Ductless Mini-Split Heat Pump Customer Survey Results

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Prepared for:

The Electric and Gas Program Administrators of Massachusetts

Part of the Residential Evaluation Program Area

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Executive Summary

The Massachusetts COOL SMART program offers rebates to customers for installing qualified, high-efficiency ductless mini-split heat pump (DMSHP) equipment in their homes. A web survey was conducted of participants in this program to better understand motivations for participating and how the DMSHP equipment is being used. The final survey included responses from 430 participants, and the key findings for the program for the Commonwealth are as follows:[1]

DMSHPs are being installed as retrofit projects. Participant responses indicate that DMSHPs are being installed primarily in retrofit projects, rather than in new construction or major renovation projects. In fact, only 1% of participants indicated that the DMSHP was installed during the course of a new construction or major renovation project.

The majority of participants are installing DMSHPs to obtain an improved level of comfort instead of a focus on saving energy. Roughly, 1/3rd of participants indicate that saving money is a primary motivator for installing a DMSHP. The other 2/3rd of participants report that improved comfort is the primary motivator for installing the DMSHP (i.e. providing a higher level of comfort; space not cooled/heated or cooled/heated adequately; or wanting zoned or central heating or cooling).

DMSHPs are more often installed for cooling than heating. Almost 75% of participants use their DMSHP for both heating and cooling. However for those participants that use their DMSHP for only one function, the majority use their DMSHP for cooling. Ninety-nine percent of participants using only one function use their DMSHP for cooling, and only 1% of participants report that they use their DMSHP only for heating. Additionally, 82% of participants indicate that they provide all of the cooling for their space from the DMSHP, while only 19% indicate that they provide all of the heating for their space from the DMSHP.

DMSHPs are being used to supplement, rather than replace existing heating systems. DMSHPs are on their own not meeting the needs of participants for heating the space they are installed in, at extremely cold temperatures. At temperatures below 15°F only 43% of participants indicate that their DMSHP provides sufficient heating to meet the needs of their entire space. While this could be an example of DMSHPs being sized for cooling requirements rather than heating requirements, it does point to the fact that DMSHPs are not typically installed to replace existing heating systems. For those participants who installed their DMSHP in a previously heated space (89%), only 5% removed the existing system. The rest of participants kept the existing system which now functions with the DMSHP to provide heating for the space.

[1] Although this survey of DMSHP participants was not designed to provide distinct information by Massachusetts electric Program Administrator (PA), there is no evidence that the findings presented in this report vary by PA.

Program Background and Objectives

The Massachusetts COOL SMART program offers rebates to customers who install qualified high-efficiency air conditioning equipment including central air conditioners and air source heat pumps. This study focused on ductless mini-split heat pumps (DMSHPs) installed through the COOL SMART program. The goal of this study was not to determine net savings, but to evaluate participant perceptions: their reasons for installing DMSHPs, how DMSHP are being used, existing equipment replaced by DMSHPs, overall satisfaction with DMSHP systems, and the success of the program incentives to encourage participants who were already planning to install a DMSHP system to consider a high-efficiency DMSHP system.

The Massachusetts electric program administrators implement this program via a network of contractors/trade allies that advise their customers of the availability of rebates. A third party administers the program. The incentives available for DMSHPs through the COOL SMART program range from $150-$500, based on the specifications of the units. The specifications required at each of the incentive levels in 2013 are listed in Table 1.

Table 1: DMSHP Incentives through the MA COOL SMART Program, 2013

	SEER	EER	HSPF	Incentive
DMSHPs Eligible for Incentives through the MA COOL SMART Program	≥ 16	≥ 12	≥ 8.2	$150
	≥ 19	≥ 12.5	≥ 10	$300
	≥ 20	≥ 13	≥ 10	$500

Methodology

The evaluation team surveyed 430 participants via a web based survey. A total of 3,289 DMSHP participants comprised the population frame, with 2,511 participants from program year 2013 and 778 from program year 2012. Participants were classified by three criteria to determine the sample structure: number of units installed, unit type and climate zone. The climate zone criteria were included only as a check to ensure adequate geographic distribution of the sample, while the other two criteria were used to stratify the sample as follows:

- **Number of Units Installed**: Participants were classified as having a "Single" installation, meaning they received an incentive for only one outdoor condenser unit, or as having a "Multiple" installation, where they received an incentive for two or more outdoor condenser units. The multiple installation group makes up just over 30% of the total population, but was oversampled to ensure that enough responses were received within the group to determine dissimilar motivations. As a result, multiple installation participants make up just over 50% of the sample responses.

- **Unit Type:** Participants were classified as "Cold climate" if all outdoor condenser units installed at a given address were cold climate[2] units; "Not cold climate" if none of the units installed were cold climate units; "Mixed" if at least one cold climate and one not cold climate unit was installed; or "Unknown" if the unit type was not known. The classification of participants in each of the *cold climate* categories was based on equipment records from the rebate process. This classification did not rely on respondent recall as the analysis team believed that it was unlikely that participants would be able to accurately determine to which group they belonged.[3]

  Participants who installed cold climate units make up just over 22% of the total population, and were oversampled, to constitute just over 33% of the sample responses. It was important to determine the motivations of participants who installed cold climate units, because these participants were likely to have higher energy savings, especially on the heating side.

An exact description of the population and sample groups as described by these strata is provided in Table 2.

[2]There is no universally recognized definition of cold climate DMSHPs. For the purpose of this study the evaluation team has adopted Efficiency Vermont's definition, or those that provide 100% of nominal capacity at 5°F, COP > 1.75 at 5°F (maximum capacity rating), HSPF > 9, and SEER > 20 (http://www.efficiencyvermont.com/for_my_home/ways-to-save-and-rebates/energy_improvements_for_your_home/Cold-climate-heat-pump/overview.aspx). Efficiency Vermont's list is not an exhaustive list of cold climate DMSHPs, but offers a list of those units commonly found in the Northeast.

[3] The hypothesis that participants would not be able to accurately classify their system as "cold climate" or other was not tested through the survey. The analysis team believed that this was not a worthwhile endeavor as "cold climate" systems are not well defined in the industry and participant understanding of DMSHP systems is already relatively low.

Table 2: Population and Sample Distribution

# of Units	Unit Type	Population		Target Completions		Total Sample Released		Survey Completions		Response Rate (Complete/ Released)	
Single	Cold climate	2286	552	200	111	861	398	206	101	24%	25%
	Not cold climate		1685		87		451		104		23%
	Unknown[4]		49		3		12		1		8%
Multiple	Cold climate	1003	197	200	39	767	146	224	43	29%	29%
	Not cold climate		673		134		517		146		28%
	Unknown		21		4		14		1		7%
	Mixed		112		22		90		34		38%
TOTAL		3289		400		1628		430		26%	

An invitation to the web based survey was distributed to 1,628 participants. Of this group, we received bounce-backs on 26% of the email addresses. Of the remaining 1,205 (74% of) participants who received a working link to the web based survey, 430 participants completed the online survey and received a $10 incentive for their participation. The overall response rate for participants with valid emails was 36%.

Since sections of the population were oversampled to ensure accurate representation, the survey results were weighted based on their distribution in the overall population, in order to be representative of the population as a whole. Results presented in this report are weighted by individual participant, rather than by individual unit. Appendix A contains tabular outputs of all survey responses.

[4] At the completion of the survey the evaluation team determined that the two participants classified in the category "unknown" unit type only led to confusion in the survey results. This realization lead to removing the responses from these two participants from the final data set. As a result, the total completes for the remainder of this report will be listed as 428 participants.

Survey Results

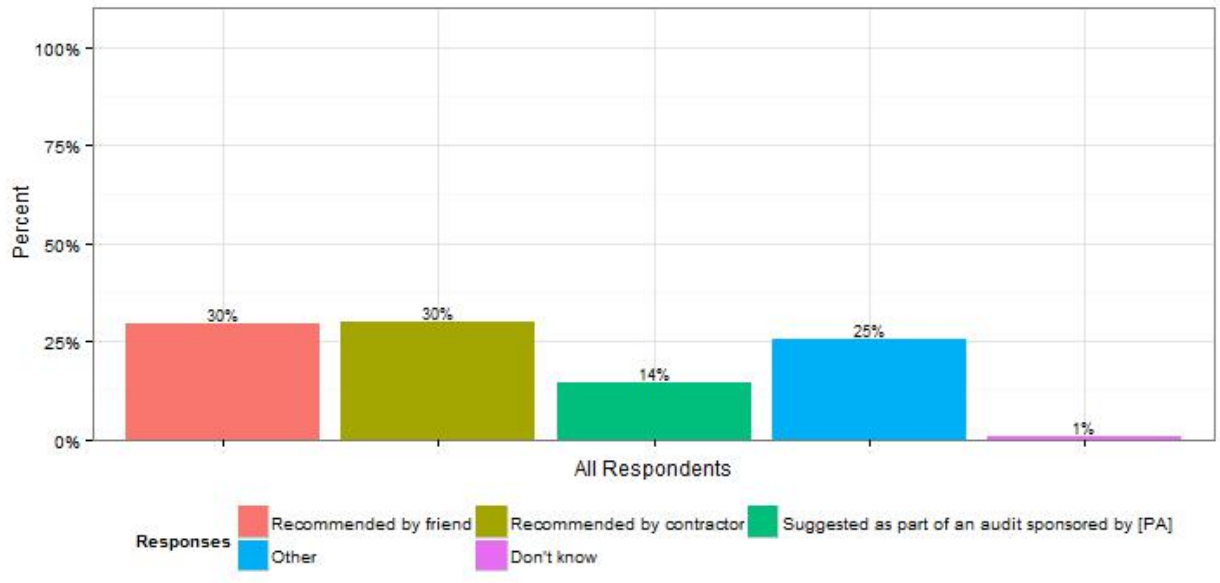
The results of the survey show a population of participants that is relatively homogeneous. The majority of program participants own their home (98%), installed the DMSHP in their primary residence (88%) and report that the DMSHP was installed in a single family home (89%). Additionally, most of the units were installed as a retrofit measure, as less than 1% of participants noted that the unit was installed during the course of a new construction project.

It is important to note that the corollary to this relatively homogeneous population is a relatively small population of other types of program participants. Ten percent of participants report that the DMSHP was installed in a vacation/secondary home. Additionally, ten percent of participants report that the DMSHP is installed in some type of a multifamily building, including a duplex or two-family home (4%), an apartment or condo in a 2-4 unit building (4%), an apartment or condo in a 5+ unit building (1%) and a townhouse or rowhouse (1%).

DMSHPs Purchased for Comfort & Money Savings

As shown in Figure 1, participants got the idea to install DMSHPs through a variety of drivers. Responses were relatively evenly split between those who reported the DMSHP was recommended by a friend (30%), those indicated the DMSHP was recommended by a contractor (30%), those who indicated the DMSHP was suggested as part of an audit sponsored by the Program Administrator (14%) and those that reported their reason as other (25%). Other responses included personal research, home shows, manufacturer advertisements, seeing them used in other installations and searching for a solution to replace room AC units.

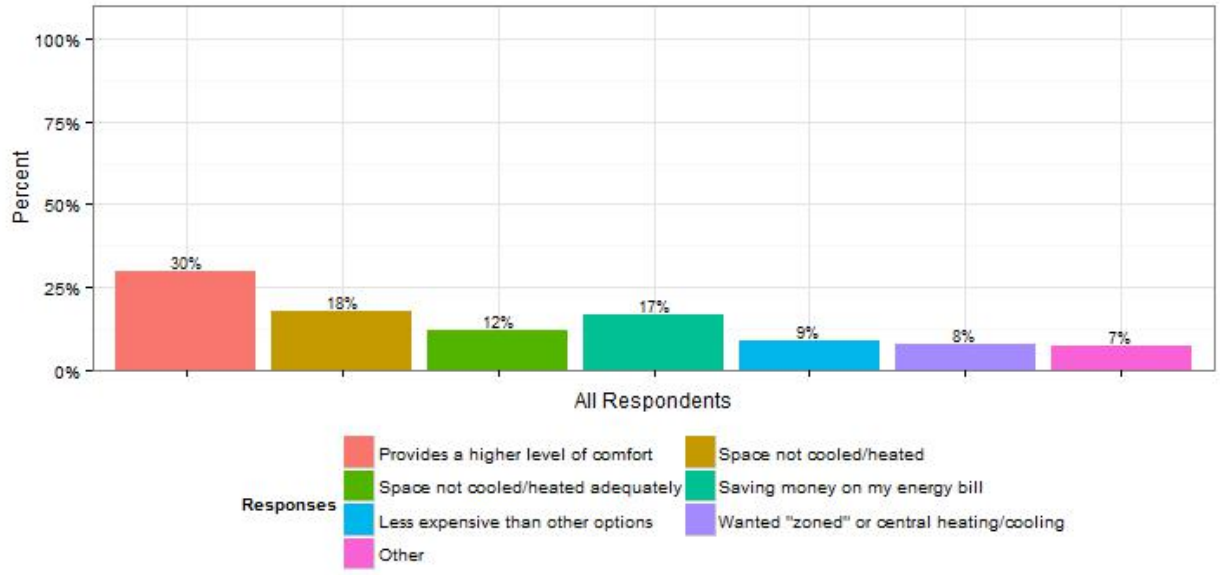
Figure 1: Source of Idea to Install DMSHP



Participants report a variety of reasons for purchasing DMSHPs, as can be seen in Figure 2. When participants were asked their primary reasons for purchasing a DMSHP, 68% indicated a comfort related

reason (providing a higher level of comfort, the space was not cooled/heated, the space was not cooled/heated adequately, and wanting zoned or central heating or cooling). An additional 26% of participants indicated a reason related to saving money (saving money on their energy bill and the DMSHP was less expensive than other options).

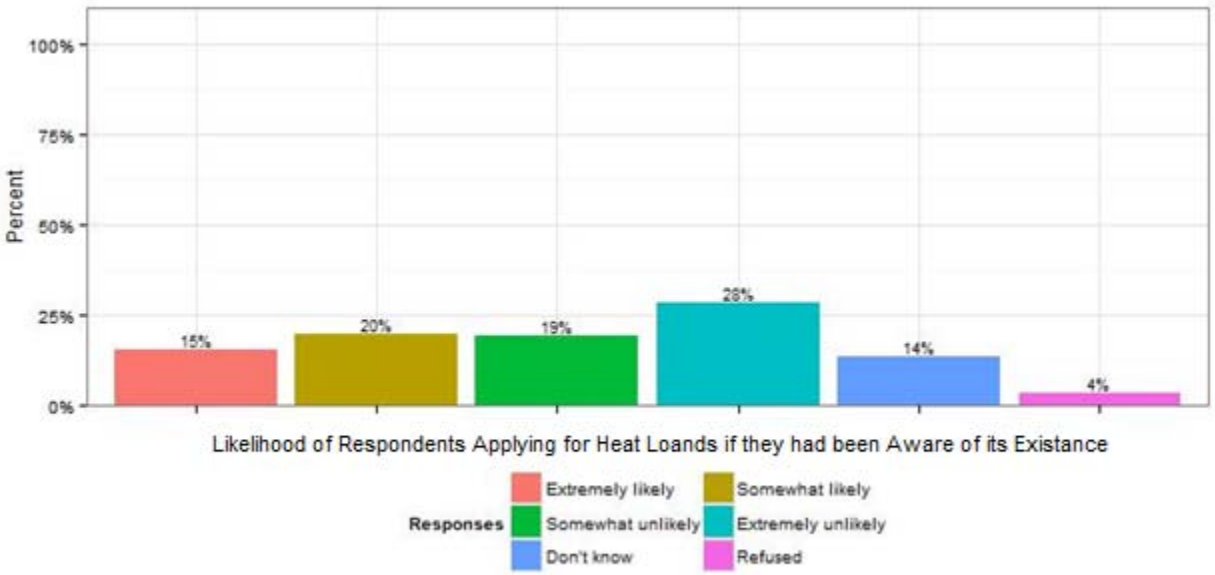
Figure 2: Primary Reasons for Purchasing a DMSHP



A Quarter of Participants Received a Heat Loan to Help Purchase their DMSHP

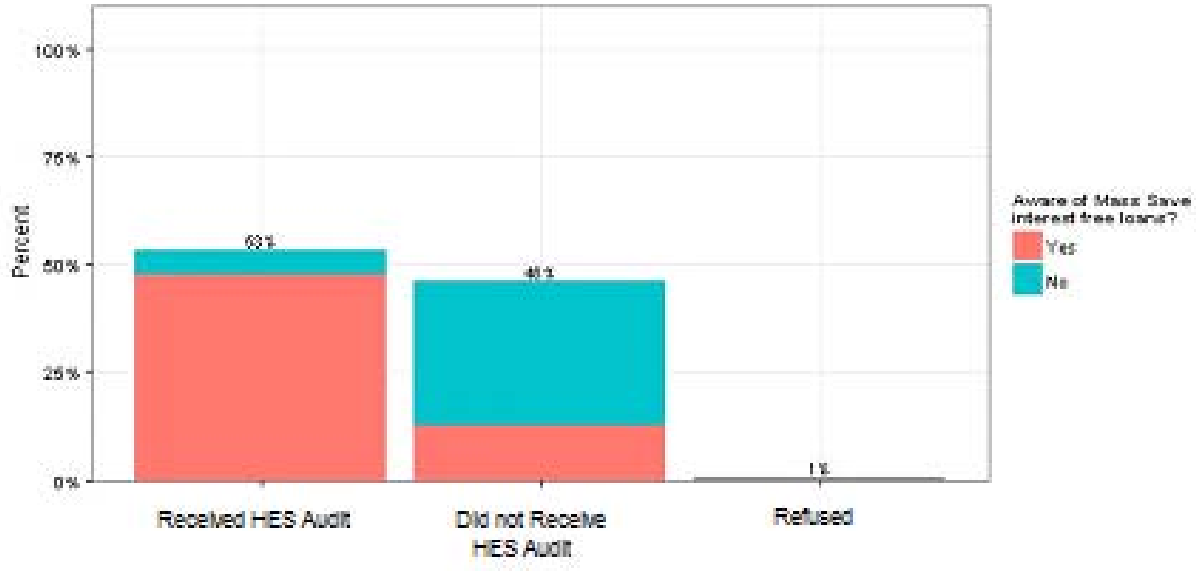
Over half of program participants (53%) received an Energy Assessment through Mass Save's Home Energy Services (HES) program before installing their DMSHP. Additionally, 61% of program participants were aware of the interest free loans offered through the HES affiliated HEAT loan program to fund qualified energy efficiency improvements, and one-half of these participants secured a loan. Of the participants that knew about the HEAT loan, but did not secure one, the most commonly stated reason was that they had the money and did not want or need an additiona loan. For participants that were unaware of the existence of the HEAT loan program, an additional question was asked to determine their likelihood to apply for a HEAT loan if they had been aware of the option. As depicted in Figure 3, 35% of the participants who were not aware of the HEAT loan program, would have been somewhat or extremely likely to apply for a HEAT loan if that had known about it.

Figure 3: Likelihood of Applying for HEAT Loan if Participants had been Aware of its Existence



As expected – due to the HES and Cool Smart program designs that require an HES audit to be eligible for a HEAT loan – those individuals who received the HES audit were much more likely to be aware of the existence of the loan than their counterparts who did not have an audit conducted (Figure 4). In fact, of the 53% of respondents who received an HES audit, 90% were aware of the interest free HEAT loans. Only 28% of the remaining participants were aware of the HEAT loan program.

