

**VERMONT SINGLE-FAMILY RETROFIT MARKET
MARKET RESEARCH**

Final Report

Prepared for:

High Meadows Fund, Inc. (Market Research)

In Association With

Vermont Public Service Department (Process Evaluation)

Prepared by:

GDS Associates, Inc.

With lead input from:

Research Into Action, Inc.

P.O. Box 12312

Portland, Oregon 97212

503 / 287-9136

February 15, 2013

ACKNOWLEDGEMENTS

The Evaluation Team Gaye Symington and Cheryl Eaton, of the High Meadows Fund and Wild Genius Group, respectively; Brian Cotterill and Kelly Launder, of the Vermont Public service Department; Emily Levin and Nancy Gamble, of the Vermont Energy Investment Corporation and Efficiency Vermont; Scott Harrington and Karen Horne, of Vermont Gas Systems, Inc.; and John Lincoln, of the Burlington Electric Department.

In addition, the Evaluation Team would like to thank the Vermont Home Performance with ENERGY STAR[®] and Home Retrofit program; the participants and stalled participants that answered our questions; and the hundreds of Vermonters that spoke with us about their experience and perspectives on energy efficiency in their homes.

This work could not be done without their cooperation.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	I
TABLE OF CONTENTS	II
LIST OF FIGURES	IV
LIST OF TABLES	V
EXECUTIVE SUMMARY	1
Market Research Objectives	1
Findings.....	2
SECTION 1: PROJECT INTRODUCTION AND METHODS	1-1
1.1 Market Research Objectives	1-1
1.2 Market Research Survey Methodology	1-2
1.2.1 Market Survey Development	1-2
1.2.2 Market (Nonparticipant) Sampling Design.....	1-2
1.2.3 Participant and Stalled Participant Sampling Design	1-4
1.2.4 Analysis Methods.....	1-4
SECTION 2: MARKET RESEARCH RESULTS.....	2-1
2.1 Recent Home Energy Improvement Projects.....	2-1
2.2 Interest in Additional Energy-efficient Home Upgrades	2-4
2.3 Barriers to Investing in Home Energy Efficiency Improvements	2-7
2.4 Awareness and Program Services.....	2-9
2.5 Participant and Nonparticipant Differences.....	2-10
2.5.1 Group Differences in Economic Circumstances.....	2-10
2.5.2 Additional Quantitative Analysis: Predictors of Program Status.....	2-15
2.6 Summary	2-18
SECTION 3: CONCLUSIONS AND RECOMMENDATIONS	3-1
3.1 Background and Research Objectives	3-1
3.2 Market Research Context.....	3-1
3.3 Conclusions and Recommendations	3-1

APPENDIX A: NONPARTICIPANT SURVEY..... 1

APPENDIX B: AKAB THEORY 1

APPENDIX C: LOGISTIC REGRESSION METHOD 1

LIST OF FIGURES

Figure 1-1: Income Levels at 60% of Estimated State Median Income by Household Size*	1-3
Figure 2-1: Home Upgrades in the Last 5 Years by Age of the Home.....	2-2
Figure 2-2: Home Upgrades in the Last 5 Years by How Long Respondents Owned Their Homes	2-2
Figure 2-3: Interest in Adding Insulation by Prior Project Status	2-5
Figure 2-4: Cost as a Barrier in Making Energy-efficient Improvements by Prior Project Status.....	2-7
Figure 2-5: Portion Rating Hypothetical Program Features as “Valuable” (“4” or “5” on a 5-point scale).....	2-9
Figure 2-6: Income by Group	2-11
Figure 2-7: Household Size by Group	2-11
Figure 2-8: Age by Group.....	2-12
Figure 2-9: Age of Home by Group.....	2-13
Figure 2-10: Length of Homeownership by Group	2-14
Figure 2-11: Portion Expressing Concern for Personal Economic Situation	2-14
Figure 2-12: Indicators of Environmental Concern, Responsibility and Intention to Act.....	2-16
Figure 2-13: Indicators of Financial Concern, Responsibility and Intention to Act.....	2-17
Figure 2-14: Predictors of Group Membership When Compared to Participants	2-17
Figure C-1: Environmental & Financial akAB Constructs.....	2

