the displacement theory when educating customers about DHPs? (i.e., leaving the existing heat in place and adding a DHP; primarily focused on 1 head to 1 compressor)
7) Have your promotion efforts or budget increased or decreased in the past year? Why, and how so?

8) In the next 12 months, will your promotion efforts change in any way? If so, how?

9) What rebate amount(s) are you offering in 2013? *Distinguish between: existing SFR – zonal heating, existing SFR – forced air furnace, other existing homes.*

a) How do these rebate amounts compare to those offered in 2012?
b) If different in 2013: Why did you make these changes? (Probe on BPA funding levels, changes in local install costs, shifting utility priorities, other)
c) 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?

10) What percent of your residential portfolio is allocated to DHP rebates?

11) 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?

12) Does your utility have an expected time frame for when DHP rebates will no longer be offered?

13) 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?
e) If YES: What is your perception of your utility's financing options – should they be changed in any way for DHPs in particular?

14) 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?

15) Which aspects of your program (e.g., rebates, marketing, technical training, contractor referrals, financing) have had the most impacts on driving customer participation?

16) Did you achieve your installation goals for 2012? Why or why not? (Probe on program challenges, successes)

17) What are the biggest challenges for DHPs in your service territory?
    a) Is cold climate an obstacle for installations? If so, how?

18) Are your goals for 2013 different than 2012? If so, why?

19) 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 with any installation issue?

20) Do you need any additional assistance to improve the inspections process in your area?
    a) If YES: Who should provide this assistance?

Regional Initiative and Coordination

Now I'd like to ask you some questions regarding the Northwest DHPs Project and then we'll be done.

21) Who do you work with primarily to administer your DHPs program – the new DHP Project Administered by Fluid or BPA?

22) (If Fluid is main admin provider) How do you use Fluid's database, and how well is this working for you? For instance, do you use it to run reports to support your own program or reporting to BPA?

23) (If BPA is main admin provider) Please describe how you work with BPA for program administration, project tracking and rebates processing.

    a) How often do you provide data to BPA?
        i) If annual or each 6 months: How difficult would it be to provide data more frequently, perhaps quarterly or monthly?

b) Do the data you provide include detailed customer information, such as name, address and DHP model?
   i) If not, why?
c) How well is this process working in your opinion?
d) Do you have any recommendations to improve this process?

24) How well are you able to stay informed about NEEA's current or planned Initiative activities? (PROBE to see if any confusion with BPA's activities)
   a) If YES: Are you or other staff usually able to attend NEEA's webinars covering program updates?
   b) If YES to main Q: Do you have suggestions for improving communications between the utilities, NEEA, Fluid and/or BPA?

25) Have you visited the 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?

26) How satisfied have you been with the technical resources that are available through the Initiative?

27) And how satisfied have you been with the Initiative's marketing support?

28) What features of NEEA's Initiative do you like best and have worked well for you?

29) How could NEEA's Initiative better support your endeavors? (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!

Appendix E: Urban/Rural Markets Definitions

NEEA distinguishes urban from rural counties using Rural-Urban Continuum Codes (RUCC) developed by the United States Department of Agriculture (USDA). As noted on the USDA website, the RUCC forms "a classification scheme that distinguishes metropolitan counties by size and nonmetropolitan counties by degree of urbanization and proximity to metro areas." The table below provides additional details about the various RUCC codes.

2003 Rural-Urban Continuum Codes	
Code	**Description**
Urban Counties:	
1	Counties in metro areas of 1 million population or more
2	Counties in metro areas of 250,000 to 1 million population
3	Counties in metro areas of fewer than 250,000 population
Higher-Density Rural Counties:	
4	Urban population of 20,000 or more, adjacent to a metro area
5	Urban population of 20,000 or more, not adjacent to a metro area
6	Urban population of 2,500 to 19,999, adjacent to a metro area
Lower-Density Rural Counties:	
7	Urban population of 2,500 to 19,999, not adjacent to a metro area
8	Completely rural or less than 2,500 urban population, adjacent to a metro area
9	Completely rural or less than 2,500 urban population, not adjacent to a metro area