Figure 4: Awareness of HEAT Loans for DMSHPs by participation in HES Audit Program

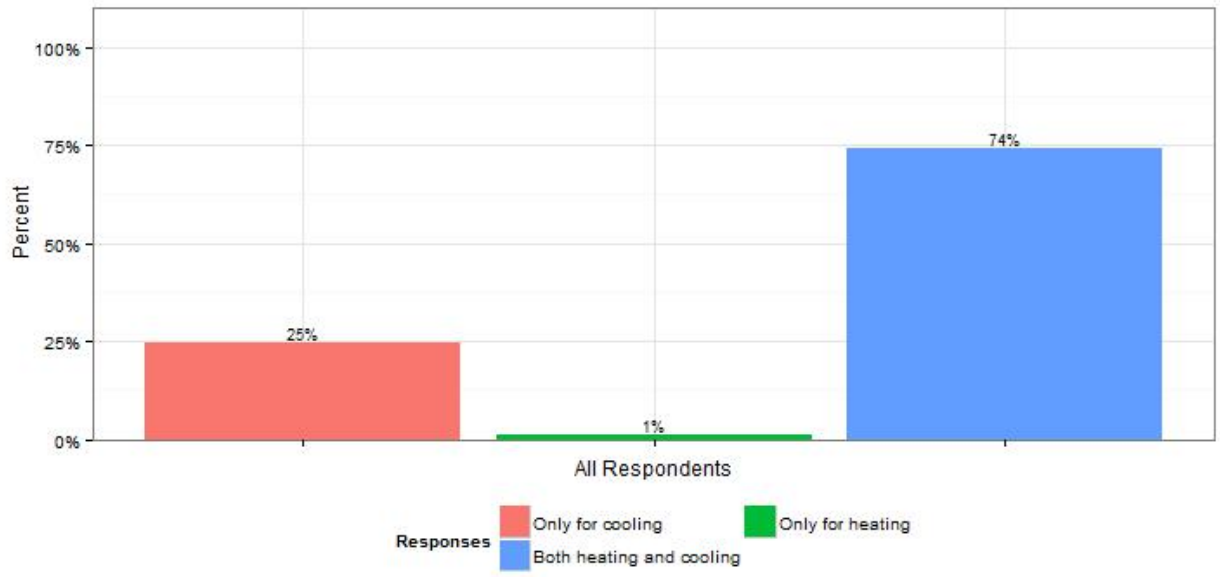


DMSHPs Used for both Cooling & Heating

Program participants are primarily using their DMSHPs for both cooling and heating, as illustrated in Figure 5. In fact, 74% of participants use their DMSHP for both heating and cooling. A very small number

of participants report using their DMSHP only for heating, only 1%. However, a relatively large percentage of participants (25%) report using their DMSHP only for cooling. The 25% of participants who only using their DMSHP for cooling are an interesting group, as they are choosing not to use the system for heating, even though in many cases it could provide less expensive heating than the heating system that currently exists in their homes. This participant group will be discussed in more detail later in this report.

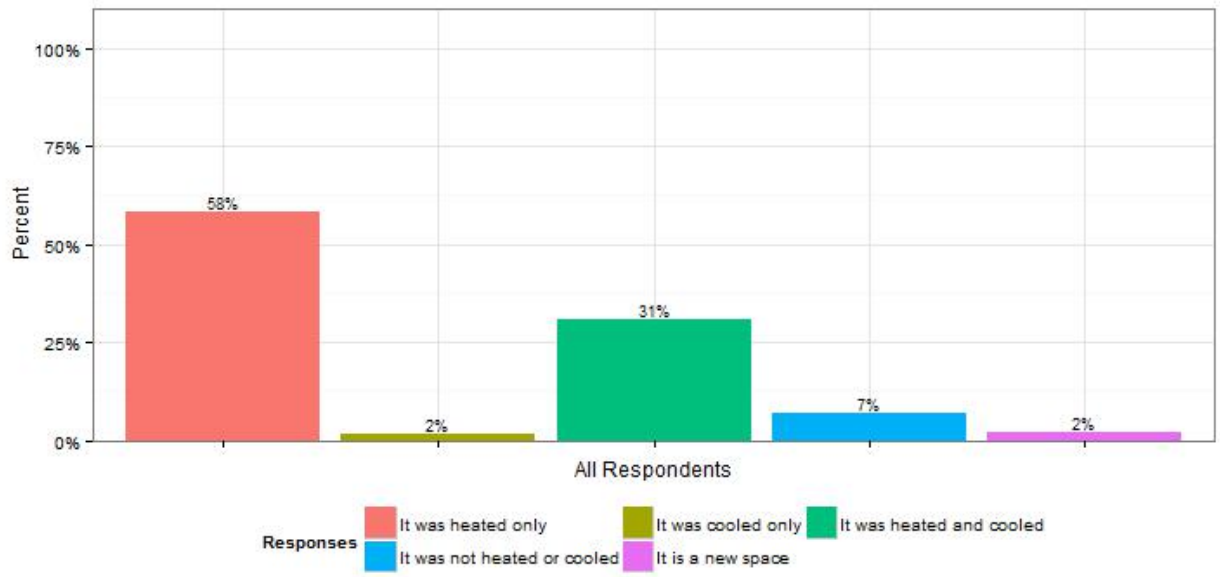
Figure 5: How Participants Use Their DMSHP



DMSHPs Allow for Added Cooling or Replacement of Existing Cooling Systems

The majority of program participants reported installing their DMSHP in a space that was previously heated, either only heated (58%) or heated and cooled (31%), as indicated in Figure 6.

Figure 6: How the Space was Conditioned before the DMSHP was Installed



As indicated in Table 3, program participants are adding cooling to these existing spaces through the installation of DMSHPs. Of the 58% of participants that only heated their existing space, 67% report that their DMSHP is used for both heating and cooling and 31% report that their DMSHP is used for only cooling. Participants are also supplementing both existing heating and cooling systems with DMSHPs. Of the 31% of participants that both heated and cooled their existing space, 80% report using their DMSHP for both heating and cooling.

Table 3: Space Conditioning Before and After DMSHP

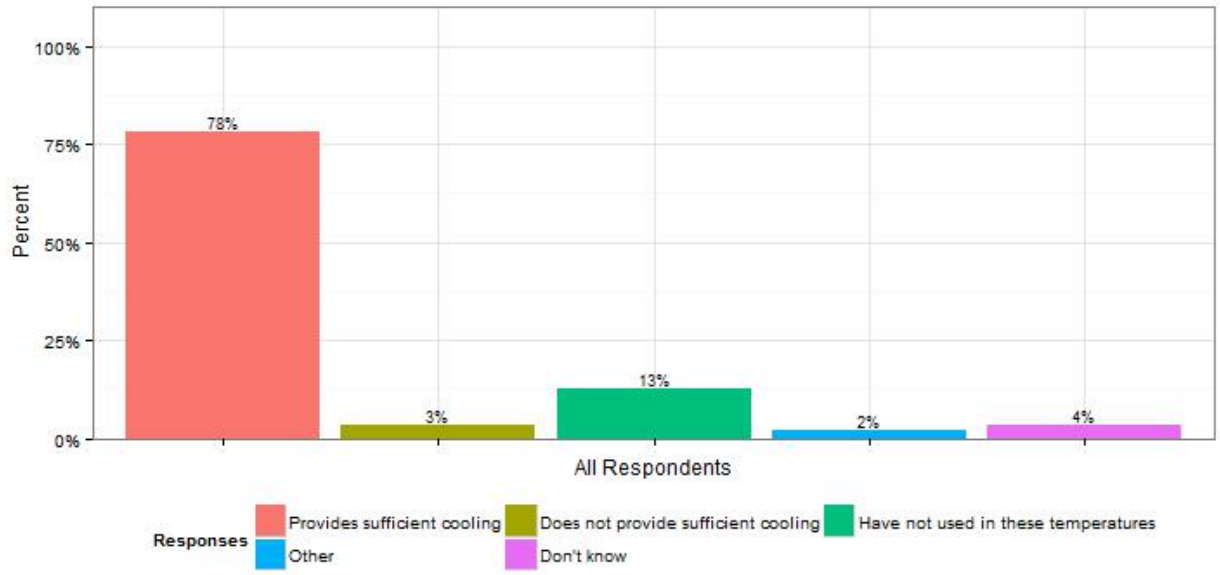
	Existing Heated Only	Existing Cooled Only	Existing Heated & Cooled	Existing Not Heated or Cooled	The Space is New	TOTAL
DMSHP used only for heating	0.95%	0.00%	0.13%	0.14%	0.00%	1.22%
DMSHP used only for cooling	18.05%	0.34%	5.92%	0.53%	0.00%	24.84%
DMSHP used for both heating and cooling	39.36%	1.28%	24.61%	6.41%	2.29%	73.95%
TOTAL	58.36%	1.62%	30.66%	7.08%	2.29%	100%

DMSHPs Provide Satisfactory Cooling

Ninety-nine percent of program participants use their DMSHPs for cooling. As a whole, these participants are generally satisfied with the cooling performance of the system. As shown in Figure 7, at extremely warm temperatures, above 90°F, the majority of participants report that their DMSHP provides sufficient cooling (78%). At these extremely warm temperatures only 3% of participants report that their DMSHP does not provide sufficient cooling. Additionally, 13% of participants report that they

have not used their DMSHP in these temperatures; however some of this 13% could be comprised of individuals that have not yet had the DMSHP installed through a full summer season.

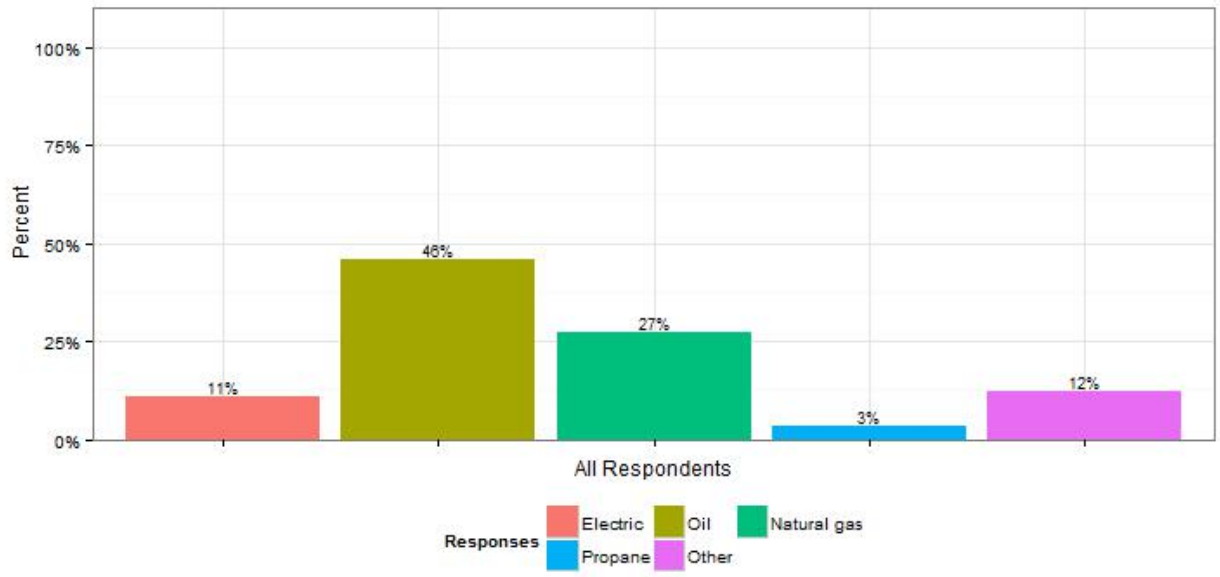
Figure 7: DMSHP Performance in Extremely Warm Temperatures (Above 90°F)



DMSHPs Are Not Replacing Existing Heating Systems

Eighty-nine percent of program participants report that their space was heated before the installation of the DMSHP. Of the participants who had heating before the DMSHP, the largest group (45%) report having oil heat before the DMSHP was installed, followed by 27% who reported having natural gas heat, as indicated in Figure 8.

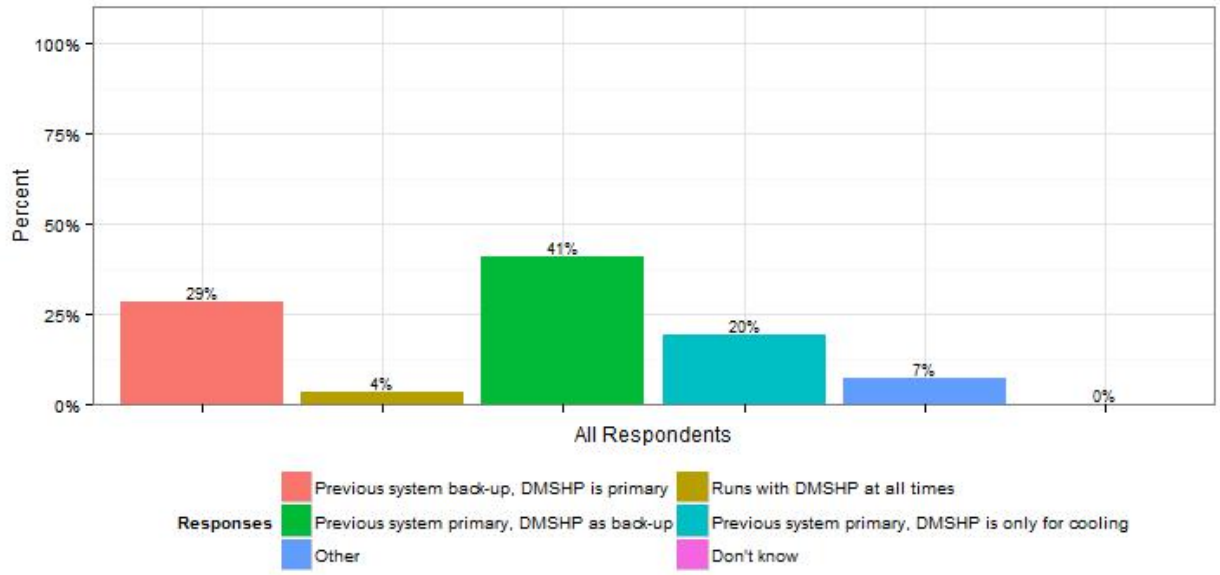
Figure 8: Primary Heating System before Installation of DMSHP, for Those who Reported Having Heating in the Space before the Installation of the DMSHP



The majority (95%) of participants who reported that their space was heated before the installation of the DMSHP indicated that the pre-existing system was still in place after the installation of the DMSHP. Only 5% report removing the existing system and note that it was removed either because the existing system didn't function well or they wanted a more energy efficient system.

Of those participants who report that their existing heating system still functions with the DMSHP, the majority report that the two systems work together to meet the heating needs of their space. As shown in Figure 9, most participants report that the previous system functions as the primary system with the DMSHP as backup (41%), followed by 29% of participants who report that the DMSHP functions as the primary system with the existing system as the backup. During the course of this survey participants were not given an exact definition of a "primary" or "backup" system, so metering will have to determine how these systems do actually function together.

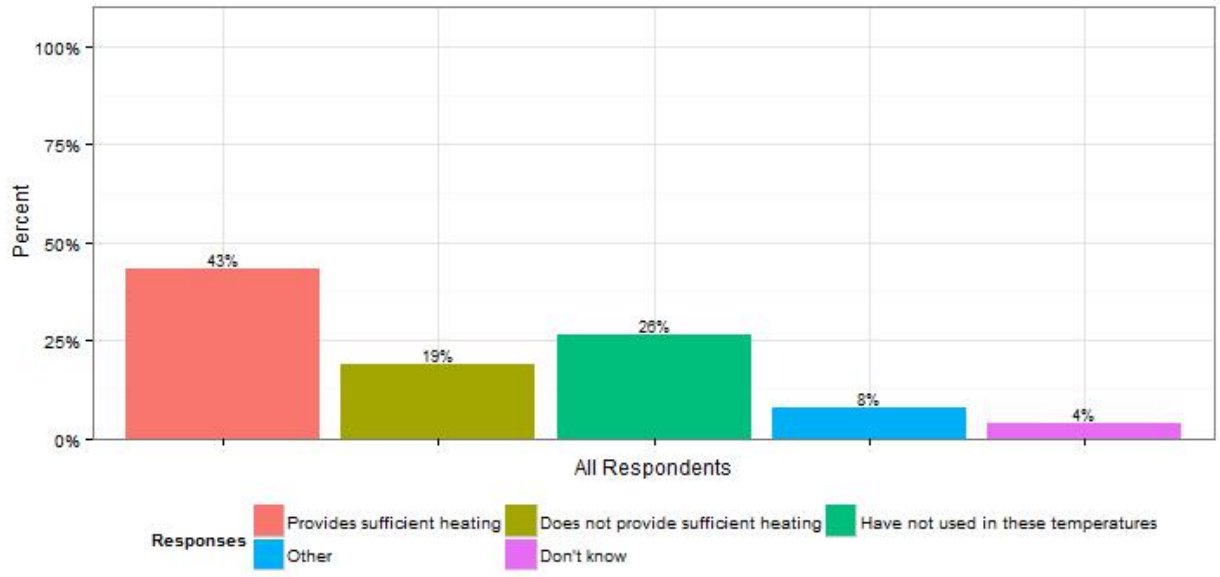
Figure 9: Function of Existing Heating System with DMSHP



Concerns with DMSHPs Providing Heating at Cold Temperatures

Seventy-five percent of program participants use their DMSHP for heating. As a whole, these participants have mixed reviews as to the heating performance of the systems. At extremely cold temperatures, or below 15°F, an almost equal number of participants report that their DMSHP provides sufficient heat (43%) to those who report that their unit either does not provide sufficient heat (19%) or that they have not used the DMSHP in these temperatures (25%), as indicated in Figure 10.

Figure 10: DMSHP Performance in Extremely Cold Temperatures (Below 15°F)



When considering participant responses about heating performance of their DMSHP system, it is important to remember that in most cases these systems are being sized for the cooling needs of the homes. As only 5% of those with pre-existing heating systems are being removed as a result of the installation of the DMSHP systems, and only 11% of all participants did not previously heat the space, it seems that a minority of participants are expecting the DMSHP to provide all of their heating needs, especially at cold temperatures. Sizing a DMSHP to meet the heating load of a home requires a system that is often two to three times the size of one sized to meet the cooling load. The sizing requirement alone can cause the system price to skyrocket and doesn't make sense for most individuals. The fact that a low percentage of participants indicated in the survey that their DMSHP provides sufficient heating alone at extremely cold temperatures is not a surprise and should not stand out as an issue that needs to be rectified.

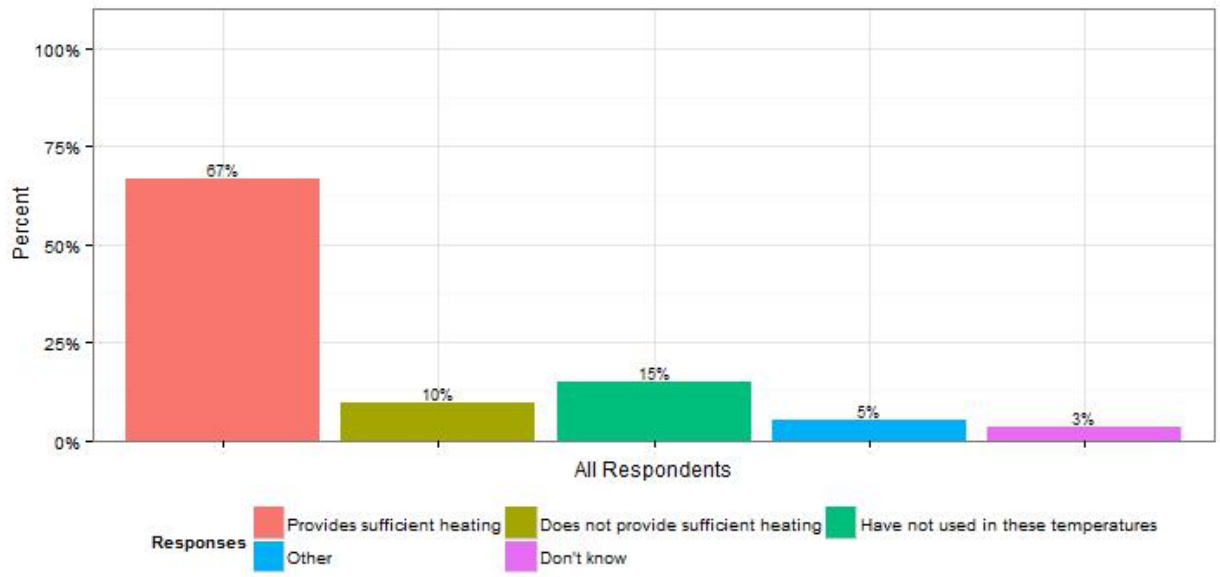
A related question that arises—particularly when considering these results—is whether there are differences in performance between those participants who have installed cold climate DMSHPs versus those who installed standard DMSHPs. As shown in Table 4, almost half of participants who installed cold climate DMSHPs reported that their DMSHP provides sufficient heat at these extremely cold temperatures. However, 23% of participants who installed cold climate heat pumps also report that their DMSHP does not provide sufficient heat at these extremely cold temperatures. While the data does seem to point towards participants who installed cold climate heat pumps being slightly happier with the heating provided by their DMSHP, site visits will have to be conducted to determine if DMSHPs are being properly sized by contractors to meet the heating requirements net of any existing heating systems in each individual home, and to fully understand whether participants perceive and receive performance differences between cold climate and standard heat pumps at these extremely cold as well as more moderate winter temperatures.

Table 4: DMSHP Performance in Extremely Cold Temperatures (Below 15°F), by Unit Type

F3a (330 Resp)	TOTAL	1. Provides Sufficient Heat	2. Does not provide sufficient heat	3. Have not used in these temperatures	97. Other	98. Don't Know
All	**100%**	**43.2%**	**18.8%**	**26.4%**	**7.8%**	**3.8%**
Cold Climate	**25.8%**	48.5%	22.7%	22.4%	4.8%	1.6%
Not Cold Climate	**70.8%**	41.7%	16.8%	28.7%	8.3%	4.5%
Mixed	**3.4%**	35.3%	32.0%	8.5%	20.2%	3.9%

Figure 11 illustrates that when the heating performance question is considered for slightly warmer conditions, 15°F - 30°F, the number of participants who believe that their DMSHP provides sufficient heating jumps to 67%.