LIST OF TABLES

Table 1-1: Geographic Population Density Sample Strata 1-2

Table 1-2: Number of Survey Completes for Participants and Stalled Participants..... 1-4

Table 2-1: Projects Completed in the Past Five Years (Multiple Responses Allowed, n=614) 2-1

Table 2-2: Percent of Respondents that Received a Rebate by Number of Projects 2-3

Table 2-3: Reasons for Completing Home Energy Projects in Past Five Years (Multiple Responses Allowed, n=444) 2-4

Table 2-4: Reasons for Interest in Completing Home Energy (Multiple Responses Allowed, n=347) 2-6

Table 2-5: Barriers to Desired Energy Improvements (Multiple Responses Allowed, n=347) 2-6

Table 2-6: Specific Cost Barriers (Multiple Responses Allowed, n=292) 2-8

Table D-1: Multinomial Logistic Regression Results 1

EXECUTIVE SUMMARY

This document presents the results of market research conducted as part of a larger Vermont Single-Family Retrofit Evaluation. This evaluation was conducted by GDS Associates, Inc., together with Research Into Action, Inc., West Hill Energy and Computing, Inc., and RKM Research and Communications (the Evaluation Team).

The overall evaluation included:¹

- A process evaluation of the single-family existing home building retrofit programs for Efficiency Vermont (EVT) and Vermont Gas Systems, Inc., (VGS); and
- An impact evaluation of both the thermal (regulated and unregulated fuels) and electric energy savings achieved through these programs;
- Market research focused on understanding the experiences of participants and stalled participants, as well as opportunities to reach deeper into the overall residential market.

This document presents the findings of the market research work.²

MARKET RESEARCH OBJECTIVES

The Vermont legislature established State Building Efficiency goals in 2008. These goals included improving the energy fitness of 25% of Vermont's housing units by 2020. This equals about 80,000 housing units. These goals also included reducing annual fuel needs by 25% and reducing total residential fossil fuel consumption by 7.5% by 2020, and increasing weatherization services to low income households.

Increasing the thermal efficiency of 80,000 units of Vermont housing stock will require reaching out to more than a quarter of current Vermont homeowners or renters. Single-family comprehensive programs typically reach less than 5% of the eligible market, so it is unlikely that the existing program structures alone will reach this goal without a substantial expansion in marketing, awareness, and customer interest. To support this objective and improve the likelihood that Vermont will meet its residential retrofit targets, this market research study was conducted to explore the barriers and potential motivations behind the decision-making of single-family homeowners. In order to

¹ Vermont Public Service Department funded the Process and Impact Evaluation for Efficiency Vermont's Home Performance with Energy Star, Vermont Gas Systems provided funding for its portion of the Impact and Process evaluation. High Meadows funded the market research portion.

² See http://publicservice.vermont.gov/topics/energy_efficiency for the process evaluation findings which were leveraged to provide additional context for the market research.

maximize the benefit of the market survey, this work was conducted concurrently with EVT's Home Performance and VGS's Home Retrofit program evaluations.

The market research included a survey of 615 Vermonters not known to have participated in either EVT's Home Performance program or in the VGS Home Retrofit program. The survey sought to collect information on recent home energy upgrades; barriers to, and motivations for, pursuing energy-efficiency home improvements; awareness of the existing retrofit programs; and interest in potential program services. These surveys also explored homeowners' decision stages for adopting energy efficient behavior.³ To facilitate comparative analysis, several sections of the nonparticipant/market survey were also asked of participants and stalled participants surveyed as part of the process evaluation work on EVT and VGS programs.⁴

FINDINGS

Conclusion 1: Vermont households are interested in and are currently taking action to reduce their energy use—for both economic and environmental reasons.