Appendix F: Supplemental Households Phone Survey Tables

Table 33: Awareness of DHPs Among Non-DHP Households

Cooling Zone, Urban/ Rural	Yes, Unaided	Yes, Aided	No/Don't Know	Total
CZ1				
Rural (n=38)	40%	3%	58%	100%
Urban (n=35)	47%	9%	44%	100%
CZ2				
Rural (n=35)	31%	3%	66%	100%
Urban (n=35)	43%	0%	57%	100%
CZ3				
Rural (n=29)	20%	3%	77%	100%
Urban (n=31)	52%	3%	45%	100%
Overall (n=203)	43%	5%	52%	100%

Q1. Before this call, had you ever seen or heard about ductless heat pumps, or DHPs?

Table 34: Reasons for not Installing DHPs - Non-DHP Households

Source (n=21)	Primary Reasons	Secondary Reasons
They cost too much/don't have the money	79%	1%
Aesthetics/they are ugly	12%	19%
Existing equipment works fine	6%	5%
Noise	0%	10%
Don't know enough about them	0%	5%
Would have to install additional wiring	0%	2%
No other reason	NA	70%
Don't know	3%	0%

Q10. (If considered purchasing a DHP) What was the primary reason you chose not to install one? Q11. Were there other reasons why you chose not to install a ductless heat pump? Multiple responses allowed for Q11.

Table 35: Most Attractive Features of DHPs Among Non-DHP Households

Source (n=42)	Primary Reasons
Lower utility bills/energy cost savings	44%
More efficient equipment	24%
New cooling capability	13%
Unit is small	12%
Improved control over heating/cooling	9%
Reduced allergens	9%
High on wall	7%
Can target areas	7%
Not gas/oil	6%
Don't Know	5%
Rebates	5%
New equipment	2%
Ductless	2%

Q17. (If Q15. is "Very interested" or "Somewhat interested") What benefits of ductless heat pumps are especially attractive to you? Multiple responses allowed for Q17.

Table 36: Awareness of Specific DHP Brands Among Interested Non-DHP Households

Source (n=9)	Responses
Mitsubishi	66%
Toshiba-Carrier	45%
LG	45%
Frigidaire	26%
General Electric	22%
Honeywell	22%
York	22%
Trane	8%
Rheem	4%

Q19. (If somewhat or very interested in purchasing a DHP, and aware of DHP brands) What ductless heat pump brands have you heard of? Multiple responses allowed for Q19.

Table 37: Willingness to Buy DHP Brands Among Interested Non-DHP Households

Source (n=9)	Responses
Toshiba- Carrier	96%
Mitsubishi	96%
Samsung	88%
Panasonic	88%
Fujitsu	53%
LG	53%
Sanyo	39%
Comfort Aire	30%
Frigidaire	22%
Daikin	12%
Trane	8%

Q20. (If somewhat or very interested in purchasing a DHP, and aware of DHP brands) What ductless heat pump brands would you consider buying? Q21. Would you consider buying [BRAND]? Multiple responses allowed for Q20. And Q21.

Table 38: Primary Heating Types for Non-DHP Households

Heat Source (n=203)	General Population Responses
Heat Pump (not ductless)	22%
Forced Air Furnace	21%
Wood heat	21%
Baseboards	12%
Propane	7%
Electric radiant heat	6%
Kerosene or oil	4%
Wall Heaters	3%
Space Heaters	1%
Don't Know	1%

Q31c. What is your primary type of Heating?

Table 39: Primary Cooling Types for Non-DHP Households

Cooling Source (n=154*)	General Population Responses
None / No cooling source	60%
Heat Pump (not ductless)	15%
Window Air Conditioner	10%
Central/Whole house Air Conditioner	7%
Forced Air Furnace	5%
Portable Air Conditioner (not fan)	2%
Propane	1%

Q31d. What is your primary type of Cooling?
* 53 respondents did not provide this information.