Figure 11: DMSHP Performance in Cold Temperatures (15°F - 30°F)



When these results were again considered against the type of unit each participant installed, the participants who installed cold climate units were generally happier with the heat provided by their DMSHP unit, as indicated in Table 5. Over 75% of participants who had installed cold climate units reported that their DMSHP provides sufficient heat at cold temperatures (15°F - 30°F). This is comparable to the just over 60% of participants who installed standard DMSHP units and reported that their unit provides sufficient heating between 15°F and 30°F.

Table 5: DMSHP Performance in Cold Temperatures (15°F - 30°F), by Unit Type

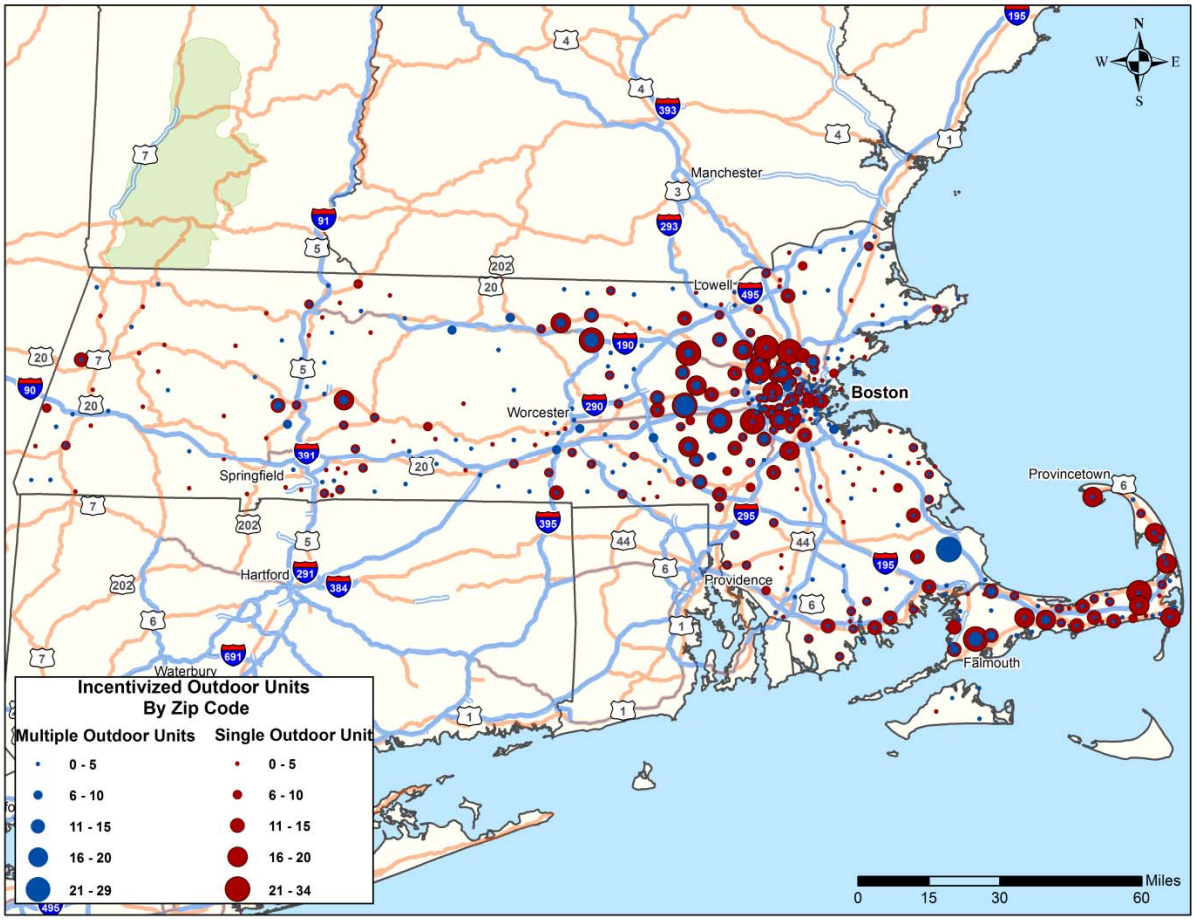
F3b (330 Resp)	TOTAL	1. Provides Sufficient Heat	2. Does not provide sufficient heat	3. Have not used in these temperatures	97. Other	98. Don't Know
All	**100%**	**66.8%**	**9.5%**	**15.0%**	**5.4%**	**3.2%**
Cold Climate	**25.8%**	76.6%	7.2%	10.2%	4.4%	1.6%
Not Cold Climate	**70.8%**	62.8%	10.2%	17.3%	6.0%	3.6%
Mixed	**3.4%**	75.2%	12.4%	4.5%	0.0%	7.8%

Single & Multi-Unit Installations are Generally Distributed as Expected

When the DMSHP participant data was first pulled together and it was clear that almost 1/3 of participants were receiving incentives for installing more than one outdoor compressor unit, some questions raised as to why this might be happening. Speculations ranged from (1) contractors trying to game the Mass Save incentive system, to (2) the multiple outdoor compressors being installed in more urban locations, where single family homes may be sub-divided into two or three apartments to meet diverse living needs. Analyses were performed to try to understand why so many participants were installing multiple outdoor compressor units.

The evaluation team first considered whether there was a link between geographic location and the number of outdoor compressor units installed. As shown in Figure 12, when geography (population density) is considered there seems to be no difference between single and multiple unit installations.

Figure 12: Geographic Distribution of Single and Multiple Unit Installations



The evaluation team also considered the total capacity provided by the DMSHP(s) from the PA's program tracking systems to provide additional insights into the motivation of participants to install multiple outdoor condenser units. The capacity distribution shown in Table 6 reveals that single units are likely meeting the needs of users with lower capacity requirements, and multiple units are likely meeting the needs of users with higher capacity requirements. We cannot determine from this capacity analysis whether the DMSHP units were being sized correctly. Site visits will have to be conducted to determine if DMSHPs are being properly sized by contractors to meet the heating/cooling needs of each individual home. One additional hypothesis the evaluation team considered is that many participants with multiple outdoor units want multiple indoor units and cold climate systems. Cold climate multi-head systems were not really available in Massachusetts as of the of end of 2013.

Table 6: Capacity Distribution of Single and Multiple Unit Installations

Total Capacity (BTU/hr)	Total Installations	Single Unit Installations	Multiple Unit Installations
0-11,999	277	277	0
12,000-17,999	766	766	0
18,000-23,999	1050	907	143
24,000-29,999	209	2	207
30,000-35,999	114	0	114
Total	**2,416**[5]	**1,952**	**464**

There was very little indication in the survey results that there are different motivations for those participants who installed single DMSHPs compared to those who installed multiple DMSHPs. However, when participants who had installed multiple outdoor compressor units were asked to comment on their reasons to install these multiple units, some motivations were uncovered. For example:

- "We had two distinct – and far apart – areas that weren't heated/cooled adequately. Two units seemed like the sensible approach."
- ". . .the terms of the program limited the number of units which could be on a single compressor to 3 which did not meet the needs of my installation."
- "The Mass Save Representative indicated it would be a better solution, but I don't remember being shown a cost comparison. He did say that the larger Fujitsu unit didn't qualify because of its energy efficiency rating."

It appears that the participants who installed multiple units were responding to design conditions, such as two dramatically different areas in their homes or a desire for multiple zones and cold climate performance, or were responding to program requirements. The program limitation of only three indoor units being connected to a single compressor seems like the single largest reason pushing participants to install multiple units.

[5] While data was provided from 3,289 participants, only 2,416 participants were included in this analysis. Capacities were evaluated for the DMSHP make and models that were most commonly installed. Additionally, some participants did not have complete make and model information for their DMSHP installations so they could not be included in an analysis of this kind.

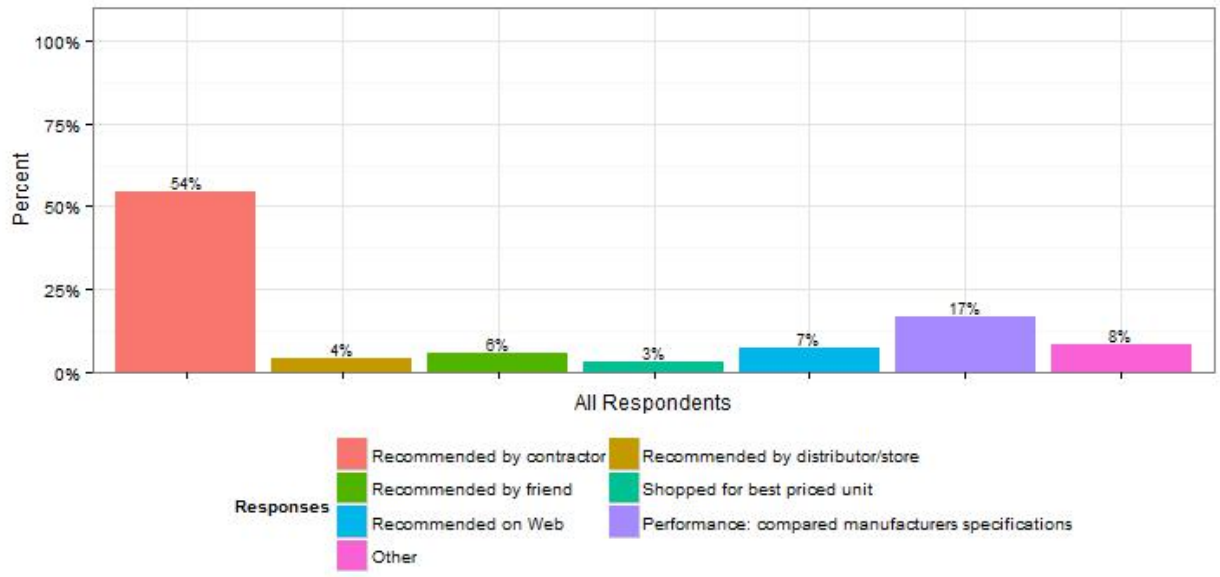
Program Considerations

Many of the motivations and uses uncovered in this survey will require further exploration to directly impact program activities. However, there are a few discoveries to consider immediately in terms of program design.

Contractors Have High Influence over Program Participants

Individual contractors should be considered the primary avenue for reaching participants. While only 30% of participants reported that the contractor was responsible for giving them the idea to install a DMSHP, when questioned about why they installed what they installed, participants often referred to contractor recommendations. Fifty-four percent of participants credit the contractor with recommending the specific make and model of the system that they ultimately installed. Additionally, when participants who had installed multiple outdoor compressor units were asked who made the design decision to install the multiple units rather than just one with larger capacity, 77% reported that the contractor was responsible for that decision, as indicated in Figure 13.

Figure 13: Responsibility for Make and Model Installed



A series of questions were asked to gauge whether contractors had explained the difference between cold climate and standard DMSHPs to participants, and what effect this knowledge might have had on their decision of what type of unit to install. Thirty-eight percent of participants reported that their contractor had explained to them the difference between cold climate and standard DMSHPs. Of those participants that received the knowledge about the two systems from their contractor, 31% actually installed cold climate units. In contrast, only 17% of those who were not told of the difference between the two systems and who actually installed cold climate DMSHPs.

It therefor appears that contractors have a significant and important influence over the design and selection of DMSHP installations. Additionally, the cold climate installations indicate that contractor education has an effect on the units that participants ultimately do install in their homes. In a large number of cases, contractors provide the avenue for the program to reach participants and be part of the conversations happening in their home. Contractor education about cold climate units or higher efficiency units could have a dramatic effect on the savings claimed by the program. Specifically, contractor education about cold climate units could help to reach the 62% of participants who currently are not having a conversation with their contractor about cold climate versus standard units.

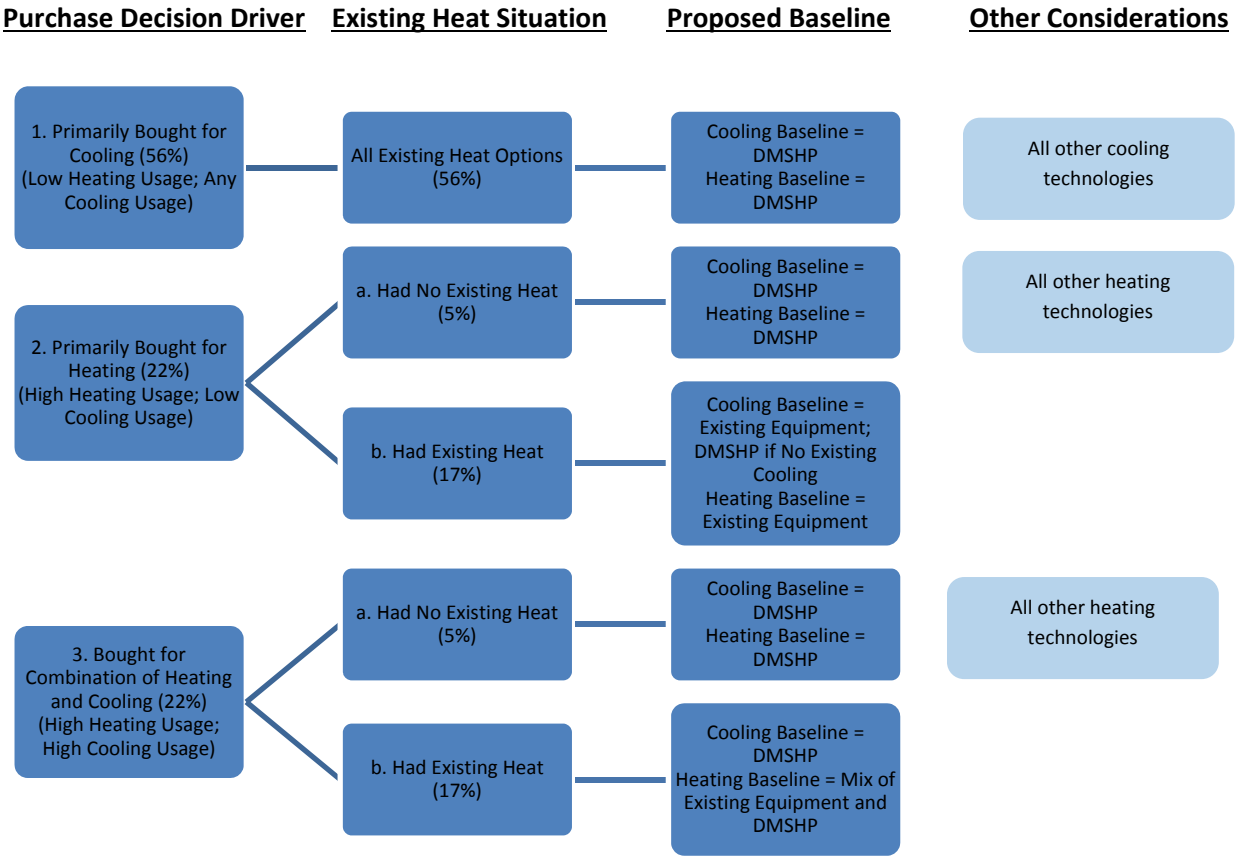
In previous conversations between the evaluation team, PAs and the EEAC the idea of a larger incentive for cold climate heat pumps has been a topic of discussion. The survey results suggest a correlation between DSMHP heating usage and cold climate heat pumps, but the information is insufficient to draw conclusions about savings and the value of a higher incentive to the PAs and ratepayers. Again, site visits and the metering of heating systems can provide the information necessary to inform this aspect of the program.

Baseline Considerations

Another goal of this survey was to work towards establishing a better understanding of the program baseline, upon which program savings are based. The current program assumes a standard heat pump as the baseline for all participants; the survey results suggest that while this assumption might be applicable to most participants, for a significant portion of participants, an existing equipment baseline is more applicable for at least a portion of the operation. The goal of developing a baseline proved much harder to reach than preliminarily expected. Even working within the constraints of a multiple choice survey, there appears to just be too many options to really begin to classify participants into understandable groups. After reviewing the survey results the determination was made that further analysis of the baseline was needed.

The evaluation team has used the results of the survey to inform a methodology for determining the baseline for each individual participant during the metering phase extension of this evaluation. The working conjecture for likely cooling and heating baselines that will be uncovered during the on-site interviews with participants during the metering evaluation is presented in Figure 14. The percentages in Figure 14 were developed using the best available information from the survey and an assumption that the group of people with significant heating usage identified by the survey could be split 50-50 into a group with significant heating AND cooling usage and a group with significant heating usage and limited cooling usage. This proposed baseline also includes other options that may factor into the baseline if the metering evaluation determines them to be critical components.

Figure 14: Preliminary Baseline Considerations for Participants Receiving DMSHP Rebates



Continued Use of the Survey Instrument

In developing the survey instrument for this particular study the evaluation team was asked to attempt to incorporate as many questions as possible about participant motivations and use of the DMSHP systems without developing an unwieldy instrument. If the instrument is to be redeployed in the future, thought should be given to whether there are questions that no longer need to be part of the instrument. Questions that could be considered viable for elimination in future applications of this survey include the following:

- Questions D3a through D3c: These three questions focus on the design decision to install multiple outdoor units. This variable was of particular interest in the first application of the survey as the occurrence of so many multiple outdoor unit installations was unexpectedly found in the tracking data. However, this issue may not need to be revisited in subsequent studies.
- Question F2a: This question was specifically developed to dig into the cold climate heat pump issue from a different angle. As cold climate heat pumps begin to be a more established market segment, this question, and possibly other cold climate DMSHP focused questions, may not be needed.
- Various B-section questions: The questions in the B-section were developed to try to better understand the baseline, whether participants were replacing existing systems and whether

their DMSHPs work in tandem with existing systems, the number of possibilities led to an incredibly complex list of questions. The metering study is specifically designed to better understand the list of possibilities and to develop some “buckets” in which participants can be classified for baseline purposes. Once these “buckets” are determined through the metering study only those questions that place individuals in their individual “buckets” will need to be included, unless there is interest in tracking population changes for additional questions.

If some questions could be eliminated, a larger number of questions could be asked to all participants, leading to responses that could be more directly related to developing a better understanding of the baseline, evaluating freeridership, or any other area of program concern.

Conclusion

Prior to the completion of this survey of COOL SMART DMSHP participants, the DMSHP measure was one of the least understood measures in the Mass Save program. The results of this survey allow for a much better understanding of this measure, specifically in relation to participant motivation and an overall understanding of how the units are being used. The following list includes the key takeaways from this survey effort:

1. DMSHPs are being installed to replace existing, functioning equipment. DMSHPs are not being installed in new construction or major renovation projects. Roughly 2/3 of individuals are installing DMSHPs for reasons related more to improving comfort, while the other 1/3 are generally looking to save money on their energy bills.
2. DMSHPs are primarily being used for both heating and cooling. When they are used for only one function, the majority of DMSHPs are being used for cooling only.
3. Participants are replacing existing cooling systems or adding functionality through the installation of DMSHPs.
4. DMSHPs are being used to supplement, rather than replace existing heating systems. The DMSHP units on their own do not meet the heating needs of, specifically at extremely cold temperatures, most likely due to sizing for cooling rather than heating or the participant not installing a cold-climate unit if they hoped to provide 100% of the heating for the space.
5. DMSHPs appear to be providing satisfactory cooling at all times.
6. Installations of single and multiple outdoor compressor units are generally distributed as would be expected. Single outdoor compressors are installed in situations with lower total capacity levels and multiple outdoor compressors are installed in situations where a larger total capacity is desired from the DMSHP system.
7. Contractors are primarily responsible for informing customers of the Mass Save program; the benefits of DMSHPs in general and cold climate DMSHPs specifically; and are ultimately responsible for most system design choices.

Ductless mini-split heat pumps will likely continue to be a challenging market to understand. Because the systems provide both heating and cooling and are used to replace multiple heating fuels, they don't fit neatly into the well understood dynamics of either heating or cooling retrofit systems. However, it seems that overall the DMSHP systems are recognized for their benefits in individual comfort and are seen as a replacement option for room/window AC systems. Concerns and issues continue to rise on the heating side of the equation, where participants are either paying more than expected to supply their heating from a DMSHP, or need to use their existing system to supplement the DMSHP system at a higher level than expected.