The single largest group in the market research was those that reported having taken some action already and remained interested in doing more. While improving the comfort of one's home was a reason for completing a project, this factor was dwarfed by a desire to lower energy costs. Households that reported having taken action were more likely to want to do additional projects than those that had not.

Vermonters are being exposed to many messages about the value of energy efficiency, and we do not mean to imply that program administrators should ignore nonparticipating households. Rather, we expect that the first step is unlikely to be a comprehensive whole house upgrade. As homeowners sign up for audits, purchase efficient appliances, receive home energy kits or apply for lighting upgrades, they should be flagged and contacted about how to pursue more extensive whole-house upgrades.

Recommendation 1: Be strategic with outreach. Focus on encouraging those that have taken action to take additional action. Target households that have installed insulation, windows or heating systems in order to convince them to take the next step.

³ Homeowner decision stages are based on Awareness-Knowledge-Attitude-Behavior (akAB) model of change. A description of the model can be found in Appendix B.

⁴ Participants received an audit and completed a qualified project through either EVT's Home Performance with Energy Star program or VGS Home Retrofit program. Stalled participants were known to either program because they had received an audit, but had failed to complete a program-qualified retrofit project and apply for incentives.

Conclusion 2: Vermonters want to lower their energy costs but report the costs of upgrade projects are too high.

Concerns about project costs can be related to financial constraints. These concerns can also reflect skepticism in the overall value of the project, given the cost. Confidence in energy savings estimates was most frequently rated as valuable, ahead of access to rebates and lower project costs, indicating the need to vigorously avoid overpromising by contractors and equipment vendors.

Recommendation 2: Investigate strategies for increasing overall confidence in project quality and expected savings. Confirm that program-supported energy savings estimates are reliable and promote specific high leverage activities that should be done in tandem with other home upgrades—for example, insulating and sealing sill plates when windows are replaced and sealing exterior penetration points during insulation projects.

Conclusion 3: Overall and upfront costs associated with energy efficiency projects continue to present the most substantial barriers to completing comprehensive home upgrades.

Financing can be an attractive strategy for households that want to defer payments, but will not be attractive to everyone. Breaking projects into manageable pieces could provide motivated households with a strategy for getting everything done without straining tight household budgets. The comprehensive, house-as-a-system approach may be ideal; but if energy upgrades are pitched as all-or-nothing projects, many households will drop out without substantial incentives or attractive financing options. Shifting to a step-by-step strategy could create opportunities and challenges for both homeowners and market actors:

- Creating an action plan for homeowners that fits within tight household budgets and obtains homeowner commitment to work through each step should enable homeowners to make comprehensive upgrades in a step-by-step process.
- Communicating a step-by-step approach will create marketing challenges in that sponsors must avoid creating disillusionment while convincing households that have already taken action that they are “not done yet.”
- Developing this commitment to long-term services could provide contractors with an additional incentive to do high quality work and avoid overpromising as contractors encourage people to do the best first thing, and then strategize with them to do the next thing to realize additional savings at appropriate times in the future.
- This approach could help contractors minimize the costs of new customer acquisition and instead approach their customers with the expectation that they are likely to have additional projects in the future.

Recommendation 3: Maximizing energy efficiency usually means touching three to five household systems. Create a framework for breaking projects down without creating lost opportunities. Encourage program administrators to set up and host portals that allow households to develop a step-by-step plan for customer's homes. Encourage contractors to develop longer term relationships with customers and prospective customers that allow them to complete a project now and schedule the next step for the following year.