Table 40: Reasons that Participants Chose DHP Installation Contractors

Reason (n=98)	Responses
Trust the contractor	29%
Liked their presentation/customer service	26%
Good company reputation	24%
Offered the lowest cost	19%
Recommended by friend/had good references	10%
Offered an acceptable cost	9%
Have used contractor before/satisfied with past work	9%
Are local/close by	8%
Only one available	5%
Are on utility list of preferred contractors	4%
Brand/program came with installer	4%
Could install DHP quickly	3%
They were very experienced with DHPs	1%
Was certified by Mitsubishi	1%
He was willing to do it my way	1%

Q44. What were the main reasons you chose the installation contractor that you did? Multiple responses allowed for Q44.

Table 41. Participant DHP Temperature Control Practices

Temperature Adjustment (n=101)	Participant Responses
Manual	72%
Automatic	21%
Both manual and automatic	7%

Q63. Have you programmed your DHP to automatically adjust the temperature throughout the day, or do you usually adjust the temperature setting manually?

Table 42: Participant DHP Recommendations Practices

Response (n=101)	Participant Responses
Yes- would	68%
Yes- have	32%
No	0%

Q70. Have you, or would you, recommend the DHP to a friend, colleague or family member?

Table 43: Importance of Having an Energy Efficient Home – Initiative Participants and Non-DHP Households

Importance of having an energy efficient home	Very important	Somewhat important	A little important	Not at all important	Don't know/ refused	Total
Participants (n=101)	76%	23%	1%	0%	0%	100%
General Population (n=203)	61%	32%	3%	4%	1%	100%
Overall (n=304)	66%	29%	2%	3%	1%	100%

Q 73. How important is it for you to have an energy-efficient home? Would you say it is: ____

Table 44: Technology Adoption Levels of Survey Respondents

Adoption Level	Percentage of Participants (n=101)	Percentage of General Population (n=203)
I am typically in the middle of the group when purchasing new technology	45%	37%
I am one of the last people to purchase new technology	7%	28%
I purchase new technology sooner than most of my friends	26%	11%
I purchase new technology after most of my friends have purchased it	11%	11%
I am the first among my friends to purchase new technology	5%	4%
Don't know/ refused	7%	9%

Q76. Now I'd like you to think about how quickly you, personally, adopt new technology. Which of the following best describes you?

Table 45: Home Age of Survey Respondents

Year Range	Percentage of Participants (n=101)	Percentage of General Population (n=203)
2006 or later	4%	5%
2000 to 2005	2%	8%
1990 to 1999	14%	13%
1980 to 1989	12%	15%
1970 to 1979	23%	24%
1960 to 1969	10%	7%
Earlier than 1960	33%	26%
Don't Know	3%	2%

Q77. What year was your home built? Q77a. Would you say . . .

Table 46: Age Range of Survey Respondents

Age Range (Years)	Percentage of Participants (n=101)	Percentage of General Population (n=203)
18 to 24	0%	1%
25 to 34	5%	2%
35 to 44	3%	7%
45 to 54	16%	13%
55 to 64	24%	26%
65 and over	43%	40%
Refused/ Don't know	10%	12%

Q78. Can you please tell me your age? Q79. Could you please tell me which of the following categories includes your age?

Table 47: Education Level of Survey Respondents

Education Level	Percentage of Participants (n=101)	Percentage of General Population (n=203)
High school or GED	13%	19%
Some college	29%	21%
Technical College (2 year degree)	9%	13%
4 Year college	29%	25%
Graduate degree	17%	15%
Less than high school	0%	2%
Refused/ don't know	2%	4%

Q 80. Which of the following best describes your educational background?

Table 48: Income Level of Survey Respondents

Income Level	Percentage of Participants (n=101)	Percentage of General Population (n=203)
<40K	23%	26%
Between 40K and 60K	18%	19%
Between 61K and 80K	19%	15%
Between 81K and 120K	16%	11%
Over 120K	4%	7%
Refused/ don't know	23%	23%

Q 81. Which of the following best represents your approximate annual household income from all sources in 2012, before taxes?