From an engineering viewpoint, it will always be easier to meet the Massachusetts cooling needs with a DMSHP, than to meet the heating needs. In terms of cooling, these systems are relied on to cool the space to 65-70°F on 100°F days, a temperature change of 30-35°F. However, on the heating side of the equation, the units are being relied on to warm from 0°F on the coldest days, a temperature change of 65-70°F to achieve the same indoor temperature. And this is being required of a system that typically

has a lower efficiency and heating capacity at these extremely cold temperatures. Cold climate DMSHPs have better performance than their standard counterparts, both in terms of efficiency and heating capacity at very cold temperatures, but they still see lower performance at these cold temperatures when compared to milder temperature ranges.

If DMSHPs are being looked to by the program to provide their full potential, offering both heating and cooling savings and to replace existing heating systems, similar to their replacement of existing cooling systems today, some changes will likely have to be made. The PAs and EEAC are already taking the first step by undertaking a metering study which will help to determine whether higher savings are actually seen with cold climate heat pumps and the program can help to ensure that customers actually receive the heat that they need from their DMSHP. The program will also have to consider the system design, as designed by the contractor. In most cases these systems are likely only being sized for the cooling load. If DMSHPs are to provide heating to the lowest temperatures, thought will have to be put towards sizing the systems for the heating load, requiring maybe twice to three times as much capacity as is required to meet the cooling load. Designing systems to meet heating loads will increase participant capital cost and may drive individuals away from installing DMSHPs. Careful thought will have to be given to any program design changes that encourage participants to meet more of their heating load with these DMSHP systems.

Overall, the survey completed here has allowed participants to be grouped into usage groups, i.e. those that use their DMSHP as their primary cooling system and backup heating system, those that use the DMSHP as a primary cooling system and primary heating system, or as a back-up cooling system and primary heating system, etc. This assignment of system use by participants will allow for a more detailed approach in the second phase of this study, the metering of these systems to determine actual energy savings from these units. In the future, this survey, or an updated version of this survey, can be used to assign percentages of participants to the usage groups quantified in the metering study.

Appendix A – Survey Instrument & Full Results

Appendix A includes the full web survey instrument used with participants as well as results for each survey question. A discussion of how to interpret the results presented in Appendix A can be found on the next page in the section titled *Interpreting Results.*

Web Email Invitation

Dear <FNAME><LNAME>,

Thank you for participating in the Mass Save Cool Smart Program.

To help us evaluate and make improvements, we are asking customers who received a rebate through this program to share their experience, and to let us know what they think about the cooling equipment installed through the program.

This brief survey should take less than 15 minutes to complete. And as our way of saying thank you, a $10 Amazon gift card will be provided to all eligible participants who complete this survey in its entirety.

The following link will bring you to the online survey. A password has been provided here too.

www.coolsmartdmshpsurvey.com

Password: <PIN>

<PA> has contracted Navigant Consulting and Tetra Tech to host the survey. If you have any technical questions about this survey, please contact Daniel Weeks at Tetra Tech at (800) 454-5070 or email daniel.weeks@tetratech.com. If you have further questions, please feel free to contact<PA CONTACT> at <PA> at<PA CONTACT PHONE> or email <PA CONTACT EMAIL>.

Thank you in advance for your help with this important study!

Sincerely,

<PA CONTACT>
<PA CONTACT PHONE>
<PA CONTACT EMAIL>
<PA LOGO>

Sample Variables

PIN	Unique case identification number (created by Tetra Tech)
ACCT	Account number (from sample file)
FNAME	Participant first name (from sample file)
LNAME	Participant last name (from sample file)
ADDR	Participant street address (from sample file)
CITY	Participant address city (from sample file)
ZIP	Participant address zip code (from sample file)
EMAIL	Participant email (from sample file)
PHONE	Participant phone number (from sample file)

PA	PA from which participant receive rebate (from sample file)
TIER	Sample tier group (from sample file)
QTY	Number of outdoor units installed at location (from sample file)
CLIMATEZONE	Climate zone (from sample file)
MULTIVS.SINGLEUNITS	Indicator of multiple or single outdoor units (from sample file)
CAPACITY	Unit capacity (from sample file)
COLDCLIMATE	Cold climate DMSHP indicator (from sample file)
STRAT	Strata group identification number (created by Tetra Tech)
YEAR	Year of participation (from tracking data)

Interpreting Results

The results of each of the survey questions are presented in the following pages of this document. The following discussion describes the format for the results presentation. The results to every question are presented in an identical table. The columns are titled by each question answer that received a response, while the rows are established by each of the defined strata. The strata are the classifications given to participants to determine sample structure, as well as one classification developed through the course of the survey, and are described as follows:

- Cold climate, not cold climate or mixed - based on whether the participant had installed a cold climate heat pump, installed only a standard heat pump, or installed both.
- Single or multiple - based on whether the participant had installed only one DMSHP, outdoor compressor unit or had installed multiple DMSP outdoor, compressor units.
- Bedroom; kitchen; living room, family room or den; office or other - which is a classification developed during the survey. In question F0 participants were asked which rooms their DMSHP serves. If they answered more than one, the survey instrument randomly choose one of the spaces they had listed. For the remainder of the survey, participants were asked to consider only this singular space when answering questions. The space type strata is only reported for questions that were asked after this space was established with the participant.

All of the survey result tables are set up in the same way and can be consistently read throughout this document. Listed in the top left hand corner are the question number and the number of responses to the question, as some questions were only asked to participants who answered a specific response to a previous question. The possible question answers label the columns and the strata label the rows. Across the top in the light blue row, the total percent of respondents who answered each of the answers is listed. The light blue column lists the total percent of respondents who fall in each of the strata. The full results are presented in the rest of the white cells. These cells indicate the percent of participants in each stratum who answered each of the possible answers. For example, in *Table A.1*, the top left white box reports the percent of cold climate participants who answered the first answer. The next box to the right reports the percent of cold climate participants who answered the second answer. All responses presented in Appendix A will follow this protocol except for those questions that were either asked to such a small number of participants or were otherwise irrelevant in terms of stratum to report stratum level results. For these questions, only total results are reported.

Table A.1: Example Results Presentation

Q. # (# of Resp.)	TOTAL	First Answer	Second Answer	Third Answer
All	**100%**	**Total % Answering**	**Total % Answering**	**Total % Answering**
Cold Climate	**% in Strata**	% Answering in Strata	% Answering in Strata	% Answering in Strata
Not Cold Climate	**% in Strata**	% Answering in Strata	% Answering in Strata	% Answering in Strata
Mixed	**% in Strata**	% Answering in Strata	% Answering in Strata	% Answering in Strata
Single	**% in Strata**	% Answering in Strata	% Answering in Strata	% Answering in Strata
Multiple	**% in Strata**	% Answering in Strata	% Answering in Strata	% Answering in Strata

Survey Questions - Introduction:

I1a. Our records show that you received a rebate from **<PA>** for installing **<QTY>** ductless mini-split heat pump outdoor compressor unit(s) at **<ADDR>**. Is this correct? (Select only one response)

1. Yes. **[Continue with survey]**
2. No. The ductless mini-split heat pump(s) was/were installed at the noted address, but rebates were received for a different number of outdoor compressor units.
3. No. The number of outdoor compressor units installed is correct, but they were installed at a different address.
4. No. A different number of outdoor compressor units were installed at a different address than noted.
5. No. Our household did not install a ductless mini-split heat pump. **[Stop survey]**

Table A.2: Answers to Question I1a

I1a (428 Resp)	TOTAL	1. Yes	2. No. Different Number of Units	3. No. Different Address
All	**100%**	**98.0%**	**1.4%**	**0.5%**

[ASK IF I1a = 2 or 4]

I1b. Can you please tell us for how many ductless mini-split heat pump outdoor compressor units you received a rebate at this address? (Select only one response)

1. One
2. Two
3. Three
4. Four or More

[SURVEY TOOL TO UPDATE <QTY> AS NEEDED FROM THIS RESPONSE = <Rev Unit Qty>]

Table A.3: Answers to Questions I1b

I1b (5 Resp)	TOTAL	2. Two	3. Three
All	**100%**	**70.5%**	**29.5%**

[ASK IF I1a = 3 or 4]

I1c. Can you please provide the address where you installed the rebated ductless mini-split heat pump system(s)?

[Text field for Street]
[Text field for Town]
[Text field for State]
[Text field for Zip Code]

[Responses not provided as this question collected sensitive client data]

I2. What type of residence is this? (Select only one response)

1. Single-family
2. Duplex or two-family
3. Apartment/condo in a 2-4 unit building
4. Apartment/condo in a 5+ unit building
5. Townhouse or row house (adjacent walls to another house)
6. Mobile home, house trailer

97. (Other, please specify)
99. (Refused)

Table A.4: Answers to Question I2

I2 (428 Resp)	TOTAL	1. Single Family	2. Duplex	3. Apt (2-4 units)	4. Apt (5+ units)	5. Town house	97. Other	99. Refused
All	**100%**	**89.1%**	**3.9%**	**4.2%**	**1.5%**	**0.8%**	**0.4%**	**0.2%**
Cold Climate	**23.3%**	88.1%	2.6%	3.8%	4.0%	0.8%	0.0%	0.8%
Not Cold Climate	**73.3%**	89.3%	4.3%	4.3%	0.7%	0. 8%	0.6%	0.0%
Mixed	**3.5%**	91.4%	5.8%	2.9%	0.0%	0.0%	0.0%	0.0%
Single	**69.5%**	87.5%	3.4%	5.3%	2.1%	0.9%	0.6%	0.3%
Multiple	**30.5%**	92.7%	5.2%	1.7%	0.0%	0.4%	0.0%	0.0%

I3a. Approximately, when was this residence first built? (Select only one response)

1. Before 1950
2. Between 1950 and 1959
3. Between 1960 and 1969
4. Between 1970 and 1978
5. Between 1979 and 1988
6. Between 1989 and 2001
7. Between 2002 and 2007
8. 2008 or later

98. (Don't Know)
99. (Refused)

Table A.5: Answers to Question I3a

I3a (428 Resp)	TOTAL	1. pre 1950	2. 1950-1959	3. 1960-1969	4. 1970-1978	5. 1979-1988	6. 1989-2001	7. 2002-2007	8. After 2008	98. Don't Know
All	**100%**	**26.8%**	**13.5%**	**9.9%**	**18.3%**	**13.6%**	**13.4%**	**1.9%**	**1.4%**	**1.3%**
Cold Climate	**23.3%**	23.1%	10.4%	13.0%	20.2%	15.9%	11.6%	2.6%	2.4%	0.7%
Not Cold Climate	**73.3%**	28.2%	13.9%	9.0%	18.1%	12.2%	14.2%	1.7%	1.1%	1.6%
Mixed	**3.5%**	23.1%	26.6%	6.7%	8.7%	26.5%	8.5%	0.0%	0.0%	0.0%
Single	**69.5%**	28.3%	12.3%	10.4%	18.0%	12.1%	14.3%	1.5%	1.5%	1.7%
Multiple	**30.5%**	23.4%	16.4%	8.8%	19.0%	16.9%	11.2%	2.6%	1.2%	0.4%

[ASK IF I3a = 8]

I3b. Was this ductless mini-split heat pump system installed during the course of a new construction or major renovation project? (Select only one response)

1. Yes
2. No
99. (Refused)

Table A.6: Answers to Question I3b

I3b (6 Resp)	TOTAL	1. Yes	2. No
All	**100%**	**9.9%**	**90.1%**

I4a. Do you own or rent this residence? (Select only one response)

1. Own
2. Rent
97. (Other, please specify)

Table A.7: Answers to Question I4a

14a (428 Resp)	TOTAL	1. Own	2. Rent	97. Other
All	**100%**	**98.1%**	**0.5%**	**1.4%**
Cold Climate	**23.3%**	98.9%	0.0%	1.1%
Not Cold Climate	**73.3%**	97.8%	0.7%	1.4%
Mixed	**3.5%**	97.1%	0.0%	2.9%
Single	**69.5%**	97.6%	0.8%	1.7%
Multiple	**30.5%**	99.2%	0.0%	0.8%

I4b. Is this your primary residence or a secondary residence/vacation home? (Select only one response)

1. Primary residence
2. Secondary residence/vacation home
97. (Other, please specify)

Table A.8: Answers to Question I4b

14b (428 Resp)	TOTAL	1. Primary Residence	2. Secondary Residence	97. Other
All	**100%**	**88.5%**	**9.7%**	**1.9%**
Cold Climate	**23.3%**	91.0%	5.2%	3.8%
Not Cold Climate	**73.3%**	87.1%	11.6%	1.3%
Mixed	**3.5%**	100.0%	0.0%	0.0%
Single	**69.5%**	86.7%	10.9%	2.4%
Multiple	**30.5%**	92.6%	6.8%	0.6%

[ASK IF I4b = 2]

I4c. How much time, in weeks, do you spend in this secondary residence/vacation home per year?

1. [Number response 0-52] weeks/year

Table A.9: Answers to Question 14c

14d (31 Resp)	TOTAL	0-10 Weeks	11-15 Weeks	16-20 Weeks	21-25 Weeks	26-52 Weeks
All	**100%**	**40.8%**	**19.8%**	**22.8%**	**6.2%**	**10.4%**

[ASK IF I4b = 2]

I4d. When do you spend this time in the secondary residence/vacation home? (Select only one response)

1. Most of the time is spent during the summer
2. Most of the time is spent during the winter
3. Most of the time is spent during the fall & spring
4. The time is evenly distributed throughout the year

97. (Other, please specify)
99. (Refused)

Table A.10: Answers to Question I4d

14d (31 Resp)	TOTAL	1. Summer	3. Fall & Spring	4. Evenly Distributed	97. Other
All	**100%**	**52.9%**	**3.9%**	**32.6%**	**10.5%**

Survey Questions - Heat Loans & Audits:

H1. Did you receive an Energy Assessment through the Mass Save Program prior to the installation of the ductless mini-split heat pump system(s)? (Select only one response)

1. Yes
2. No

99. (Refused)

Table A.11: Answers to Question H1

H1 (428 Resp)	TOTAL	1. Yes	2. No	99. Refused
All	**100%**	**53.2%**	**46.1%**	**0.7%**
Cold Climate	**23.3%**	47.5%	52.5%	0.0%
Not Cold Climate	**73.3%**	53.5%	45.8%	0.8%
Mixed	**3.5%**	85.6%	11.5%	2.9%
Single	**69.5%**	48.1%	51.3%	0.6%
Multiple	**30.5%**	64.8%	34.3%	0.8%

H2. Were you aware that the Mass Save Program provides interest free loans to fund the installation of qualified energy efficiency improvements, such as your ductless mini-split heat pump? (Select only one response)

1. Yes
2. No

Table A.12: Answers to Question H2

H2 (428 Resp)	TOTAL	1. Yes	2. No
All	**100%**	**60.73%**	**39.27%**
Cold Climate	**23.3%**	54.4%	45.6%
Not Cold Climate	**73.3%**	61.9%	38.1%
Mixed	**3.5%**	79.3%	20.7%
Single	**69.5%**	58.5%	41.5%
Multiple	**30.5%**	65.9%	34.2%

[ASK IF H2 = 1]

H3. Did you secure a loan through a participating lender with the Mass Save Program? (Select only one response)

1. Yes
2. No
99. (Refused)

Table A.13: Answers to Question H3

H3 (264 Resp)	TOTAL	1. Yes	2. No	99. Refused
All	**100%**	**50.1%**	**47.9%**	**2.0%**
Cold Climate	**20.8%**	40.6%	59.4%	0.0%
Not Cold Climate	**74.6%**	52.1%	45.2%	2.7%
Mixed	**4.5%**	60.2%	39.8%	0.0%
Single	**66.9%**	42.7%	54.6%	2.7%
Multiple	**33.1%**	64.9%	34.4%	0.7%

[ASK IF H3 = 2]

H4. Why did you not secure a Heat Loan through a participating lender with the Mass Save program?

[Open ended, text – Categories developed after responses were received]

1. Had the money or didn't want another loan
2. Found out too late in the process
3. Used a different loan source
4. Didn't qualify/rejected
5. The process was too challenging
6. Other

Table A.14: Answers to Question H4

H4 (117 Resp)	TOTAL	1. Had the money or didn't want another loan	2. Found out too late in the process	3. Used a different loan source	4. Didn't qualify or rejected	5. Process too challenging	6. Other
All	**100%**	**79.6%**	**1.5%**	**7.2%**	**5.2%**	**2.5%**	**4.0%**
Cold Climate	**25.9%**	69.2%	4.9%	8.7%	1.4%	7.2%	8.7%
Not Cold Climate	**71.4%**	83.0%	0.0%	6.9%	6.7%	0.9%	2.4%
Mixed	**2.6%**	91.0%	9.0%	0.0%	0.0%	0.0%	0.0%
Single	**78.5%**	83.2%	0.5%	8.2%	5.2%	1.9%	0.9%
Multiple	**21.5%**	66.6%	5.0%	3.4%	5.1%	4.6%	15.2%

Sample Verbatim Responses for Question H4:

- **"**Had the cash, so no need to step through extra hoops." [1]
- "We choose to save for the unit and pay up front." [1]
- "Paid cash." [1]
- **"**We found out about it too late in the process given our construction/timing constraints. Our Energy Assessment was a bit out of date and would require a reassessment. Didn't have time to fill out paper work and get approved." [2]
- "I used my home equity account so that I would have more control over repayment amounts." [3]

- "Rejected because of limited availability of funds, limited sources of funds and very tight credit requirements." [4]
- "They offered to help but it is too much work." [5]

[ASK IF H2 =2]

H5. If you had known that the Mass Save Program offered an interest free loan for your ductless mini-split heat pump(s), how likely would you have been to apply for such a loan? (Select only one response)

1. Extremely likely
2. Somewhat likely
3. Somewhat unlikely
4. Extremely unlikely
98. (Don't know)
99. (Refused)

Table A.15: Answers to Question H5

H5 (164 Resp)	TOTAL	1. Extremely Likely	2. Somewhat Likely	3. Somewhat Unlikely	4. Extremely Unlikely	98. Don't Know	99. Refused
All	**100%**	**15.4%**	**20.0%**	**19.2%**	**28.3%**	**13.7%**	**3.5%**
Cold Climate	**27.0%**	10.4%	28.2%	24.7%	25.1%	11.6%	0.0%
Not Cold Climate	**71.1%**	17.3%	16.3%	17.5%	29.4%	14.8%	4.6%
Mixed	**1.8%**	13.9%	42.0%	0.0%	30.1%	0.0%	13.9%
Single	**73.5%**	14.6%	22.1%	20.5%	24.2%	15.2%	3.5%
Multiple	**26.5%**	17.7%	14.0%	15.6%	39.6%	9.6%	3.6%

Survey Questions - Decisions:

D1. How did you get the idea to install a ductless mini-split heat pump in this space? (Select all that apply)

1. Recommended by a friend
2. Recommended by a heating/cooling contractor
3. Suggested as part of an audit sponsored by [PA]
97. (Other, please specify)
98. Don't Know

Table A.16: Answers to Question D1

D1 (428 Resp)	TOTAL	1. Rec. by Friend	2. Rec. by Contractor	3. Suggested as part of an Audit	97. Other	98. Don't Know
All	**100%**	**29.7%**	**30.0%**	**14.3%**	**25.3%**	**0.8%**
Cold Climate	**23.3%**	29.4%	33.4%	7.4%	28.8%	1.1%
Not Cold Climate	**73.3%**	29.7%	29.3%	16.4%	23.9%	0.6%
Mixed	**3.5%**	30.7%	20.8%	14.4%	31.4%	2.7%
Single	**69.5%**	30.1%	31.3%	11.7%	25.9%	1.0%
Multiple	**30.5%**	28.7%	26.8%	20.2%	24.0%	0.3%

Table A.17: "Other" Answers to Question D1

D1 Other (108 Resp)	TOTAL	97.1. Advertisement /Online/Home Store	97.2. Home Show/ Community Event	97.3. Actively researched (other option for AC)	97.4. Had seen DMSHP installed in other locations	97.5. Upgrading Existing DMSHP	97.6. Other
All	**100%**	**11.0%**	**7.5%**	**34.5%**	**24.5%**	**1.7%**	**20.7%**
Cold Climate	**23.3%**	44.7%	47.7%	26.8%	18.5%	17.2%	3.4%
Not Cold Climate	**73.3%**	47.4%	42.6%	69.2%	81.5%	82.8%	94.7%
Mixed	**3.4%**	7.9%	9.7%	4.0%	0.0%	0.0%	2.0%
Single	**69.6%**	57.1%	65.8%	60.8%	79.4%	82.8%	79.4%
Multiple	**30.4%**	42.9%	34.2%	39.2%	20.6%	17.2%	20.6%

Sample Verbatim Responses for "Other" Answers to Question D1:

- "Advertisements on the television and desire to have home air-condition[ing]." [97.1]
- "Saw display at WMass home show." [97.2]
- "Web research into alternative heating and cooling systems." [97.3]
- "Researched Ductless Mini-Splits as an alternative to Central A/C." [97.3]
- "I work for a bank and we have installed this unit in some of our apartments with good success." [97.4]
- "I had older 10 SEER cooling mini-splits, upgraded." [5]

D2a. What were your reasons for purchasing a ductless mini-split heat pump? (Select all that apply)

1. Provides a higher level of comfort, i.e. quieter than alternatives, dehumidifying capability, effectively cools/heats space
2. Existing space not cooled/heated
3. Existing space not cooled/heated adequately, (e.g. hot upstairs room)
4. Saving money on my energy bill; wanted more efficient cooling and/or heating
5. It was less expensive than other cooling/heating options
6. Wanted "zoned" or central cooling/heating
97. (Other, please specify)

Table A.18: Answers to Question D2a

D2a (428 Resp)	TOTAL	1. Provides higher level of comfort	2. Existing not heated/ cooled	3. Existing not heated/ cooled well	4. Saving money on energy bill	5. Less expensive than other options	6. Wanted "zoned" heating/ cooling	97. Other
All	**100%**	**24.8%**	**13.9%**	**11.9%**	**20.0%**	**13.3%**	**11.4%**	**4.7%**
Cold Climate	**23.3%**	25.1%	15.5%	10.0%	21.4%	13.0%	10.9%	4.0%
Not Cold Climate	**73.3%**	24.6%	13.8%	12.5%	19.3%	13.6%	11.3%	5.0%
Mixed	**3.5%**	28.4%	6.7%	12.3%	24.5%	9.0%	16.9%	2.2%
Single	**69.5%**	24.3%	13.3%	13.1%	19.0%	14.6%	10.8%	5.0%
Multiple	**30.5%**	26.1%	15.3%	9.2%	22.3%	10.5%	12.8%	3.9%

[ASK IF >1 RESPONSE WAS PROVIDED FOR D2a]

D2b. From the reasons you just provided, what was your primary reason for purchasing a ductless mini-split heat pump? (Select only one response)

1. (Provide those responses selected from D2a)

Table A.19: Answers to Question D2b

D2b (428 Resp)	TOTAL	1. Provides higher level of comfort	2. Existing not heated/ cooled	3. Existing not heated/ cooled well	4. Saving money on energy bill	5. Less expensive than other options	6. Wanted "zoned" heating/ cooling	97. Other
All	**100%**	**30.0%**	**17.5%**	**12.2%**	**16.8%**	**8.6%**	**7.8%**	**7.1%**
Cold Climate	**23.3%**	27.2%	21.6%	10.5%	19.4%	8.4%	7.3%	5.6%
Not Cold Climate	**73.3%**	30.8%	16.9%	12.9%	14.9%	8.8%	8.0%	7.7%
Mixed	**3.5%**	32.1%	2.9%	8.7%	38.6%	5.8%	6.2%	5.8%
Single	**69.5%**	31.0%	15.9%	14.5%	13.3%	9.9%	8.4%	6.9%
Multiple	**30.5%**	27.7%	21.2%	7.0%	24.7%	5.5%	6.4%	7.5%

[ASK IF <Rev Unit Qty> >1]

D3a. Our records indicate that you installed a ductless mini-split heat pump with more than one outdoor compressor unit. Why did you decide to install these multiple outdoor compressor units? (Select all that apply)

1. I wanted separate control over multiple heating zones.
2. I wanted separate control over multiple cooling zones.
3. The systems were being installed to replace separate existing systems.
4. It was cheaper than installing one large outdoor compressor unit to serve multiple indoor units.
5. I wanted to have back-up cooling or heating in case one unit failed.
6. It was recommended by my contractor
97. (Other, please specify)
98. (Don't Know)
99. (Refused)

Table A.20: Answers to Question D3a

D3a (428 Resp)	TOTAL	1. Separate heating zones	2. Separate cooling zones	3. Replace separate existing systems	4. Cheaper than one large unit	5. Back-up for unit failure	6. Rec. by Cont.	97. Other	98. Don't Know
All	**100%**	**17.5%**	**25.3%**	**0.8%**	**10.3%**	**3.3%**	**36.8%**	**5.5%**	**0.5%**
Cold Climate	**20.1%**	20.5%	23.8%	1.4%	11.7%	5.6%	29.7%	6.1%	1.2%
Not Cold Climate	**68.5%**	16.9%	25.3%	0.8%	9.8%	2.1%	39.4%	5.3%	0.4%
Mixed	**11.4%**	16.2%	27.5%	0.0%	10.8%	6.3%	33.3%	5.9%	0.00%
Multiple	**100%**	17.5%	25.3%	0.8%	10.3%	3.3%	36.8%	5.5%	0.5%

[ASK IF <Rev Unit Qty> >1]

D3b. Who made the design decision to install multiple outdoor compressor units rather than just one with a larger capacity, did you request that design, did your contractor suggest the design, or did someone else suggest the design? (Select only one response)

1. My contractor
2. I requested the design
3. (Other, please specify)
98. (Don't Know)
99. (Refused)

Table A.21: Answers to Question D3b

D3b (225 Resp)	TOTAL	1. My contractor	2. I requested the design	3. Other	98. Don't Know	99. Refused
All	**100%**	**74.4%**	**19.0%**	**5.8%**	**0.3%**	**0.4%**
Cold Climate	**20.1%**	74.3%	21.1%	4.5%	0.0%	0.0%
Not Cold Climate	**68.5%**	76.1%	18.1%	5.2%	0.0%	0.0%
Mixed	**11.4%**	64.4%	20.7%	12.0%	2.9%	0.0%
Multiple	**100%**	74.4%	19.0%	5.8%	0.3%	0.4%

[ASK IF <Rev Unit Qty> >1]

D3c. Is there anything more you would like to share about your decision to purchase multiple outdoor compressor units and how you plan to use them?

[Open ended, text – Categories developed after responses were received]

1. Organization of house made multiple units the best decision
2. Technical capacity of units, higher efficiency, possibility of adding additional units
3. Zoned control was important
4. Terms of program made multiple units the only option
5. Happy with system installation
6. System didn't work as well as expected (cold temps, noise, cost)
7. Issues with contractor
8. Other

Table A.22: Answers to Question D3c

D3c (73 Resp)	TOTAL	1. Org. of house	2 Tech. Cap. of Units	3. Zoned control	4. Terms of Prog.	5. Happy with System	6. System didn't work well	7. Issues with Contr.	8. Other
All	**100%**	**16.6%**	**9.5%**	**4.8%**	**5.7%**	**30.8%**	**9.3%**	**4.1%**	**19.1%**
Cold Climate	**26.9%**	17.2%	16.1%	5.3%	5.3%	32.4%	9.7%	0.0%	14.1%
Not Cold Climate	**58.5%**	16.8%	7.0%	3.9%	7.4%	28.9%	9.8%	7.0%	19.1%
Mixed	**14.5%**	14.3%	7.2%	7.2%	0.0%	35.7%	7.1%	0.0%	28.6%
Multiple	**100%**	16.6%	9.5%	4.8%	5.7%	30.8%	9.3%	4.1%	19.1%

Sample Verbatim Responses for Question D3c:

- "They are at alternate ends of the house, I was told it would be more efficient to install separate units." [1]
- "I installed two outdoor units because each unit could support only 3 indoor units and I needed 6 indoor units to cool the whole house. [2]
- "I liked the fact that I was zoning each room." [3]

- "I believe that technically I could have satisfied my requirements with a single compressor; however the terms of the program limited the number of units which could be on a single compressor to 3 which did not meet the needs of my installation." [4]
- "It is terrific and efficient. The cost to operate is very inexpensive compared to a whole house A/C." [5]
- "Our house was built in 1892. Old house not very well insulated high ceiling, we feel they don't heat very well, still have to use oil. Not 100% happy." [6]
- "The contractor's . . . sales representative lied to us about the savings and operating costs." [7]

D4. How did you determine which specific make and model of ductless mini-split heat pump(s) to install? (Select all that apply)

1. Recommended by contractor
2. Recommended by distributor/store
3. Recommended by friend
4. Shopped for best priced unit
5. Recommended on Web
6. Performance: compared manufacturers specifications

97. (Other, please specify)

Table A.23: Answers to Question D4

D4 (428 Resp)	TOTAL	1. Rec. by Contractor	2. Rec. by Distributor /Store	3. Rec. by Friend	4. Shopped for best Price Unit	5. Rec. on Web	6. Perform. /Specs	97. Other
All	**100%**	**54.4%**	**4.0%**	**5.9%**	**3.3%**	**7.4%**	**16.9%**	**8.2%**
Cold Climate	**23.3%**	54.0%	2.2%	8.3%	3.6%	7.3%	20.1%	4.5%
Not Cold Climate	**73.3%**	54.3%	4.6%	5.0%	3.2%	7.5%	16.0%	9.4%
Mixed	**3.5%**	58.3%	4.0%	8.0%	3.9%	5.9%	13.9%	6.0%
Single	**69.5%**	51.8%	4.8%	5.5%	3.1%	7.8%	16.8%	10.2%
Multiple	**30.5%**	60.2%	2.2%	6.7%	3.8%	6.6%	17.0%	3.4%

D5. Where did you first learn about the Mass Save Cool Smart Program, from which you received the rebate for the ductless mini-split heat pump? (Select only one response)

1. Contractor
2. Cool Smart mailing/letter
3. Bill insert
4. Mass Save website
5. Family/friends/word of mouth
6. Retailer/Store
7. Web; social media
8. Mass Save Energy Auditor

97. (Other, please specify)
99. (Refused)

Table A.24: Answers to Question D5

D5 (428 Resp)	TOTAL	1. Contr	2. Cool Smart Letter	3. Bill Insert	4. Mass Save Web.	5. Family/ Friend	6. Retail /Store	7. Web; Social Media	8. Mass Save Audit	97. Other
All	**100%**	**47.8%**	**1.5%**	**2.6%**	**10.8%**	**11.2%**	**2.6%**	**2.9%**	**15.1%**	**5.6%**
Cold Climate	**23.3%**	56.7%	0.0%	4.2%	11.1%	12.1%	2.4%	2.2%	7.2%	4.2%
Not Cold Climate	**73.3%**	44.8%	1.9%	2.1%	10.5%	11.1%	2.7%	3.3%	17.7%	5.9%
Mixed	**3.5%**	50.3%	2.9%	2.9%	14.5%	8.7%	0.0%	0.0%	12.0%	8.7%
Single	**69.5%**	49.0%	1.4%	2.5%	11.9%	11.1%	3.1%	3.2%	12.7%	5.1%
Multiple	**30.5%**	45.1%	1.7%	2.8%	8.2%	11.5%	1.2%	2.2%	20.6%	6.7%

D6. Would you have still purchased a ductless mini-split heat pump in the absence of available rebates of financing? (Select only one response)

1. Yes
2. No
3. Not sure
99. (Refused)

Table A.25: Answers to Question D6

D6 (428 Resp)	TOTAL	1. Yes	2. No	3. Not Sure	99. Refused
All	**100%**	**51.6%**	**12.4%**	**35.1%**	**0.9%**
Cold Climate	**23.3%**	52.1%	9.9%	37.2%	0.8%
Not Cold Climate	**73.3%**	52.1%	12.6%	34.3%	1.0%
Mixed	**3.5%**	37.4%	24.9%	37.6%	0.0%
Single	**69.5%**	55.5%	11.1%	32.3%	1.1%
Multiple	**30.5%**	42.7%	15.4%	41.5%	0.4%

D7. If rebates or financing had been unavailable, would you have purchased a less expensive, less energy efficient, ductless mini-split heat pump(s)? (Select only one response)

1. Yes
2. No
3. Not sure
99. (Refused)

Table A.26: Answers to Question D7

D7 (428 Resp)	TOTAL	1. Yes	2. No	3. Not Sure	99. Refused
All	**100%**	**6.9%**	**55.0%**	**37.5%**	**0.6%**
Cold Climate	**23.3%**	11.6%	52.0%	36.4%	0.0%
Not Cold Climate	**73.3%**	5.4%	55.6%	38.2%	0.8%
Mixed	**3.5%**	8.7%	61.9%	29.4%	0.0%
Single	**69.5%**	6.1%	57.3%	35.7%	0.9%
Multiple	**30.5%**	8.8%	49.8%	41.4%	0.0%

Survey Questions - Cold Climate:

C1a. Before purchasing the ductless mini-split heat pump(s), did your contractor explain to you that they are available with two different types of heat pump systems, one that operates efficiently with outdoor temperatures below 0°F and one that relies on auxiliary heat around 15°F? (Select only one response)

1. Yes
2. No
99. (Refused)

Table A.27: Answers to Question C1a

C1a (428 Resp)	TOTAL	1. Yes	2. No	99. Refused
All	**100%**	**38.3%**	**55.7%**	**6.0%**
Cold Climate	**23.3%**	50.9%	41.7%	7.3%
Not Cold Climate	**73.3%**	34.0%	60.3%	5.7%
Mixed	**3.5%**	44.7%	52.4%	2.9%
Single	**69.5%**	38.2%	55.4%	6.5%
Multiple	**30.5%**	38.7%	56.4%	4.9%

[ASK IF C1a = 1]

C1b. What exactly did your contractor tell you about the difference between these two different types of ductless mini-split heat pump systems?

[Open ended, text– Categories developed after responses were received]

1. Explained what was best for the home, including expected use of the existing system
2. One would function better/be cheaper/more efficient at a lower outside temperatures; made sense in terms of climate considerations
3. Provided specifications/technical discussion
4. One working at lower temperature is better/more efficient
5. Don't remember, only that two options were available
6. Made decision based on own research/advice from individual other than contractor
7. Capability to heat as well to cool

8. Other

Table A.28: Answers to Question C1b

C1b (173 Resp)	TOTAL	1. What was best for home	2. Function better/ cheaper/ more efficient	3. Provided specs	4. One was better	5. Don't remember	6. Own research	7. Heat and cool	8. Other
All	**100%**	**12.1%**	**26.8%**	**2.6%**	**4.3%**	**37.2%**	**2.5%**	**3.9%**	**10.7%**
Cold Climate	**30.9%**	12.7%	32.0%	1.4%	2.1%	31.9%	2.3%	2.9%	14.7%
Not Cold Climate	**65.0%**	11.7%	24.7%	2.9%	5.6%	38.8%	2.7%	4.6%	9.0%
Mixed	**4.1%**	13.0%	21.5%	6.5%	0.0%	52.6%	0.0%	0.0%	6.5%
Single	**69.2%**	11.3%	23.4%	2.3%	4.6%	39.3%	2.1%	5.6%	11.3%
Multiple	**30.8%**	13.7%	34.6%	3.3%	3.4%	32.5%	3.2%	0.0%	9.3%

Sample Verbatim Responses for Question C1b:

- "I had a new working furnace which he said would be more efficient and cheaper than going with the more complex heat pump. We already had backup heat, in other words." [1]
- "That one operates well when it's colder and the other one will only work if the temp doesn't go below 0." [2]
- "Contractor shared the energy efficiency chart for both the systems and we did end up installing high eff. One in one zone. The other zones had multi-output hence couldn't do the high efficiency system in our other two zones." [3]
- "The one that works in lower temps is better." [4]
- "I chose to go with the hyper heat due to my own research," [6]
- "One can only cool, the other has heating and cooling capability." [7]

[ASK IF C1a ≠ 1]

C2. When considering which ductless mini-split heat pump to purchase, did you consider the performance at extremely cold temperatures (below 15°F)? (Select only one response)

1. Yes
2. No
99. (Refused)

Table A.29: Answers to Question C2

C2 (254 Resp)	TOTAL	1. Yes	2. No	99. Refused
All	**100%**	**22.3%**	**74.7%**	**3.1%**
Cold Climate	**18.5%**	32.1%	60.8%	7.1%
Not Cold Climate	**78.4%**	20.2%	77.5%	2.3%
Mixed	**3.1%**	15.8%	84.2%	0.0%
Single	**69.7%**	21.9%	74.6%	3.5%
Multiple	**30.3%**	23.1%	74.8%	2.2%

[ASK IF C1a = 1 OR C2 = 1]

C3. Did the knowledge of how the ductless mini-split heat pump system would operate at extremely cold temperatures (below 15°F) have any effect on the system that you decided to purchase and install? (Select only one response)

1. Yes
2. No
99. (Refused)

Table A.30: Answers to Question C3

C3 (233 Resp)	TOTAL	1. Yes	2. No	99. Refused
All	**100%**	**48.0%**	**48.4%**	**3.6%**
Cold Climate	**31.6%**	67.7%	28.2%	4.0%
Not Cold Climate	**65.1%**	38.0%	58.4%	3.6%
Mixed	**3.3%**	57.3%	42.7%	0.0%
Single	**68.8%**	46.5%	48.9%	4.5%
Multiple	**31.2%**	51.3%	47.1%	1.6%

[ASK IF C3 = 1 OR 99]

C4. How did this knowledge ultimately affect your purchase? (Select only one response)

1. I decided to purchase and install a unit that was more efficient at extremely cold temperatures (below 15°F)
2. I decided to purchase and install a unit that was less efficient at extremely cold temperatures (below 15°F), because there aren't many days when I need heating at those cold temperatures.
3. I decided to purchase the least expensive unit, regardless of efficiencies at different temperatures
97. (Other, please specify)
99. (Refused)

Table A.31: Answers to Question C4

C4 (130 Resp)	TOTAL	1. Purchase Unit More Efficient at Cold Temps	2. Purchase Unit Less Efficient at Cold Temps	3. Purchase the Least Expensive Unit	97. Other	99. Refused
All	**100%**	**67.7%**	**10.5%**	**4.7%**	**14.2%**	**2.8%**
Cold Climate	**43.9%**	71.8%	11.8%	5.0%	6.0%	5.3%
Not Cold Climate	**52.4%**	62.7%	9.5%	4.7%	22.1%	0.9%
Mixed	**3.7%**	89.7%	10.3%	0.0%	0.0%	0.0%
Single	**68.1%**	67.4%	7.7%	5.5%	16.6%	2.8%
Multiple	**31.9%**	68.4%	16.6%	3.0%	9.1%	2.9%

Survey Questions - Function:

F0. What space(s) does/do your ductless mini-split heat pump system(s) serve? (Select all that apply)

1. Master Bedroom
2. Other Bedrooms
3. Living Room, Family Room or Den
4. Kitchen
5. Office
6. Sunroom or three-season space
7. Auxiliary spaces, such as basements, lofts, attics . . .
97. (Other, please specify)

Table A.32: Answers to Question F0

F0 (428 Resp)	TOTAL	1. M. Bed	2. Other Bed	3. Living Room	4. Kitchen	5. Office	6. 3 Season	7. Aux. Spaces	97. Other
All	**100%**	**22.6%**	**12.4%**	**31.9%**	**16.4%**	**3.9%**	**2.9%**	**3.9%**	**5.9%**
Cold Climate	**23.3%**	17.7%	8.0%	36.4%	17.8%	3.4%	5.0%	4.7%	7.1%
Not Cold Climate	**73.3%**	23.9%	13.8%	30.6%	16.1%	3.8%	2.3%	3.8%	5.7%
Mixed	**3.5%**	29.9%	13.0%	29.1%	14.6%	9.5%	0.0%	1.3%	2.7%
Single	**69.5%**	21.0%	10.7%	33.2%	16.2%	3.0%	3.6%	4.6%	7.7%
Multiple	**30.5%**	26.3%	16.3%	28.9%	17.1%	6.0%	1.2%	2.4%	1.9%

[SURVEY TOOL TO RANDOMLY SELECT ONE OF THE SELECTED SPACE TYPES = F0x]

F0x.

1. Master Bedroom [Bedroom]
2. Other Bedrooms [Bedroom]
3. Living Room, Family Room or Den [Living Room]
4. Kitchen [Kitchen]
5. Office [Office]
6. Sunroom or three-season space [Other]
7. Auxiliary spaces [Other]

97. (Other)[Other]

Table A.33: Answers to Question F0x

F0x (428 Resp)	TOTAL	1,2. Bedroom	3. Living Room	4. Kitchen	5. Office	6,7,97. Other
All	**100%**	**33.7%**	**36.5%**	**10.4%**	**3.4%**	**16.0%**
Cold Climate	**23.3%**	23.8%	33.9%	17.5%	2.1%	22.7%
Not Cold Climate	**73.3%**	36.3%	37.3%	8.4%	3.6%	14.4%
Mixed	**3.5%**	43.2%	36.5%	5.8%	8.7%	5.8%
Single	**69.5%**	29.3%	38.8%	9.0%	3.2%	19.7%
Multiple	**30.5%**	43.6%	31.1%	13.6%	4.1%	7.7%

[PRINT IF <Rev Unit Qty> >1]
For the rest of this survey, we ask that only to focus on the ductless mini-split heat pump system serving the **< F0x >**.