Conclusion 4: Reaching the substantial goals established for residential building efficiency in Vermont will likely require engaging market actors throughout the weatherization industry. Home Performance will continue to provide a high-quality option for a certain portion of the market, but reaching deeper and more broadly into the market will likely require expanding the number of market actors to include insulation, HVAC, general contractors, and even services provided by big box stores (41% of nonparticipants with recent projects reported doing the work themselves). Encouraging a growing pool of contractors and materials suppliers (often those trusted with existing direct professional working relationships with customers) to learn proper energy efficiency measure specification and installation skills will increase the capacity of the supply chain to deliver energy efficiency to all Vermont homeowners.

Recommendation 4: Develop processes for tracking and counting out-of-program projects while encouraging additional action. Given the level of existing action reported in the nonparticipant market surveys, it will be important to maximize the efficiency obtained from non-program projects. Consider community-based engagement strategies that could encourage Vermonters to register their projects and help the State meet its goals. Assuming there continues to be a high level of energy efficiency actions taken in the general population—potentially increased if proponents launch a substantial and radical marketing strategy—key stakeholders in the State should collaborate to devise a process to ensure the resulting projects will be tracked.

Section 1:

PROJECT INTRODUCTION AND METHODS

GDS Associates, Inc., together with Research Into Action, Inc., West Hill Energy and Computing, Inc., and RKM Research and Communications (the Evaluation Team), completed an evaluation of single-family existing home building retrofit programs for Efficiency Vermont (EVT) and Vermont Gas Systems, Inc. (VGS). The evaluation included process evaluation and market research focused on understanding the experiences of participants and stalled participants, as well as opportunities to reach deeper into the overall residential market.

This document presents the findings of the market research work. This work was done in tandem with process evaluation work and, in some cases; some results were combined to provide more in-depth analyses. Full process evaluation findings can be found in a separate Vermont Single-Family Retrofit Market Process Evaluation report.⁵

1.1 MARKET RESEARCH OBJECTIVES

The market research for the Vermont Single-Family Existing Buildings market relied primarily on data gathered from a general population survey of households likely to be eligible to participate in comprehensive upgrade programs in Vermont. The market research analysis also used a subset of the data gathered from process and impact evaluation surveys of participants and stalled participants known to Vermont comprehensive upgrade programs.

The objectives of this market research were to:

- Catalog current Vermont household energy efficiency behaviors;
- Understand barriers to conducting comprehensive upgrades; and
- Investigate opportunities to increase participation in Vermont’s comprehensive programs.

The market research surveys focused on several elements of Vermont homeowner experiences, including:

- Awareness of current Vermont comprehensive programs
- Motivations for conducting energy efficiency projects
- Barriers to participating in current Vermont programs

⁵ See http://publicservice.vermont.gov/topics/energy_efficiency

- Awareness, knowledge and attitudes towards energy efficiency

1.2 MARKET RESEARCH SURVEY METHODOLOGY

1.2.1 Market Survey Development

The Evaluation Team conducted a telephone survey with Vermont homeowners who were not known to have participated in EVT's Home Performance or VGS's Home Retrofit program. The survey included questions about recent home energy projects, interest in making any or additional home energy improvements, barriers that may or may not prevent homeowners from pursuing energy-efficiency retrofit projects, potential interest in program services, and factors that might induce a homeowner to undertake an energy efficiency upgrade. The survey instrument also contained a series of awareness, knowledge, attitude and behavior, demographic, and house-related questions. For a final survey instrument, see Appendix A.

Participant and stalled participant telephone surveys fielded as part of the process evaluation contained the same attitudinal, demographic, and house-related questions as the market survey to facilitate comparison among the groups.