Appendix G: Supplemental Installers Phone Survey Tables

Table 49: Ductless Heat Pump Brands Offered

Brand (n=187)	Currently Offered	Planning to Offer in Next 12 Months
Mitsubishi	71%	1%
Daikin	44%	3%
Fujitsu	39%	1%
Panasonic	8%	1%
Lennox	6%	0%
LG	6%	1%
Sanyo	6%	1%
Goodman	5%	0%
None	1%	74%
Don't Know	1%	17%

Q3.Which DHP brands does your firm currently offer to customers? Q4. Are you planning to offer any other DHP brands in the next 12 months? Multiple responses allowed.

Table 50: Marketing Tools Used

Response	Installation Contractor Responses (Percentage) (n=187)
Talking to customers	95%
Materials from supplier/manufacturer	90%
Showing a display unit	50%
Materials created by own firm	41%
Materials distributed by the Northwest Ductless Project	34%
Refer to website	7%
Show existing jobs/testimonials	5%
iPad demos/cell phone photos	4%
None	3%

Q60. When you want to introduce customers who are not familiar with the technology of DHPs, how many of the following marketing tools do you use? Multiple responses allowed.

Table 51: Desired Support

Response	Installation Contractor Responses (Percentage) (n=187)
Additional marketing materials/resources	54%
Additional manufacturer support	53%
Additional technical service support from distributors	41%
None	28%
Financial – tax credits, incentives, etc.	2%
Info on NEEA/rebate programs	2%

Q61. Which of these other types of support, if any, would be beneficial to you? Multiple responses allowed.

Table 52: Main Reasons for Customer Interest

Response	Installation Contractor Responses (Percentage) (n=187)
Energy efficiency/lower energy bills	62%
Don't need ducts/furnace/central AC	14%
Affordability	13%
Can heat/cool a space not currently served	11%
Add cooling (only) to a space	10%
Zonal control	10%
Available rebates/incentives	9%
Replace existing unsatisfactory equipment	5%

Q62. What are the key reasons your customers are interested in DHPs? Multiple responses allowed.

Table 53: Primary Barriers to DHP Sales Among Customers

Response	Installation Contractor Responses (Percentage) (n=187)
Cost	54%
Appearance	26%
Don't understand technology	16%
Effectiveness in cold weather/need a backup source	5%
Don't know	5%
None	4%
Change from another technology	3%
Effectiveness (general)	3%

Q65. What are the primary barriers to DHP sales among customers that are aware of them? Multiple responses allowed.

Table 54: Importance of Utility Rebates

Response	Installation Contractor Responses (Percentage) (n=186)
Extremely important	46%
Very important	30%
Somewhat important	15%
Not very important	5%
Not at all important	3%
Don't know	0%

Q66. How important would you say that utility rebates are to residential DHP sales?

Table 55: Importance of Utility Financing

Response	Installation Contractor Responses (Percentage) (n=72)
Extremely important	21%
Very important	20%
Somewhat important	34%
Not very important	20%
Not at all important	3%
Don't know	3%

Q68. How important would you say that this utility financing is to residential DHP sales?

Table 56: Perceived DHP Advantages

Response	Installation Contractor Responses (Percentage) (n=187)
More efficiency/lower operating cost	60%
Don't need furnace/central AC/ducts	31%
Zonal applications	26%
Lower install costs	14%
Ease of install/quick	13%
Ability to heat/cool	11%
Quiet	7%
Save energy	7%
Easy to operate	5%
Comfort	4%
Better control of heat/cold	4%

Q53. Briefly, what advantages do you think DHPs offer? Multiple responses allowed.

Table 57: Perceived DHP Disadvantages

Response	Installation Contractor Responses (Percentage) (n=187)
Appearance/lines/outside units	29%
Cost – general	20%
Designed to heat/cool only one room	19%
Cost to heat/cool multiple rooms	14%
None	10%
Don't work well in cold weather	7%
Hard to locate/install	6%
Need backup heat	5%
Hard to repair	3%
Not good for all homes/applications	3%

Q54. What are the disadvantages of DHPs? Multiple responses allowed.