[PRINT IF <Rev Unit Qty> = 1 and Multiple Responses Selected in F0]
For the rest of this survey, we ask that you focus on the ductless mini-split heat pump relating to how it serves the **< F0x >**.

F1. Now that you have installed your ductless mini-split heat pump in the **< F0x >**, how do you find that you are using it, do you use it only for cooling, only for heating or both heating and cooling? (Select only one response)

1. Only for cooling
2. Only for heating
3. Both heating and cooling

Table A.34: Answers to Question F1

F1 (428 Resp)	TOTAL	1. Only for Cooling	2. Only for Heating	3. Both Heating and Cooling
All	**100%**	**24.8%**	**1.2%**	**73.9%**
Cold Climate	**23.3%**	16.7%	2.9%	80.4%
Not Cold Climate	**73.3%**	27.4%	0.7%	71.9%
Mixed	**3.5%**	26.3%	0.0%	73.7%
Single	**69.5%**	24.7%	0.6%	74.7%
Multiple	**30.5%**	25.1%	2.6%	72.3%
Bedroom	**33.7%**	29.1%	1.5%	69.3%
Kitchen	**10.4%**	32.4%	0.0%	67.6%
Living Room	**36.5%**	24.1%	0.7%	75.1%
Office	**3.4%**	0.0%	0.0%	100.0%
Other	**16.0%**	17.8%	2.7%	79.5%

[ASK IF F1 = 2 or 3]

F2a. During the recent extreme cold conditions that we experienced in Massachusetts, how did you use your ductless mini-split heat pump to heat the designated space? (Select only one response)

1. Did not use at all.
2. Used it along with existing heating system
3. Used it with wood, kerosene, or another supplemental heating source
4. Used it as the only system to heat this space
97. (Other, please specify)
98. (Don't Know)

Table A.35: Answers to Question F2a

F2a (330 Resp)	TOTAL	1. Did not use at all	2. Used with existing system	3. Used with supplemental heating	4. Used as only system to heat space	97. Other
All	**100%**	**16.2%**	**51.9%**	**7.5%**	**17.8%**	**6.5%**
Cold Climate	**25.8%**	11.0%	44.5%	9.6%	29.7%	5.2%
Not Cold Climate	**70.8%**	18.5%	54.2%	7.1%	13.4%	6.7%
Mixed	**3.4%**	8.5%	60.1%	0.0%	19.6%	11.8%
Single	**69.6%**	17.0%	52.4%	8.0%	16.0%	6.6%
Multiple	**30.4%**	14.4%	50.7%	6.4%	22.1%	6.3%
Bedroom	**31.7%**	13.6%	53.3%	11.7%	17.4%	4.0%
Kitchen	**9.4%**	23.4%	54.6%	1.9%	15.2%	4.9%
Living Room	**36.8%**	14.8%	61.1%	7.1%	9.5%	7.5%
Office	**4.6%**	16.8%	24.1%	0.0%	14.1%	11.4%
Other	**17.5%**	20.2%	69.1%	5.9%	38.3%	0.0%

[ASK IF F2a = 1-3]

F2b. What is the reason that you did not rely only on the heat pump for heating? (Select only one response)

1. The heat pump could not meet the heating requirements of the space
2. The heat pump costs too much to operate
3. I closed up that space and was not heating it at all
97. (Other, please specify)
99. (Refused)

Table A.36: Answers to Question F2b

F2b (241 Resp)	TOTAL	1. Could not meet heating requirements	2. Cost too much to operate	3. Closed up space & wasn't heating	97. Other	99. Refused
All	**100%**	**33.1%**	**11.0%**	**9.2%**	**40.9%**	**5.8%**
Cold Climate	**20.0%**	41.2%	14.6%	6.1%	33.7%	4.4%
Not Cold Climate	**77.0%**	31.1%	9.7%	10.4%	42.6%	6.1%
Mixed	**3.0%**	29.2%	22.1%	0.0%	43.6%	5.1%
Single	**71.0%**	30.5%	11.5%	11.9%	41.5%	4.7%
Multiple	**29.0%**	39.4%	10.0%	2.7%	39.5%	8.5%
Bedroom	**33.3%**	27.7%	13.6%	9.6%	45.2%	4.0%
Kitchen	**9.7%**	32.4%	13.4%	11.1%	38.8%	4.3%
Living Room	**39.9%**	39.8%	10.7%	0.0%	39.8%	9.7%
Office	**5.1%**	54.5%	7.4%	0.0%	35.1%	3.0%
Other	**12.0%**	17.1%	4.7%	41.5%	36.8%	0.0%

F3. The following questions ask about performance at different temperature ranges. Make sure to pay close attention to the temperature range being considered and answer to the best of your knowledge.

[ASK IF F1 = 2 or 3]

F3a. How has the ductless mini-split heat pump system in the **< F0x >** performed in terms of heating during extremely cold temperatures **below 15°F**? (Select only one response)

1. Provides sufficient heating
2. Does not provide sufficient heating
3. Have not used in these temperatures
97. (Other, please specify)
98. (Don't Know)
99. (Refused)

Table A.37: Answers to Question F3a

F3a (330 Resp)	TOTAL	1. Provides Sufficient Heat	2. Does not provide sufficient heat	3. Have not used in these temperatures	97. Other	98. Don't Know
All	**100%**	**43.2%**	**18.8%**	**26.4%**	**7.8%**	**3.8%**
Cold Climate	**25.8%**	48.5%	22.7%	22.4%	4.8%	1.6%
Not Cold Climate	**70.8%**	41.7%	16.8%	28.7%	8.3%	4.5%
Mixed	**3.4%**	35.3%	32.0%	8.5%	20.2%	3.9%
Single	**69.6%**	45.9%	15.1%	26.9%	7.7%	4.4%
Multiple	**30.4%**	37.1%	27.4%	25.2%	8.1%	2.2%
Bedroom	**31.7%**	51.7%	14.2%	23.4%	8.0%	2.7%
Kitchen	**9.4%**	41.2%	22.0%	28.5%	6.5%	1.9%
Living Room	**36.8%**	36.9%	19.8%	30.0%	8.1%	5.2%
Office	**4.6%**	19.1%	64.3%	16.6%	0.0%	0.0%
Other	**17.5%**	48.7%	11.5%	25.6%	9.7%	4.5%

[ASK IF F1 = 2 or 3]

F3b. How has the ductless mini-split heat pump system in the **< F0x >** performed in terms of heating during cold temperatures **between 15°F and 30°F**? (Select only one response)

1. Provides sufficient heating
2. Does not provide sufficient heating
3. Have not used in these temperatures
97. (Other, please specify)
98. (Don't Know)
99. (Refused)

Table A.38: Answers to Question F3b

F3b (330 Resp)	TOTAL	1. Provides Sufficient Heat	2. Does not provide sufficient heat	3. Have not used in these temperatures	97. Other	98. Don't Know
All	**100%**	**66.8%**	**9.5%**	**15.0%**	**5.4%**	**3.2%**
Cold Climate	**25.8%**	76.6%	7.2%	10.2%	4.4%	1.6%
Not Cold Climate	**70.8%**	62.8%	10.2%	17.3%	6.0%	3.6%
Mixed	**3.4%**	75.2%	12.4%	4.5%	0.0%	7.8%
Single	**69.6%**	66.3%	9.1%	15.8%	5.1%	3.7%
Multiple	**30.4%**	68.0%	10.5%	13.3%	6.1%	2.1%
Bedroom	**31.7%**	70.5%	9.6%	12.5%	6.0%	1.4%
Kitchen	**9.4%**	68.0%	8.8%	23.2%	0.0%	0.0%
Living Room	**36.8%**	66.1%	9.6%	15.5%	3.4%	5.3%
Office	**4.6%**	59.6%	19.7%	12.8%	7.9%	0.0%
Other	**17.5%**	62.8%	7.1%	14.8%	10.7%	4.5%

[ASK IF F1 = 2 or 3]

F3c. How has the ductless mini-split heat pump system in the **< F0x >** performed in terms of heating during cool temperatures **between 30°F and 50°F**? (Select only one response)

1. Provides sufficient heating
2. Does not provide sufficient heating
3. Have not used in these temperatures

97. (Other, please specify)
98. (Don't Know)
99. (Refused)

Table A.39: Answers to Question F3c

F3c (330 Resp)	TOTAL	1. Provides Sufficient Heat	2. Does not provide sufficient heat	3. Have not used in these temperatures	97. Other	98. Don't Know
All	**100%**	**88.3%**	**1.7%**	**6.5%**	**0.9%**	**2.5%**
Cold Climate	**25.8%**	87.2%	0.6%	9.7%	1.6%	0.9%
Not Cold Climate	**70.8%**	88.8%	2.0%	5.5%	0.8%	3.0%
Mixed	**3.4%**	87.0%	4.5%	4.5%	0.0%	3.9%
Single	**69.6%**	89.7%	2.2%	4.9%	0.6%	2.6%
Multiple	**30.4%**	85.2%	0.5%	10.3%	1.8%	2.2%
Bedroom	**31.7%**	86.7%	0.0%	11.8%	0.5%	1.0%
Kitchen	**9.4%**	77.2%	6.2%	12.8%	1.9%	1.9%
Living Room	**36.8%**	92.3%	0.4%	2.3%	1.6%	3.3%
Office	**4.6%**	100.0%	0.0%	0.0%	0.0%	0.0%
Other	**17.5%**	86.0%	5.5%	4.0%	0.0%	4.5%

[ASK IF F1 = 1 or 3]

F3d. How has the ductless mini-split heat pump system in the **< F0x >** performed in terms of cooling during warm temperatures **between 70°F and 90°F**? (Select only one response)

1. Provides sufficient cooling
2. Does not provide sufficient cooling
3. Have not used in these temperatures
97. (Other, please specify)
98. (Don't Know)
99. (Refused)

Table A.40: Answers to Question F3d

F3d (419 Resp)	TOTAL	1. Provides Sufficient Cooling	3. Have not used in these temperatures	97. Other	98. Don't Know	99. Refused
All	**100%**	**92.8%**	**3.6%**	**0.4%**	**3.1%**	**0.1%**
Cold Climate	**22.9%**	89.9%	5.3%	1.2%	3.0%	0.6%
Not Cold Climate	**73.6%**	94.0%	2.7%	0.2%	3.1%	0.0%
Mixed	**3.5%**	85.7%	11.4%	0.0%	2.9%	0.0%
Single	**69.9%**	94.3%	3.5%	0.2%	2.0%	0.0%
Multiple	**30.1%**	89.2%	3.8%	0.9%	5.6%	0.5%
Bedroom	**33.6%**	91.7%	5.3%	0.4%	2.6%	0.0%
Kitchen	**10.5%**	91.7%	1.8%	2.5%	2.8%	1.3%
Living Room	**36.6%**	94.6%	2.3%	0.0%	3.1%	0.0%
Office	**3.5%**	100.0%	0.0%	0.0%	0.0%	0.0%
Other	**15.8%**	89.9%	5.0%	0.0%	5.1%	0.0%

[ASK IF F1 = 1 or 3]

F3e. How has the ductless mini-split heat pump system in the **< F0x >** performed in terms of cooling during extremely hot temperatures **above 90°F**? (Select only one response)

1. Provides sufficient cooling
2. Does not provide sufficient cooling
3. Have not used in these temperatures
97. (Other, please specify)
98. (Don't Know)
99. (Refused)

Table A.41: Answers to Question F3e

F3e (419 Resp)	TOTAL	1. Provides Sufficient Cooling	2. Does not provide sufficient cooling	3. Have not used in these temperatures	97. Other	98. Don't Know
All	**100%**	**78.1%**	**3.4%**	**12.8%**	**2.2%**	**3.6%**
Cold Climate	**22.9%**	77.9%	1.6%	14.7%	1.6%	4.3%
Not Cold Climate	**73.6%**	78.8%	4.1%	11.5%	2.1%	3.5%
Mixed	**3.5%**	64.5%	0.0%	26.3%	9.1%	0.0%
Single	**69.9%**	79.3%	4.2%	10.9%	1.3%	4.2%
Multiple	**30.1%**	75.2%	1.4%	17.0%	4.4%	2.1%
Bedroom	**33.6%**	81.0%	2.7%	10.3%	1.6%	4.4%
Kitchen	**10.5%**	78.2%	1.3%	17.5%	0.0%	3.0%
Living Room	**36.6%**	75.7%	4.8%	14.6%	2.6%	2.3%
Office	**3.5%**	90.8%	0.0%	3.8%	0.0%	5.3%
Other	**15.8%**	74.5%	3.5%	12.7%	4.7%	4.7%

F4. So far, how satisfied have you been with the cost of your heating and/or cooling using the ductless mini-split heat pump? (Select only one response)

1. Very satisfied
2. Somewhat satisfied
3. Not at all satisfied
97. (Other, please specify)
98. (Don't know)
99. (Refused)

Table A.42: Answers to Question F4

F4 (428 Resp)	TOTAL	1. Very Satisfied	2. Somewhat Satisfied	3. Not at All Satisfied	97. Other	98. Don't Know
All	**100%**	**61.2%**	**26.2%**	**2.8%**	**5.7%**	**4.1%**
Cold Climate	**23.3%**	60.5%	24.4%	1.3%	9.1%	4.7%
Not Cold Climate	**73.3%**	62.0%	26.5%	3.3%	4.5%	3.7%
Mixed	**3.5%**	49.6%	29.8%	2.9%	8.7%	8.9%
Single	**69.5%**	64.9%	25.0%	2.6%	3.5%	4.0%
Multiple	**30.5%**	52.6%	28.9%	3.3%	10.9%	4.3%
Bedroom	**33.7%**	59.9%	27.4%	1.5%	6.7%	4.4%
Kitchen	**10.4%**	50.5%	34.2%	0.0%	4.3%	10.9%
Living Room	**36.5%**	67.8%	20.1%	3.4%	5.9%	2.7%
Office	**3.4%**	57.4%	18.5%	15.8%	0.0%	8.3%
Other	**16.0%**	56.3%	33.6%	3.4%	5.5%	1.1%

[ASK IF F4 = 2 or 3]

F5. Why did you give the rating that you did on the previous question? (Select all that apply)

1. The system is not providing the level of comfort that I was expecting.
2. The energy bill has been too high when the system is providing heating.
3. The energy bill has been too high when the system is providing cooling.
4. The energy bill is higher than expected, but I am still happy with the system

97. (Other, please specify)
98. (Don't know)
99. (Refused)

Table A.43: Answers to Question F5

F5 (428 Resp)	TOTAL	1. Not providing comfort expected	2. Energy bill too high when heating	3. Energy bill too high when cooling	4. Energy bill higher, but still happy	97. Other	98. Don't Know	99. Refused
All	**100%**	**6.6%**	**16.8%**	**3.5%**	**61.7%**	**9.7%**	**0.8%**	**0.8%**
Cold Climate	**20.6%**	6.8%	23.9%	0.0%	51.3%	18.0%	0.0%	0.0%
Not Cold Climate	**75.4%**	6.9%	14.8%	4.7%	64.5%	7.1%	1.1%	1.1%
Mixed	**3.9%**	0.0%	17.7%	0.0%	64.6%	17.7%	0.0%	0.0%
Single	**66.1%**	4.7%	15.2%	4.7%	67.1%	8.3%	0.0%	0.0%
Multiple	**33.9%**	10.2%	20.0%	1.2%	51.2%	12.7%	2.4%	2.3%
Bedroom	**35.7%**	5.2%	17.2%	5.0%	65.8%	6.7%	0.0%	0.0%
Kitchen	**29.0%**	1.4%	16.3%	6.0%	56.0%	14.8%	2.8%	2.7%
Living Room	**12.0%**	17.8%	14.9%	0.0%	52.7%	14.6%	0.0%	0.0%
Office	**3.7%**	11.3%	58.0%	0.0%	20.0%	10.7%	0.0%	0.0%
Other	**19.6%**	8.9%	10.1%	0.0%	76.4%	4.7%	0.0%	0.0%

Survey Questions - Baseline

B1. Was the **< F0x >** heated and/or cooled before the installation of the ductless mini-split heat pump? (Select only one response)

1. It was heated only
2. It was cooled only
3. It was heated and cooled
4. It was not heated or cooled
5. It is a brand new space, i.e. installed in addition or new house

Table A.44: Answers to Question B1

B1 (428 Resp)	TOTAL	1. Heated only	2. Cooled only	3. Heated and Cooled	4. Not Heated or Cooled	5. Brand New Space
All	**100%**	**58.4%**	**1.6%**	**30.7%**	**7.1%**	**2.3%**
Cold Climate	**23.3%**	60.1%	1.8%	24.1%	10.1%	3.9%
Not Cold Climate	**73.3%**	57.9%	1.6%	32.3%	6.3%	1.7%
Mixed	**3.5%**	55.2%	0.0%	39.0%	2.9%	2.9%
Single	**69.5%**	54.8%	1.6%	33.2%	8.1%	2.3%
Multiple	**30.5%**	66.6%	1.5%	24.8%	4.9%	2.2%
Bedroom	**33.7%**	57.8%	2.3%	34.1%	3.4%	2.5%
Kitchen	**10.4%**	71.1%	0.0%	21.2%	5.3%	2.4%
Living Room	**36.5%**	63.9%	2.0%	32.4%	1.2%	0.5%
Office	**3.4%**	56.3%	0.0%	38.7%	5.0%	0.0%
Other	**16.0%**	39.2%	0.8%	23.8%	29.8%	6.4%

[ASK ENTIRE SECTION (B2 – B5b) ONLY IF B1 = 1 or 3]

(Space Previously Heated)

B2. What was the primary system that heated the **< F0x >** before the ductless mini-split heat pump was installed? (Select only one response)

1. Electric baseboard [Electric]
2. Electric furnace [Electric]
3. Electric space heater [Electric]
4. Oil furnace [Oil]
5. Oil boiler [Oil]
6. Natural Gas furnace [Natural Gas]
7. Natural Gas boiler [Natural Gas]
8. Propane/LPG furnace [Propane]
9. Propane/LPG boiler [Propane]
10. Woodstove, pellet stove, or fireplace [Other]
11. Other heat pump or ductless mini-split heat pump [Other]
97. (Other, please specify) [Other]
98. (Don't Know)

99. (Refused)

Table A.45: Answers to Question B2

B2 (382 Resp)	TOTAL	1,2,3. Electric	4,5. Oil	6,7. Natural Gas	8,9. Propane	10,11,97. Other
All	**100%**	**11.1%**	**45.7%**	**27.3%**	**3.4%**	**12.4%**
Cold Climate	**22.0%**	19.6%	39.2%	21.9%	6.6%	12.7%
Not Cold Climate	**74.3%**	8.8%	46.4%	29.4%	2.7%	12.8%
Mixed	**3.7%**	6.1%	72.4%	18.4%	0.0%	3.1%
Single	**68.7%**	11.0%	41.2%	28.9%	3.5%	15.3%
Multiple	**31.3%**	11.4%	55.7%	23.8%	3.2%	6.0%
Bedroom	**34.7%**	11.7%	43.5%	33.3%	4.2%	7.4%
Kitchen	**10.8%**	13.9%	49.3%	17.7%	0.0%	19.0%
Living Room	**39.5%**	6.4%	48.0%	30.2%	4.1%	11.3%
Office	**3.7%**	13.4%	72.7%	4.0%	0.0%	9.8%
Other	**11.3%**	22.2%	32.8%	15.8%	3.5%	25.7%

B3a. When the ductless mini-split heat pump was installed was the previous heating system serving the **< F0x >** removed or is it still installed? (Select only one response)

1. The previous system was removed when the ductless mini-split heat pump was installed
2. The previous system is still installed

98. (Don't Know)

Table A.46: Answers to Question B3a

B3a (382 Resp)	TOTAL	1. Previous system removed	2. Previous system still installed	98. Don't Know
All	**100%**	**5.1%**	**94.5%**	**0.4%**
Cold Climate	**22.0%**	9.8%	89.3%	0.9%
Not Cold Climate	**74.3%**	3.7%	96.1%	0.2%
Mixed	**3.7%**	6.2%	93.8%	0.0%
Single	**68.7%**	5.1%	94.6%	0.3%
Multiple	**31.3%**	5.0%	94.5%	0.5%
Bedroom	**34.7%**	5.7%	94.3%	0.0%
Kitchen	**10.8%**	3.2%	96.8%	0.0%
Living Room	**39.5%**	2.9%	97.1%	0.0%
Office	**3.7%**	0.0%	94.4%	5.6%
Other	**11.3%**	14.5%	84.1%	1.3%

[ASK IF B3a = 1]

B4. Why did you replace your existing heating system in the **< F0x >**? (Select only one response)