1.2.2 Market (Nonparticipant) Sampling Design

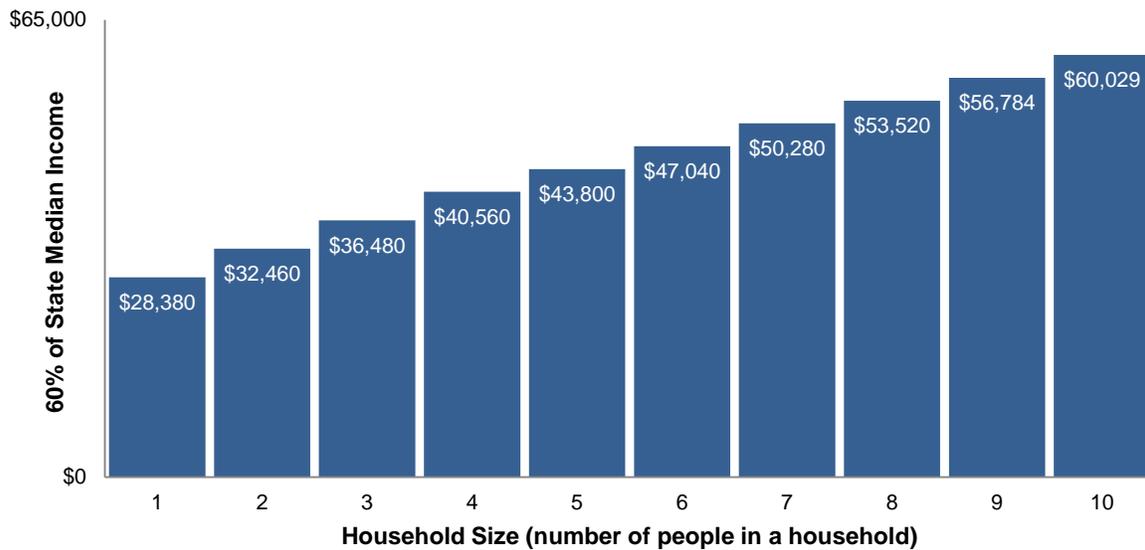
The nonparticipant survey sample had to represent homeowners in Vermont who live in both urban and rural areas of the state and do not qualify for subsidized energy-efficiency services (household incomes must be above 60% of estimated state median income). Given this requirement, the Evaluation Team stratified the sample by population density and screened out those homeowners with household incomes below 60% of estimated state median income by household size (Table 1-1 and Figure 1-1).

Table 1-1: Geographic Population Density Sample Strata

Nonparticipant Sample Strata	Percent of State Population*	Percent of Sample (n=615)
Geographic areas with Mid-high population density: 200+ persons / sq. mile	30%	31%
Geographic areas with Low-mid population density: 75-199 persons / sq. mile	31%	31%
Geographic areas with Low population density: 1-74 persons / sq. mile	39%	38%

* Data obtained from the 2011 U.S. Census for Vermont.

Figure 1-1: Income Levels at 60% of Estimated State Median Income by Household Size*



* Data received from Vermont Office of Economic Opportunity.

The Evaluation Team also included an age quota during the data collection phase to ensure that the nonparticipant sample did not include more than 15% of respondents older than 65 years. This quota was based on the 2011 U.S. Census for Vermont, which indicated that residents who are 65 years old or older comprised 15% of the Vermont population. Only 10% of all surveyed households who passed the income criteria were above the age of 65.

The market survey accessed both cell phone and landline samples. As of June 2010, Vermont had over 20% cell-phone-only households.⁶ The existence of cell only households makes Random Digit Dialing (RDD) surveys less representative of the current Vermont population, making a cell phone sample critical to obtaining a representative sample. The Evaluation Team purchased RDD lists with landline and cell phone contacts for Vermont and ensured that 20% of all called numbers were for cell phones.

The final sample consisted of 615 completed interviews. This sample size provides more than 5% precision at more than 95% confidence.

⁶ National Health Statistics Reports April 2011. Wireless Substitution: State-level Estimates from the National Health Interview Survey, January 2007-June 2010. (<http://www.cdc.gov/nchs/data/nhsr/nhsr039.pdf>. Accessed May 17, 2012)

1.2.3 Participant and Stalled Participant Sampling Design

In the course of conducting process and impact evaluations, the Evaluation Team completed phone surveys with 361 Vermont homeowners with program-qualified projects (participants) and 111 homeowners who initiated a project, but were not known to have completed it (stalled participants). A subset of the market research questions was asked of these groups to enable comparison. Table 1-2 shows the number of survey completes among participants and stalled participants. Both the participant and stalled participant sample provide 10% precision at 90% confidence.