Table 58: Responsiveness of Project Staff

Response	Installation Contractor Responses (Percentage) (n=71)
Extremely responsive	41%
Very responsive	51%
Somewhat responsive	7%
Not very responsive	1%
Not at all responsive	0%
Don't know	0%

Q75. How responsive was Project staff? Would you say they were: Extremely responsive? Very responsive? Somewhat responsive? Not very responsive? Not at all responsive?

Appendix I: ACE Model Review Memo

MEMORANDUM

Date: February 28, 2013

To: Christina Steinhoff, Praveen Chalise, Ty Stober

Re: Review of Cost-Effectiveness Modeling Assumptions for the Northwest Ductless Heat Pump Project

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Evergreen Economics conducted a review of key assumptions that are used in NEEA's Alliance Cost Effectiveness Model (ACE Model) to calculate the cost effectiveness of the Northwest Ductless Heat Pump (DHP) Initiative. This review focused on a set of prioritized model assumptions initially provided to Evergreen Economics on January 29, 2013 and supporting documentation that was provided subsequently. Other model assumptions will be reviewed during the course of the evaluation after further consultations with NEEA.

Following are our observations and suggestions based on our review, organized by topic.

Tracked and Incented DHP Units

NEEA relies on Fluid Market Strategies (Fluid) to track total DHP sales in the Northwest. The sales data is actual 2012 sales data from 11 distributors of DHPs (one of these distributors only reported data for Q1 2012).

From the total DHP sales data, Fluid estimates non-incented DHP installations replacing electric resistance heaters in NEEA's target market (the primary living space of residential single family homes). Fluid relied on values from Research into Action's "Unincented DHP Market Analysis" memo – corroborated by Evergreen – to estimate the installation characteristics of all non-incented DHPs.

Research Into Action specifically estimated the percentages of non-incented DHPs installed by sector, housing type (single family, multi-family, new construction, and manufactured homes), installation location, and displaced heater type. Fluid used this information to determine the quantity of regional non-incented heating and cooling DHP sales installed in NEEA's target market. They applied the percentages to quarterly sales data, after netting out incented DHPs (discussed next) and produced a very complete representation of non-incented heating and cooling DHP installations across the region. All incented DHPs are assumed to go into NEEA's target market.

The application of these percentages by Fluid on their estimates of regional non-incented heating and cooling DHP sales is applied accurately and provides NEEA with a decent estimate for inclusion in their cost effectiveness model. It is uncertain if recent DHP sales have been

installed in a similar distribution as those noted in Research Into Action's memo, but this is the best available and most current data. Overall, this method is very reasonable. The Evergreen evaluation will seek to update the distribution percentages based on findings from our installer phone surveys.

NEEA and Fluid are still finalizing an estimate for 2012 incented DHPs in single-family zonal heat homes, and this review is based upon preliminary information through January 27, 2013.

In the past, Fluid maintained a comprehensive database of all regional incented DHPs, and tracking was much easier. For 2012, incented DHPs data were compiled from the following sources:

1. Fluid's tracking of approximately 25 utilities,
2. A regional utilities survey administered by NEEA, and
3. Data provided by BPA for many of its constituent utilities.

Data were not available for nearly 30 (mostly small) utilities, however the sources above likely account for the vast majority (over 95%) of expected DHP installations, based on utility size and 2011 incentives data. To complete the incented DHPs estimate Fluid has carried forward 2011 installation counts without adjustments for the utilities with missing 2012 data. Fluid currently estimates that (at least) 5,415 DHPs were incented in 2012. (Since BPA reports data on a fiscal year basis, it is possible that additional incented DHPs will be identified later in 2013.) In comparison, 4,893 DHPs were incented in 2011.

We have not reviewed all the raw data that were assembled, but note that this approach of assembling actual installations data from multiple sources is recommended and preferred to developing high-level, regional estimations. On a minor note, in extrapolating missing 2012 values from 2011 data NEEA could apply an average increase/decrease percentage calculated from similarly sized or "peer" utilities with complete data. In particular, much of the overall annual increase is due to two utilities (Puget Sound Energy, Rocky Mountain Power), whereas other utilities experienced a range of increases and decreases. That said, because the overall percentage of "missing" DHPs appears to be very small (less than five percent), this additional step may not enhance confidence significantly, since a wide range of factors appears to be affecting installations at the local level. (These factors will be further identified during the planned interviews with participating utilities.)