1. Old system didn't work well, i.e. wanted improved performance
2. Old system broke and wanted to take advantage of the rebate
3. Anticipated old system would break and wanted to take advantage of the rebate
4. Wanted a more energy efficient system
5. Wanted/needed a different size system
97. (Other, please specify)
99. (Refused)

Table A.47: Answers to Question B4

B4 (22 Resp)	TOTAL	1. Old system didn't work well	4. Wanted a more energy efficient system	5. Wanted/ needed a different size system	97. Other	99. Refused
All	**100%**	**32.4%**	**30.9%**	**2.8%**	**31.2%**	**2.7%**
Cold Climate	**45.2%**	31.1%	37.4%	6.1%	25.4%	0.0%
Not Cold Climate	**50.6%**	36.2%	23.5%	0.0%	34.9%	5.4%
Mixed	**4.1%**	0.0%	50.0%	0.0%	50.0%	0.0%
Single	**70.5%**	32.2%	31.1%	3.9%	32.8%	0.0%
Multiple	**29.5%**	33.0%	30.4%	0.0%	27.4%	9.2%
Bedroom	**38.1%**	6.8%	53.7%	0.0%	39.5%	0.0%
Kitchen	**7.0%**	0.0%	62.4%	0.0%	37.6%	0.0%
Living Room	**22.7%**	59.7%	9.1%	0.0%	19.2%	12.0%
Office	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%
Other	**32.3%**	50.5%	12.5%	8.6%	28.4%	0.0%

[ASK B3a = 2]

B3b. How does the previous heating system function today in the **< F0x >** with the ductless mini-split heat pump? (Select only one response)

1. The previous system functions as a back-up or supplemental system to the ductless mini-split heat pump
2. The previous system and the new ductless mini-split heat pump run together at all times.
3. The previous system still runs as the primary system. The ductless mini-split heat pump is used as a supplemental system only when needed.
4. The previous system still runs as the primary system. The ductless mini-split heat pump is only used for cooling.
97. (Other)
98. (Don't Know)
99. (Refused)

Table A.48: Answers to Question B3b

B3b (358 Resp)	TOTAL	1. Previous back-up to DMSHP	2. Both systems run together	3. Previous primary, DMSHP supplements	4. Previous primary, DMSHP cooling only	97. Other	98. Don't Know
All	**100%**	**28.5%**	**3.6%**	**40.8%**	**19.6%**	**7.2%**	**0.3%**
Cold Climate	**21.9%**	40.2%	2.5%	31.8%	17.9%	6.9%	0.7%
Not Cold Climate	**74.6%**	24.8%	3.7%	43.9%	20.0%	7.3%	0.2%
Mixed	**3.5%**	33.7%	9.9%	30.3%	19.5%	6.6%	0.0%
Single	**69.5%**	24.4%	4.7%	42.5%	21.4%	6.8%	0.2%
Multiple	**30.5%**	37.9%	1.1%	37.0%	15.3%	8.2%	0.5%
Bedroom	**34.4%**	28.0%	3.7%	36.9%	24.1%	7.0%	0.4%
Kitchen	**11.1%**	24.0%	10.8%	45.5%	13.4%	6.4%	0.0%
Living Room	**40.8%**	27.0%	2.6%	45.3%	21.8%	2.9%	0.4%
Office	**3.6%**	59.3%	3.2%	24.6%	0.0%	13.0%	0.0%
Other	**10.1%**	30.4%	0.0%	36.6%	8.6%	24.4%	0.0%

B5a. If you had not installed a ductless mini-split heat pump in the **< F0x >**, would you have installed a different heating system? (Select only one response)

1. Yes
2. No
99. (Refused)

Table A.49: Answers to Question B5a

B5a (382 Resp)	TOTAL	1. Yes	2. No	99. Refused
All	**100%**	**8.9%**	**88.2%**	**2.9%**
Cold Climate	**22.0%**	14.8%	84.0%	1.3%
Not Cold Climate	**74.3%**	7.2%	89.3%	3.5%
Mixed	**3.7%**	9.2%	90.8%	0.0%
Single	**68.7%**	7.7%	89.2%	3.1%
Multiple	**31.3%**	11.7%	85.9%	2.4%
Bedroom	**34.7%**	7.1%	89.1%	3.8%
Kitchen	**10.8%**	6.7%	87.1%	6.2%
Living Room	**39.5%**	7.0%	91.1%	1.9%
Office	**3.7%**	13.9%	86.1%	0.0%
Other	**11.3%**	22.0%	76.8%	1.2%

[ASK IF B5a = 1]

B5b. If you had not installed a ductless mini-split heat pump in the **< F0x >**, what type of heating system would you have most likely installed? (Select only one response)

1. Electric baseboard [Electric]
2. Electric furnace [Electric]
3. Electric space heater [Electric]
4. Oil furnace [Oil]
5. Oil boiler [Oil]
6. Natural Gas furnace [Natural Gas]
7. Natural Gas boiler [Natural Gas]
8. Propane/LPG furnace [Propane]
9. Propane/LPG boiler [Propane]
10. Woodstove, pellet stove, or fireplace [Other]
11. Other heat pump or ductless mini-split heat pump [Other]
12. The installed ductless mini-split heat pump was all that was considered
13. Would have only installed a new cooling system
97. (Other, please specify)
99. (Refused)

Table A.50: Answers to Question B5b

B5b (38 Resp)	TOTAL	1,2,3. Electric	4,5. Oil	6,7. Natural Gas	8,9. Propane	10,11,97. Other	12. DMSHP only	99. Refused
All	**100%**	**19.2%**	**8.4%**	**24.4%**	**7.1%**	**26.3%**	**7.7%**	**6.8%**
Cold Climate	**39.7%**	10.7%	0.0%	31.1%	14.8%	33.0%	10.4%	0.0%
Not Cold Climate	**56.6%**	24.3%	14.9%	21.2%	0.0%	21.2%	6.3%	12.0%
Mixed	**3.7%**	33.3%	0.0%	0.0%	33.3%	33.3%	0.0%	0.0%
Single	**61.7%**	29.2%	11.0%	12.1%	4.2%	28.3%	4.2%	11.0%
Multiple	**38.3%**	3.2%	4.2%	44.2%	11.8%	23.2%	13.3%	0.0%
Bedroom	**23.6%**	12.1%	0.0%	39.8%	14.0%	25.7%	8.3%	0.0%
Kitchen	**4.1%**	0.0%	0.0%	60.4%	0.0%	39.6%	0.0%	0.0%
Living Room	**33.7%**	20.2%	20.2%	10.6%	7.7%	16.1%	4.8%	20.2%
Office	**6.4%**	0.0%	25.2%	25.2%	0.0%	49.7%	0.0%	0.0%
Other	**32.2%**	29.6%	0.0%	22.7%	3.8%	31.1%	12.8%	0.0%

[ASK ENTIRE SECTION (B6 – B9b) IF B1 = 2 or 3]

(Space Previously Cooled)

B6. What was the primary system that cooled the **< F0x >** before the ductless mini-split heat pump was installed? (Select only one response)

1. Central air conditioning
2. Room or window air conditioning
3. Central heat pump
4. Other ductless mini-split heat pump system
97. (Other, please specify)
98. (Don't Know)
99. (Refused)

Table A.51: Answers to Question B6

B6 (126 Resp)	TOTAL	1. Central AC	2. Room/ Window AC	3. Central Heat Pump	4. Other DMSHP	97. Other
All	**100%**	**9.6%**	**84.6%**	**0.6%**	**1.8%**	**3.4%**
Cold Climate	**18.7%**	11.0%	84.0%	3.0%	0.0%	1.9%
Not Cold Climate	**77.1%**	8.6%	85.2%	0.0%	2.3%	4.0%
Mixed	**4.2%**	22.3%	77.7%	0.0%	0.0%	0.0%
Single	**75.1%**	9.4%	84.0%	0.8%	1.8%	4.1%
Multiple	**24.9%**	10.5%	86.5%	0.0%	1.6%	1.4%
Bedroom	**37.9%**	8.6%	90.3%	0.0%	1.1%	0.0%
Kitchen	**6.8%**	27.1%	72.9%	0.0%	0.0%	0.0%
Living Room	**38.9%**	2.4%	93.2%	0.0%	3.5%	0.9%
Office	**4.1%**	10.1%	76.1%	13.8%	0.0%	0.0%
Other	**12.2%**	25.9%	49.2%	0.0%	0.0%	24.9%

B7a. When the ductless mini-split heat pump was installed was the previous cooling system serving the **< F0x >** removed or is it still installed? (Select only one response)

1. The previous system was removed when the ductless mini-split heat pump was installed
2. The previous system is still installed

98. (Don't Know)

Table A.52: Answers to Question B7a

B7a (126 Resp)	TOTAL	1. Previous system removed	2. Previous system still installed	98. Don't Know
All	**100%**	**88.2%**	**11.2%**	**0.6%**
Cold Climate	**18.7%**	85.2%	11.8%	3.0%
Not Cold Climate	**77.1%**	89.1%	10.9%	0.0%
Mixed	**4.2%**	85.1%	14.9%	0.0%
Single	**75.1%**	87.3%	11.9%	0.8%
Multiple	**24.9%**	90.8%	9.2%	0.0%
Bedroom	**37.9%**	88.9%	11.1%	0.0%
Kitchen	**6.8%**	53.0%	47.0%	0.0%
Living Room	**38.9%**	97.5%	2.5%	0.0%
Office	**4.1%**	76.1%	10.1%	13.8%
Other	**12.2%**	80.2%	19.8%	0.0%

[ASK IF B7a = 1]

B8. Why did you replace your existing cooling system in the **< F0x >**? (Select only one response)

1. Old system didn't work well, i.e. wanted improved performance
2. Old system broke and wanted to take advantage of the rebate
3. Anticipated old system would break and wanted to take advantage of the rebate

4. Wanted a more energy efficient system
5. Wanted/needed a different size system
6. (Other, please specify)
99. (Refused)

Table A.53: Answers to Question B8

B8 (111 Resp)	TOTAL	1. Old system didn't work well	2. Old system broke	3. Anticipated old system would break	4. Wanted a more energy efficient system	5. Wanted/ needed a different size system	97. Other	99. Refused
All	**100%**	**33.5%**	**1.2%**	**0.6%**	**43.3%**	**3.5%**	**16.3%**	**1.6%**
Cold Climate	**22.8%**	25.7%	0.0%	0.0%	56.6%	5.5%	12.2%	0.0%
Not Cold Climate	**73.7%**	35.6%	1.7%	0.8%	38.7%	3.0%	18.1%	2.1%
Mixed	**3.5%**	40.6%	0.0%	0.0%	54.2%	0.0%	5.2%	0.0%
Single	**68.1%**	36.1%	1.8%	0.0%	36.2%	3.6%	20.0%	2.3%
Multiple	**31.9%**	28.0%	0.0%	1.7%	58.6%	3.1%	8.5%	0.0%
Bedroom	**39.3%**	28.5%	0.0%	0.0%	44.0%	1.7%	25.9%	0.0%
Kitchen	**4.3%**	0.0%	0.0%	12.8%	87.2%	0.0%	0.0%	0.0%
Living Room	**42.6%**	38.8%	2.9%	0.0%	44.0%	6.6%	4.0%	3.7%
Office	**3.1%**	79.0%	0.0%	0.0%	21.0%	0.0%	0.0%	0.0%
Other	**10.7%**	31.6%	0.0%	0.0%	27.2%	0.0%	41.2%	0.0%

[ASK B7a = 2]

B7b. How does the previous cooling system function today in the **< F0x >** with the ductless mini-split heat pump? (Select only one response)

1. The previous system functions as a back-up or supplemental system to the ductless mini-split heat pump
2. The previous system and the new ductless mini-split heat pump run together at all times.
3. The previous system still runs as the primary system. The ductless mini-split heat pump is used as a supplemental system only when needed.
4. The previous system still runs as the primary system. The ductless mini-split heat pump is only used for heating.
97. (Other)
98. (Don't Know)
99. (Refused)

Table A.54: Answers to Question B7b

B7b (14 Resp)	TOTAL	1. Previous back-up to DMSHP	2. Both systems run together	3. Previous primary, DMSHP supplements	97. Other
All	**100%**	**13.6%**	**5.2%**	**25.8%**	**55.4%**

B9a. If you had not installed a ductless mini-split heat pump in the **< F0x >**, would you have still replaced your existing cooling system? (Select only one response)

1. Yes
2. No
98. (Don't Know)
99. (Refused)

Table A.55: Answers to Question B9a

B9a (126 Resp)	TOTAL	1. Yes	2. No	98. Don't Know
All	**100%**	**27.3%**	**53.5%**	**19.2%**
Cold Climate	**18.7%**	39.1%	45.1%	15.8%
Not Cold Climate	**77.1%**	24.3%	56.8%	18.9%
Mixed	**4.2%**	30.8%	30.9%	38.3%
Single	**75.1%**	27.7%	56.3%	16.0%
Multiple	**24.9%**	26.3%	45.1%	28.5%
Bedroom	**37.9%**	22.7%	59.5%	17.8%
Kitchen	**6.8%**	18.3%	75.7%	6.0%
Living Room	**38.9%**	30.8%	50.7%	18.5%
Office	**4.1%**	43.1%	0.0%	56.9%
Other	**12.2%**	30.5%	49.7%	19.9%

[ASK IF B9a = 1]

B9b. If you had not installed a ductless mini-split heat pump in the **< F0x >**, what type of cooling system would you have most likely installed? (Select only one response)

1. Central air conditioning
2. Room or window air conditioning
3. Ductless air conditioner with no heating
4. Central heat pump
5. Other ductless mini-split heat pump system
6. The installed ductless mini-split heat pump was all that was considered
7. Would have only installed a new heating system
97. (Other, please specify)
99. (Refused)

Table A.56: Answers to Question B9b

B9b (38 Resp)	TOTAL	1. Central AC	2. Room/ Window AC	3. Ductless AC with no heating	4. DMSHP was all considered	97. Other
All	**100%**	**32.2%**	**32.2%**	**15.9%**	**11.1%**	**8.6%**
Cold Climate	**34.1%**	30.8%	44.3%	11.5%	5.3%	8.1%
Not Cold Climate	**61.5%**	35.3%	24.5%	15.6%	15.1%	9.5%
Mixed	**4.4%**	0.0%	46.2%	53.8%	0.0%	0.0%
Single	**71.4%**	37.5%	31.9%	14.7%	6.8%	9.2%
Multiple	**28.6%**	19.0%	33.1%	19.0%	21.8%	7.0%
Bedroom	**34.5%**	38.7%	37.0%	11.4%	12.9%	0.0%
Kitchen	**6.8%**	25.1%	40.5%	34.4%	0.0%	0.0%
Living Room	**38.5%**	39.6%	30.7%	9.9%	12.6%	7.2%
Office	**5.8%**	0.0%	0.0%	65.3%	0.0%	34.7%
Other	**14.4%**	13.4%	33.8%	14.0%	12.4%	26.4%

[ASK ENTIRE SECTION (B10 – B14b) IF B1 = 1, 2 or 3]

(Space Previously Heated or Cooled)

[ASK IF ((B1 = 1, 3 and B3a = 2) or (B1 = 2, 3 and B7a = 2))]

B10a. Other than the ductless mini-split heat pump and the existing heating or cooling system, does another system provide heating or cooling to the **< F0x >**? (Select only one response)

1. Yes
2. No
99. (Refused)

[Answers to question B10a are combined with the answers to question B10b below]

[ASK IF ((B1 = 1 and B3a = 1, 98) or (B1 = 2 and B7a = 1, 98) or (B1 = 3 and B3a = 1, 98 and B7a = 1, 98))]

B10b. Other than the ductless mini-split heat pump, does any other system provide heating or cooling to the **< F0x >**? (Select only one response)

1. Yes
2. No
99. (Refused)

Table A.57: Answers to Questions B10a & B10b Combined

B10a & B10b (388 Resp)	TOTAL	1. Yes	2. No	99. Refused
All	**100%**	**24.8%**	**74.7%**	**0.5%**
Cold Climate	**22.1%**	28.8%	71.2%	0.0%
Not Cold Climate	**74.3%**	23.2%	76.2%	0.7%
Mixed	**3.6%**	34.6%	65.4%	0.0%
Single	**68.7%**	23.7%	75.6%	0.8%
Multiple	**31.3%**	27.3%	72.7%	0.0%
Bedroom	**34.8%**	19.2%	79.3%	1.5%
Kitchen	**11.0%**	15.9%	84.1%	0.0%
Living Room	**40.4%**	34.5%	65.5%	0.0%
Office	**3.6%**	3.6%	96.4%	0.0%
Other	**10.2%**	22.8%	77.2%	0.0%

[ASK IF B10a = 1 or B10b = 1]

B11. Does this "other" system you indicated provide heating or cooling to the **< F0x >**? (Select only one response)

1. Only heating
2. Only cooling
3. Both heating and cooling

Table A.58: Answers to Question B11

B11 (98 Resp)	TOTAL	1. Only Heating	2. Only Cooling	3. Both Heating and Cooling
All	**100%**	**88.4%**	**6.7%**	**4.9%**
Cold Climate	**25.6%**	90.1%	3.5%	6.4%
Not Cold Climate	**69.3%**	86.9%	8.4%	4.7%
Mixed	**5.0%**	100.0%	0.0%	0.0%
Single	**65.6%**	85.1%	8.3%	6.6%
Multiple	**34.4%**	94.7%	3.6%	1.7%
Bedroom	**27.0%**	75.6%	9.2%	15.1%
Kitchen	**7.0%**	91.3%	8.7%	0.0%
Living Room	**56.1%**	93.5%	6.5%	0.0%
Office	**0.5%**	100.0%	0.0%	0.0%
Other	**9.4%**	93.5%	6.5%	0.0%

[ASK IF B11 = 1 or 3]

B12a. What is the other heating system that provides heating to the **< F0x >**? (Choose all that apply)

1. Electric baseboard [Electric]
2. Electric furnace [Electric]
3. Electric space heater [Electric]

4. Oil furnace [Oil]
5. Oil boiler [Oil]
6. Natural Gas furnace [Natural Gas]
7. Natural Gas boiler [Natural Gas
8. Propane/LPG furnace [Propane]
9. Propane/LPG boiler [Propane]
10. Woodstove, pellet stove, or fireplace [Other]
11. Other heat pump or ductless mini-split heat pump [Other]
97. (Other, please specify) [Other]
99. (Refused)

Table A.59: Answers to Question B12a

B12a (94 Resp)	TOTAL	1,2,3. Electric	4,5. Oil	6,7. Natural Gas	10,11,97. Other	99. Refused
All	**100%**	**12.4%**	**24.5%**	**25.8%**	**35.3%**	**2.1%**
Cold Climate	**42.4%**	15.1%	30.6%	13.4%	40.9%	0.0%
Not Cold Climate	**56.7%**	10.5%	20.3%	35.4%	30.1%	3.7%
Mixed	**0.9%**	0.0%	0.0%	0.0%	100.0%	0.0%
Single	**76.3%**	13.7%	21.8%	23.4%	38.3%	2.8%
Multiple	**23.7%**	8.3%	32.9%	33.3%	25.5%	0.0%
Bedroom	**27.1%**	14.7%	26.6%	31.0%	27.6%	0.0%
Kitchen	**4.9%**	5.2%	39.3%	10.2%	45.3%	0.0%
Living Room	**57.3%**	6.7%	26.3%	20.9%	42.4%	3.7%
Office	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%
Other	**10.7%**	40.0%	2.3%	45.7%	11.9%	0.0%

[ASK IF B11 = 2 or 3]
B12b. What is the other cooling system that provides cooling to the **< F0x >**? (Choose all that apply)

1. Central air conditioning
2. Room or window air conditioning
3. Ductless air conditioner with no heating
4. Central heat pump
5. Other ductless mini-split heat pump system
97. (Other, please specify)
99. (Refused)

Table A.60: Answers to Question B12b

B12b (9 Resp)	TOTAL	1. Central AC	2. Room/ Window AC	4. Central Heat Pump	5. Other DMSHP
All	**100%**	**26.4%**	**25.8%**	**23.9%**	**23.9%**

[ASK IF F1 = 2 or 3]
B13a. How much of the heating for the **< F0x >** is provided by the ductless mini-split heat pump system, all, most, very little or none? (Select only one response)

1. All
2. Most
3. Very Little
4. None

Table A.61: Answers to Question B13a

B13a (294 Resp)	TOTAL	1. All	2. Most	3. Very Little	4. None
All	**100%**	**20.2%**	**32.8%**	**43.6%**	**3.4%**
Cold Climate	**25.8%**	32.7%	37.8%	25.8%	3.8%
Not Cold Climate	**70.8%**	15.5%	30.7%	50.8%	3.1%
Mixed	**3.4%**	22.0%	38.8%	30.4%	8.8%
Single	**69.6%**	19.8%	29.4%	47.5%	3.4%
Multiple	**30.4%**	21.1%	40.5%	34.8%	3.6%
Bedroom	**33.3%**	21.7%	29.6%	41.6%	7.1%
Kitchen	**9.8%**	19.5%	19.9%	57.7%	2.8%
Living Room	**40.7%**	12.6%	35.2%	50.3%	2.0%
Office	**4.8%**	13.3%	57.8%	28.8%	0.0%
Other	**11.4%**	46.1%	33.9%	20.0%	0.0%