Table 1-2: Number of Survey Completes for Participants and Stalled Participants

Group	Number of Survey Completes
Participants	
Process Survey Respondents	120
Impact Survey Respondents	241
<i>Total Participant Respondents</i>	<i>361</i>
Stalled Participants	
<i>Total Stalled Participant Respondents</i>	<i>111</i>

This study defines participants as homeowners who completed a project through the EVT Home Performance or VGS Home Retrofit program. In addition to the process evaluation surveys, the Evaluation Team conducted phone surveys with 241 participants who were contacted for the impact evaluation. The Evaluation Team surveyed these program participants separately from the participants surveyed as part of the process evaluation.

The Evaluation Team also conducted phone surveys with stalled participants. Stalled participants are Vermont homeowners who were known to have completed an audit, but did not go on to complete a program-qualified project and receive an incentive. The Evaluation Team received a list of 665 total stalled participants from program staff at EVT and VGS. The Evaluation Team attained 40 completes from VGS territory and 71 from EVT territory, for a total of 111 stalled participants.

1.2.4 Analysis Methods

The Evaluation Team used a variety of statistical methods to identify differences between surveyed groups. These included methods to examine discernible differences in the response patterns of group members and to identify predictors of group membership.⁷

⁷ See Appendix C for variables and coefficients used to conduct multinomial logistic regression.

Section 2:

MARKET RESEARCH RESULTS

This section documents findings from the nonparticipant survey fielded in August and September of 2012 and compares patterns of responses to subsets of questions asked of nonparticipants, participants, and stalled participants.

2.1 RECENT HOME ENERGY IMPROVEMENT PROJECTS

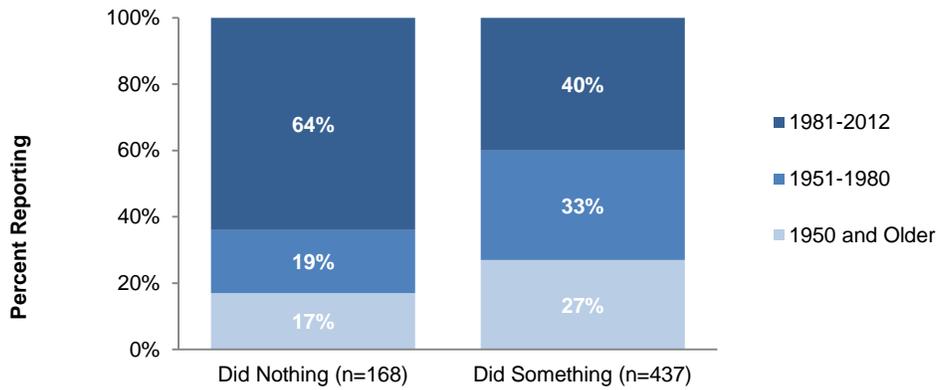
An indicator of overall commitment to energy efficiency in Vermont can be seen in the results of a question that asked nonparticipants whether or not they had completed any projects to reduce heating fuel or electricity use in the past five years. This question helps understand the level of energy efficiency activity occurring in Vermont's general homeowner population and provides context for other responses in our sample. Only 28% of respondents reported they had *not* completed any projects, and 42% of respondents reported having made more than one projects. The top three projects reported were insulation, window replacement, and heating equipment replacement (Table 2-1).