Target Market Size

The primary source for updating the target market size for DHPs is data collected as part of the Residential Building Stock Assessment (RBSA).[5] Specifically, NEEA relies on population-weighted counts of single-family households with existing electric baseboard heating. The number of households meeting these criteria in the Northwest is estimated at 500,619.

[5] Ecotope, Inc., 2012. "2011 Residential Building Stock Assessment: Single-Family Characteristics and Energy Use." Prepared for the Northwest Energy Efficiency Alliance. September 18, 2012.

There are two issues with this methodology:

1. The RBSA relies on single-family to multi-family ratios derived from the 2000 Census, applied to 2010 household counts.
2. Households with DHPs installed at the time of the RBSA study are not included in the target market statistic.

The first point, that the RBSA relies on an old ratio of single-family to multi-family homes across the Northwest, is not a major concern. While more accurate data is currently available since the full release of 2010 Census data, the ratios are similar enough not to warrant reweighting RBSA figures (very minimal gains in precision would be gained).

However, the second issue leads to significant bookkeeping issues over time. The calculation for market share proposed by NEEA is the number of homes with DHPs installed, divided by the total market size, or total technically available homes, defined as the number of single-family homes with electric baseboard heating, derived from the RBSA. If the number of these technically available homes is reduced when a household switches – or in this case, had already switched – to a DHP, this has the effect of artificially inflating the numerator and must be corrected. The denominator in the market share calculation must also include those homes that have and, ultimately, will switch from baseboards to a DHP.

A total of 60,790 single-family homes in the Northwest currently have DHPs installed as the primary heating source, based on the RBSA data. The Fluid data suggests a much lower number of installations in the target market since 2007. However, it is currently unclear how many sales/installations of DHPs (from Fluid) serve as primary versus supplementary heating (independent of DHP install location). It is also unclear how many DHPs in the RBSA data replaced electric baseboards. Our pending research can help answer this question so that the number of DHPs estimated to have *replaced* electric baseboards in single-family homes in the Northwest can be added back into the denominator for the market share calculations.

Maximum Potential (single-family homes with zonal heat)

NEEA's model currently assumes that 85% of single-family homes with zonal heat will ultimately install DHPs, based on the Northwest Power and Conservation Council's similar assumption in its 6th Power Plan.[6] Following are additional details regarding the Power Council's assumptions:[7]

- DHP achievable potential savings is calculated over a 20-year period from 2010 – 2029.
- The achievable potential includes 85% of the existing and new zonal electrically heated single-family homes (only those with baseboard, radiant or wall heaters).

[6] NEEA's model assumes regional installations will accelerate more rapidly starting in 2015, peaking at about 36,000 units in 2022. NEEA assumes utility rebates will continue through 2029.
[7] Communications from Tom Eckman, February 13, 2013.

- Fifteen percent of zonal electric single-family homes have one or more DHP adoption barrier that is insurmountable over 20 years.
- Utilities will find it cost effective to pay for the entire installation (because the DHP is cost-effective on a Total Resource Cost basis) so that there is no financial barrier to overcome, only physical or consumer preferences.[8]

The following observations lead us to believe that robust, long-term market growth is achievable for DHPs:

1. In countries where manufacturers have promoted DHPs for a long time, significant market penetration has resulted. In Japan, where DHPs have been in the market for over 30 years, DHPs comprise over 90% of HVAC sales. In Europe, 81% of HVAC systems sold are ductless.[9]
2. NEEA's involvement in the market is still relatively young, DHP retail presence is still fairly low in the Northwest, and there is still room for significant adoption growth.
    a. Only 34% of regional households are aware of DHPs.
    b. Current market share (considering all incented plus non-incented units) is approximately five percent, and households with DHPs are a mix of "Innovators" and "Early Adopters."[10]
3. Energy prices in the United States and Northwest are likely to increase due to federal policies related to global warming, and to pay for new generation capacity.
4. Households often install DHPs to add new cooling capacity (i.e., not just improve their heating).
5. Manufacturers interviewed for the previous evaluation indicated that DHPs will continue to realize performance and aesthetic improvements, which will reduce customer barriers.
6. The manufacturers noted that equipment costs may decline further (by an unspecified amount) with improvements to internal components, and new market entrants. According to NEEA staff, Panasonic (which purchased Sanyo) recently re-entered the market and has plans to offer very high-quality product. The manufacturers did not anticipate significant cost reductions for installation labor.