[ASK IF F1 = 1 or 3]

B13b. How much of the cooling for the **< F0x >** is provided by the ductless mini-split heat pump system, all, most, very little or none? (Select only one response)

1. All
2. Most
3. Very Little
4. None

Table A.62: Answers to Question B13b

B13b (381 Resp)	TOTAL	1. All	2. Most	3. Very Little	4. None
All	**100%**	**83.6%**	**11.8%**	**3.0%**	**1.7%**
Cold Climate	**22.9%**	85.2%	13.6%	1.2%	0.0%
Not Cold Climate	**73.6%**	82.9%	11.3%	3.7%	2.1%
Mixed	**3.5%**	87.6%	9.3%	0.0%	3.1%
Single	**69.9%**	81.1%	13.4%	3.6%	1.9%
Multiple	**30.1%**	89.3%	7.9%	1.5%	1.3%
Bedroom	**34.8%**	89.2%	5.0%	1.8%	4.0%
Kitchen	**10.7%**	69.4%	28.1%	2.6%	0.0%
Living Room	**39.8%**	83.0%	12.9%	3.4%	0.7%
Office	**3.5%**	93.8%	6.2%	0.0%	0.0%
Other	**11.1%**	78.3%	14.9%	6.8%	0.0%

[ASK IF B3a = 2, B7a = 2 or B10b = 1]

B14a. How do you control which heating and cooling systems run more or less often in your home? (Select only one response)

1. I manually adjust the thermostats
2. I use temperature set points to adjust which system comes on first
97. (Other)
98. (Don't Know)
99. (Refused)

Table A.63: Answers to Question B14a

B14a (331 Resp)	TOTAL	1. Manually adjust	2. Temp. Setpoints	97. Other	98. Don't Know	99. Refused
All	**100%**	**71.0%**	**12.1%**	**10.3%**	**3.7%**	**2.9%**
Cold Climate	**21.1%**	70.6%	12.3%	9.2%	5.7%	2.3%
Not Cold Climate	**75.3%**	71.3%	11.8%	10.2%	3.3%	3.2%
Mixed	**3.6%**	66.2%	16.9%	16.9%	0.0%	0.0%
Single	**68.3%**	73.6%	10.3%	9.8%	2.5%	3.8%
Multiple	**31.7%**	65.5%	16.0%	11.2%	6.2%	1.1%
Bedroom	**35.0%**	64.5%	15.9%	11.9%	3.5%	4.2%
Kitchen	**10.9%**	74.2%	8.6%	8.6%	6.9%	1.6%
Living Room	**40.4%**	74.2%	12.2%	6.7%	3.9%	3.1%
Office	**3.6%**	86.8%	4.4%	8.9%	0.0%	0.0%
Other	**10.2%**	72.0%	5.2%	21.0%	1.8%	0.0%

[ASK IF B14a = 1 or 2]

B14b. Please explain how you **<fill B14a response>** to control which heating and cooling systems run more or less often in your home.

[Open ended, Text – Categories developed after responses were recieved]

1. Adjust DMSHP manually, as needed
2. Adjust systems based on outdoor temperature
3. Use setpoints, DMSHP dominant system, raise and lower existing system as needed
4. Both systems are set to the same temperature
5. DMSHP used until very cold temperatures, when existing system is turned on
6. DMSHP supplements existing system (i.e. to make specific rooms more comfortable)
7. DMSHP used for heating only during shoulder seasons and for cooling
8. Use DMSHP for cooling only
9. Set thermostat
10. Other

[Due to the number of response categories, responses are split over two charts]

Table A.64: Answers to Question B14b [A]

B14b (308 Resp)	TOTAL	1. Adjust DMSHP Manually	2. Adjust based on outdoor temperature	3. Use setpoints, DMSHP dominant	4. Both systems set at same temperature	5. DMSHP used until very cold
All	**100%**	**28.8%**	**4.6%**	**7.0%**	**1.5%**	**8.4%**
Cold Climate	**21.1%**	30.0%	2.1%	8.4%	1.1%	10.7%
Not Cold Climate	**75.4%**	28.5%	5.3%	6.4%	1.6%	8.0%
Mixed	**3.6%**	27.2%	3.9%	11.8%	0.0%	3.9%
Single	**68.9%**	29.0%	5.1%	4.7%	2.1%	8.9%
Multiple	**31.1%**	28.2%	3.5%	12.0%	0.0%	7.3%
Bedroom	**33.7%**	31.6%	4.8%	7.7%	0.0%	10.0%
Kitchen	**10.9%**	13.7%	1.7%	12.5%	0.0%	7.1%
Living Room	**42.0%**	28.1%	4.2%	6.3%	3.5%	6.4%
Office	**3.9%**	13.2%	0.0%	4.8%	0.0%	21.6%
Other	**9.5%**	45.6%	10.8%	2.0%	0.0%	2.7%

Table A.65: Answers to Question B14b [B]

B14b (308 Resp)	TOTAL	6. DMSHP supplements existing system	7. DMSHP used in shoulder seasons	8. Use DMSHP for cooling only	9. Set thermostat	10. Other
All	**100%**	**13.0%**	**5.4%**	**6.0%**	**9.5%**	**15.8%**
Cold Climate	**21.1%**	16.0%	3.5%	8.1%	5.9%	14.1%
Not Cold Climate	**75.4%**	11.9%	5.9%	5.2%	10.9%	16.3%
Mixed	**3.6%**	20.3%	4.6%	11.8%	0.0%	16.4%
Single	**68.9%**	12.8%	7.0%	5.2%	10.0%	15.0%
Multiple	**31.1%**	13.5%	1.7%	7.8%	8.3%	17.6%
Bedroom	**33.7%**	17.4%	3.6%	6.4%	6.1%	12.5%
Kitchen	**10.9%**	21.1%	9.3%	7.0%	1.7%	25.9%
Living Room	**42.0%**	9.5%	4.6%	7.4%	13.2%	16.8%
Office	**3.9%**	3.6%	15.6%	0.0%	19.7%	8.4%
Other	**9.5%**	7.8%	6.4%	0.0%	9.6%	15.2%

Selected Verbatim Responses to Question B14b:

- "We turn them on and off manually." [1]
- "Based on the outside temperature I decide which system will function to keep us the most comfortable." [2]
- "I set the furnace to come on if the temp in the house drops below 64." [3]

- "Put both on same temp." [4]
- "When the outside temp drops below 20 we switch to oil heat; above that, we use the heat pumps." [5]
- "I turn it up when we are going to use, and down when we are in another part of the house." [6]
- "If it's less than 40 degrees outside we use the existing oil. If it's 40-60 degrees we use the heat pump. If it's above 78, we use the A/C." [7]
- "Programmable thermostat for oil heat. I manually turn on the ductless units for A/C." [8]
- "I set thermostat program according to our schedule." [9]

[ASK ENTIRE SECTION (B15– B21b) ONLY IF B1 = 4 or 5]

(Space Previously Neither Heated or Cooled)

B15. If you had not installed a ductless mini-split heat pump in the **< F0x >**, would you have installed a different type of heating or cooling system in the **< F0x >**? (Select only one response)

1. Yes. A heating system only
2. Yes. A cooling system only
3. Yes. A heating and cooling system
4. No
99. (Refused)

Table A.66: Answers to Question B15

B15 (39 Resp)	TOTAL	1. Yes. Heating only	2. Yes. Cooling only	3. Yes. Heating and Cooling	4. No.
All	**100%**	**9.0%**	**16.7%**	**43.9%**	**30.4%**
Cold Climate	**33.1%**	14.3%	7.8%	40.9%	37.0%
Not Cold Climate	**65.5%**	6.5%	21.6%	46.3%	25.6%
Mixed	**1.4%**	0.0%	0.0%	0.0%	100.0%
Single	**79.1%**	10.1%	18.4%	52.7%	18.8%
Multiple	**20.9%**	4.7%	10.4%	10.4%	74.6%
Bedroom	**20.6%**	25.2%	10.6%	40.6%	23.6%
Kitchen	**8.2%**	0.0%	0.0%	0.0%	100.0%
Living Room	**6.6%**	0.0%	0.0%	67.6%	32.4%
Office	**1.9%**	0.0%	0.0%	100.0%	0.0%
Other	**62.7%**	6.0%	23.2%	46.5%	24.3%

[ASK IF B15 = 1 or 3]

B16a. If you had not installed a ductless mini-split heat pump in the **< F0x >**, what type of heating system would you have most likely installed? (Select only one response)

1. Electric baseboard [Electric]
2. Electric furnace [Electric]
3. Electric space heater [Electric]
4. Oil furnace [Oil]
5. Oil boiler [Oil]

6. Natural Gas furnace [Natural Gas]
7. Natural Gas boiler [Natural Gas]
8. Propane/LPG furnace [Propane]
9. Propane/LPG boiler [Propane]
10. Woodstove, pellet stove, or fireplace [Other]
11. Other heat pump or ductless mini-split heat pump [Other]
12. The installed ductless mini-split heat pump was all that was considered
13. Would have only installed a new cooling system
97. (Other, please specify) [Other]
99. (Refused)

Table A.67: Answers to Question B16a

B16a (20 Resp)	TOTAL	1,2,3. Electric	4,5. Oil	6,7. Natural Gas	10,11,97. Other	12. Only Considered DMSHP
All	100%	19.3%	15.0%	11.9%	29.7%	24.1%

[ASK IF B15 = 2 or 3]

B16b. If you had not installed a ductless mini-split heat pump in the **< F0x >**, what type of cooling system would you have most likely installed? (Select only one response)

1. Central air conditioning
2. Room or window air conditioning
3. Ductless air conditioner with no heating
4. Central heat pump
5. Other ductless mini-split heat pump system
6. The installed ductless mini-split heat pump was all that was considered
7. Would have only installed a new heating system
97. (Other, please specify)
99. (Refused)

Table A.68: Answers to Question B16b

B16b (19 Resp)	TOTAL	1. Central AC	2. Room/ Window AC	3. Ductless AC, no heating	4. Central Heat Pump	5. Other DMSHP	6. Only Installed DMSHP	7. Only new Heating System	97. Other
All	100%	2.4%	44.6%	11.1%	2.4%	4.7%	14.1%	4.7%	16.0%

B17. Other than the ductless mini-split heat pump, does any other system provide heating or cooling to the **< F0x >**? (Select only one response)

1. Yes
2. No
99. (Refused)

Table A.69: Answers to Question B17

B17 (39 Resp)	TOTAL	1. Yes	2. No
All	**100%**	**13.1%**	**86.9%**
Cold Climate	**33.1%**	12.3%	87.7%
Not Cold Climate	**65.5%**	13.8%	86.2%
Mixed	**1.4%**	0.0%	100.0%
Single	**79.1%**	2.4%	97.6%
Multiple	**20.9%**	53.8%	46.2%
Bedroom	**20.6%**	31.7%	68.3%
Kitchen	**8.2%**	26.7%	73.3%
Living Room	**6.6%**	19.3%	80.7%
Office	**1.9%**	0.0%	100.0%
Other	**62.7%**	5.0%	95.0%

[ASK IF B17 = 1]

B18. Does this "other" system you indicated provide heating or cooling to the **< F0x >**? (Select only one response)

1. Only heating
2. Only cooling
3. Both heating and cooling

Table A.70: Answers to Question B18

B18 (7 Resp)	TOTAL	1. Only Heating
All	**100%**	**100%**

[ASK IF B18 = 1 or 3]

B19a. What is the other heating system that provides heating to the **< F0x >**? (Choose all that apply)

1. Electric baseboard [Electric]
2. Electric furnace [Electric]
3. Electric space heater [Electric]
4. Oil furnace [Oil]
5. Oil boiler [Oil]
6. Natural Gas furnace [Natural Gas]
7. Natural Gas boiler [Natural Gas]
8. Propane/LPG furnace [Propane]
9. Propane/LPG boiler [Propane]
10. Woodstove, pellet stove, or fireplace [Other]
11. Other heat pump or ductless mini-split heat pump [Other]

97. (Other, please specify)
99. (Refused)

Table A.71: Answers to Question B19a

B19a (7 Resp)	TOTAL	1,2,3. Electric System	4,5. Oil System	6,7. Natural Gas System	10,11,97. Other
All	**100%**	**27.3%**	**12.8%**	**43.8%**	**16.1%**

[ASK IF B18 = 2 or 3]

B19b. What is the other cooling system that provides cooling to the **< F0x >**? (Choose all that apply)

1. Central air conditioning
2. Room or window air conditioning
3. Ductless air conditioner with no heating
4. Central heat pump
5. Other ductless mini-split heat pump system
97. (Other, please specify)
99. (Refused)

Table A.72: Answers to Question B19b

B19b (0 Resp)	TOTAL	All Responses
All	**0%**	**0%**

[ASK IF F1 = 2 or 3]

B20a. How much of the heating for the **< F0x >** is provided by the ductless mini-split heat pump system, all, most, very little or none? (Select only one response)

1. All
2. Most
3. Very Little
4. None

Table A.73: Answers to Question B20a

B20a (36 Resp)	TOTAL	1. All	2. Most	3. Very Little	4. None
All	**100%**	**65.5%**	**30.9%**	**3.2%**	**0.5%**
Cold Climate	**27.0%**	82.7%	15.6%	0.0%	1.7%
Not Cold Climate	**69.8%**	60.2%	35.3%	4.6%	0.0%
Mixed	**3.3%**	36.2%	63.8%	0.0%	0.0%
Single	**68.8%**	62.7%	37.3%	0.0%	0.0%
Multiple	**31.2%**	71.7%	16.7%	10.2%	1.5%
Bedroom	**23.4%**	51.7%	34.7%	13.6%	0.0%
Kitchen	**4.5%**	70.8%	18.9%	0.0%	10.3%
Living Room	**7.8%**	60.1%	39.9%	0.0%	0.0%
Office	**0.8%**	100.0%	0.0%	0.0%	0.0%
Other	**63.4%**	70.4%	29.6%	0.0%	0.0%

[ASK IF F1 = 1 or 3]

B20b. How much of the cooling for the **< F0x >** is provided by the ductless mini-split heat pump system, all, most, very little or none? (Select only one response)

1. All
2. Most
3. Very Little
4. None

Table A.74: Answers to Question B20b

B20b (38 Resp)	TOTAL	1. All	2. Most	3. Very Little
All	**100%**	**85.8%**	**13.5%**	**0.7%**
Cold Climate	**22.9%**	87.3%	9.5%	3.3%
Not Cold Climate	**73.9%**	84.7%	15.3%	0.0%
Mixed	**3.2%**	100.0%	0.0%	0.0%
Single	**68.2%**	96.7%	2.2%	1.1%
Multiple	**31.8%**	62.4%	37.6%	0.0%
Bedroom	**21.9%**	93.9%	6.1%	0.0%
Kitchen	**7.9%**	51.3%	48.7%	0.0%
Living Room	**6.6%**	100.0%	0.0%	0.0%
Office	**0.7%**	100.0%	0.0%	0.0%
Other	**62.8%**	85.7%	13.1%	1.2%

[ASK IF B17 = 1]

B21a. How do you prioritize the heating and cooling between the different systems in your home? (Select only one response)

1. Manually adjust the thermostats
2. Use set points to adjust which system comes on first
97. (Other)
98. (Don't Know)
99. (Refused)

Table A. 75: Answers to Question B21a

B21a (7 Resp)	TOTAL	1. Manually Adjust	97. Other	98. Don't Know
All	**100%**	**42.2%**	**32.2%**	**25.5%**

[ASK IF B21a = 1 or 2]

B21b. Please explain how you **<fill B21a response>** to prioritize the heating and cooling between the different systems in your home.

[Open ended, Text – Categories developed after responses were recieved]

11. Adjust DMSHP manually, as needed
12. Adjust systems based on outdoor temperature
13. Use setpoints, DMSHP dominant system, raise and lower existing system as needed

14. Both systems are set to the same temperature
15. DMSHP used until very cold temperatures, when existing system is turned on
16. DMSHP supplements existing system (i.e. to make specific rooms more comfortable)
17. DMSHP used for heating only during shoulder seasons and for cooling
18. Use DMSHP for cooling only
19. Set thermostat
20. Other

Table A.76: Answers to Question B21b

B21b (4 Resp)	TOTAL	1. Adjust DMSHP manually, as needed
All	**100%**	**100%**

Survey Questions - Conclusion:

Q1. Before we finish do you have any general comments about the Mass Save Cool Smart Program, the rebate you received for your ductless mini-split heat pump, or the performance of your ductless mini-split heat pump that you would like to share?

[Open ended, text – Categories developed after responses were recieved]

1. Happy with the process and the unit
2. Mass Save rebate encouraged our decision
3. DMSHP didn't perform as well as expected (e.g. doesn't supply heat at cold temperatures, is too loud, etc.)
4. Recommended technical/system changes (e.g., DMSHP needs different style drips, should be controlled by remote control, more compact/flatter, etc.)
5. Reported issues with program (e.g. more official envelopes, more refunds for eco-friendly home usage, installers bid for set prices similar to insulation, etc.)
6. Issues with rebate amount, thought they would receive a higher rebate
7. Reported issues with contractor
8. Other

Table A.77: Answers to Question Q1

Q1 (244 Resp)	TOTAL	1. Happy	2. Mass Save rebate good	3. DMSHP didn't perform well	4. Tech/ system changes	5. Program issues	6. Issues with rebate amount	7. Issues with contr.	8. Other
All	**100%**	**61.5%**	**6.6%**	**8.2%**	**3.1%**	**7.6%**	**1.7%**	**3.7%**	**7.5%**
Cold Climate	**23.3%**	60.9%	4.7%	13.6%	2.9%	6.2%	2.5%	2.3%	6.8%
Not Cold Climate	**73.3%**	61.1%	7.3%	6.5%	3.1%	8.4%	1.5%	4.2%	7.9%
Mixed	**3.4%**	74.6%	4.0%	9.5%	4.0%	0.0%	0.0%	4.0%	4.0%
Single	**69.6%**	61.5%	7.2%	5.2%	3.0%	9.4%	1.7%	4.8%	7.3%
Multiple	**30.4%**	61.7%	5.3%	15.3%	3.1%	3.5%	1.7%	1.3%	8.1%
Bedroom	**33.1%**	51.9%	4.8%	10.0%	4.2%	11.0%	2.6%	6.6%	8.7%
Kitchen	**9.4%**	69.1%	2.2%	12.0%	0.0%	6.2%	0.0%	2.4%	8.1%
Living Room	**34.7%**	69.4%	8.1%	5.3%	4.8%	5.5%	0.9%	0.7%	5.2%
Office	**4.5%**	49.1%	15.3%	6.0%	0.0%	0.0%	6.1%	23.5%	0.0%
Other	**18.3%**	63.1%	7.1%	9.2%	0.0%	8.0%	1.3%	0.0%	11.3%

Sample Verbatim Responses to Question Q1:

- "Great program. I have told my family and friends about it." [1]
- "We love the rebates . . .a major factor in why we bought this product." [2]
- "I was disappointed in the poor performance in cold weather and the high cost of electricity required this winter. Though I suspect it is still cheaper than oil, I had hoped for lower costs tha[n] I have been paying." [3]
- "For the most part, I believe it was a good investment. It would be nice if it were more streamlined and not such a large item." [4]
- "It was difficult to find the website and know which units qualify for what rebate." [5]
- "According to the installer, rules for the rebate were changed between the time I contracted and the time the work was done. I am still displeased that we received only 50% of what was promised." [5]
- "The initial Mass Save contractors, who performed our audit and some of insulation work, were shoddy and unreliable. . . .They were not doing work to a standard that the program should connect itself to." [7]

Q2. Would you be willing to participate in a metering study beginning this spring where we would meter the usage of your ductless mini-split heat pump in order to fully understand when it is being used? Participants in the metering study will be offered $100 for their participation.

1. Yes
2. No

Q3. With your successful completion of this survey, we would like to offer you a $10 Amazon gift card as a thank you for your participation. Would you like to receive this incentive?

1. Yes.
2. No.

[ASK IF Q3 = 1]

Q4. Can you please verify your name and the address that this gift card should be sent?

1. [Text fields for Name and Address]

That's all the questions we have prepared for you today. If you have any questions about this survey or how your responses to this survey will be used please contact Danielle Vitoff at Navigant Consulting (303) 728-2460.

Thank you for your participation in this survey.