[8] The underlying premise of all RTF achievability assumptions is that all energy efficiency resources should be acquired by utilities just like any other resources (e.g., wind, combustion turbines). This means utilities should be willing and able to pay up to the avoided cost of the next "similarly available and reliable" resource option in order to achieve their development. This is the fundamental principle embedded in the Northwest Power and Conservation Act, which established energy efficiency as a resource.

[9] Heather Tullis, Mitsubishi Electric. Cited on The Daily Energy Report, http://www.dailyenergyreport.com/characteristics-of-a-ductless-air-conditioning-unit/ accessed on February 19, 2013.

[10] The initial 2.5 percent of adopters are usually referred to as Innovators, and the next 13.5 percent are referred to as Early Adopters. Source: Rogers, E. Diffusion of Innovations. Free Press, London, NY, USA. 1962.

7. Incented DHP sales appear to have increased modestly from 4,893 in 2011 to 5,415 in 2012. During 2012 consumers and contractors made installation decisions expecting that no federal tax credits would be available; the credits (up to $300) were only made retroactive in December 2012.

Against these long-term, encouraging factors, we note that:

8. The previous MPER found that the maximum utility incentives were $1,500 and average installation costs were about $3,600. Anecdotal evidence from the Initiative managers and Fluid suggest that Northwest utility rebates have decreased recently in the aggregate. (This will be explored more fully during the evaluation.) In the long-term, utility rebates may not keep pace with NWPCC's assumptions.
9. Initial capital cost is the primary barrier to DHP installations.[11] The continuing poor economy has accentuated first-cost barriers for consumers, reducing energy-efficiency uptake relative to more "normal" economic conditions when longer payback periods (e.g., five years or more) were more acceptable.

We do not have a weighting scheme or comprehensive econometric model to account for all of these countervailing factors. Overall, however, it appears that short-term economic issues (declining financial assistance, poor economy) are delaying a significant growth opportunity that may take more years to fully develop. We recommend that NEEA's 85% adoption target should be extended a few years (e.g., to 2033) to reflect the young stage of the Initiative and difficult economic climate. We also recommend reviewing this assumption annually to consider fluctuating market conditions and new Initiative activities.

2012 Baseline Installations Estimate (single-family homes with zonal heat)

In 2009 NEEA has assumed baseline market penetration was less than one percent based on the following information:[12]

- Historic shipments data for DHPs and unitary air conditioners and air-source heat pumps
- Northwest DHP distributors' knowledge of primary installation locations in 2009 and earlier (i.e., mostly in townhomes and condominiums)
- 2008 research by Russell Research demonstrating low customer awareness (seven percent) and single-family installations (zero).

Furthermore, NEEA assumed that DHPs would not have been marketed to the Northwest until 2020 based on its market knowledge at the time, and that it would take over 15 years to reach a maximum baseline penetration of 65% in 2039. Based on this market knowledge and

[11] Russell Research presentation to NEEA February 2009. Findings also corroborated in previous MPER.
[12] Memo from Ander Echanove (NEEA) to Evergreen Economics January 30, 2013.

assumptions, the model includes a typical S-shaped product adoption curve to calculate baseline installations. In 2012 the cumulative baseline percent is 1.75%, an increment of 0.35% over 2011.

We believe that NEEA's very low initial baseline estimate is consistent with the documentation provided, and that the final 65% baseline market share in 2039 is a reasonable assumption based on our experience with other energy efficient technologies and other regional energy efficiency programs.