Table 2-1: Projects Completed in the Past Five Years (Multiple Responses Allowed, n=614)

Top 10 Projects Most Frequently Mentioned by The Respondents	Count of Response	Percent Offering Response
Added insulation	187	30%
Replaced windows	162	26%
Replaced heating equipment / furnace	137	22%
Replaced appliances	63	10%
Installed energy efficient lighting (CFLs, 'twisty' bulbs, LED)	62	10%
Replaced door(s)	49	8%
Installed a wood stove	46	7%
Installed solar PV or solar hot water	31	5%
Air sealing/duct sealing	32	5%
Replaced roof	27	4%
None	170	28%

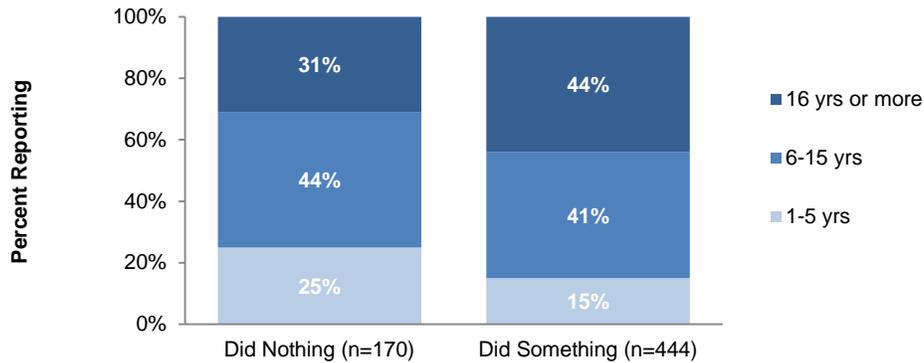
Those who live in older homes were more likely to have completed a project in the last five years than those who live in newer homes (Figure 2-1, Mann-Whitney U Test at $p < 0.05$).

Figure 2-1: Home Upgrades in the Last 5 Years by Age of the Home



Similarly, those who had owned their homes for a longer period of time were more likely to have completed a project in the last five years than those who have owned their homes for a shorter period of time (Figure 2-2, Mann-Whitney U Test at $p < 0.05$).

Figure 2-2: Home Upgrades in the Last 5 Years by How Long Respondents Owned Their Homes



Fewer than 20% of nonparticipant respondents who completed a project in the past five years reported that they received an EVT or VGS rebate for that project.⁸ Rebate eligibility is an important indicator that a project was truly an efficiency upgrade, as opposed to repair or replacement with standard efficiency equipment.

The top five most frequently mentioned projects or measures among the 84 nonparticipants who received a rebate were:

⁸ Respondents were asked whether they had received a rebate after they reported completing at least one project. Since forty-two percent of all respondents completed more than one project the evaluation team cannot attribute receiving a rebate to any specific measure.

- Insulation (31 of 84)
- Window replacement (31 of 84)
- Heating equipment replacement (30 of 84)
- Appliance replacement (20 of 84)
- Solar electric or hot water system installation (20 of 84)

Respondents who reported receiving a rebate mentioned air sealing five percent of the time, however it is possible that addressing drafts and air leaks might not be as memorable as more expensive or intrusive projects.

Respondents who reported receiving a rebate for a project also reported installing more measures than respondents who did not receive a rebate (2.3 average upgrades versus 1.96 average upgrades respectively).⁹ Table 2-2 gives the proportions of respondents who received a rebate by the number of projects reported (one project versus multiple).

Table 2-2: Percent of Respondents that Received a Rebate by Number of Projects

Received a Rebate	One Project (n=176)	Multiple Projects (n=247)
Yes	14%	24%
No	86%	76%

All nonparticipants who reported completing a project were asked why they decided to do their project. The top four responses were: (1) to lower utility bills, (2) to improve comfort, (3) to help the environment, and (4) to replace broken or failing equipment (Table 2-3). Among these four reasons, saving money on utility bills was the most frequent response (offered 62% of the time). While nonparticipants offered many reasons for completing a home energy improvement project, only those mentioned more than 10% of the time are listed in Table 2-3.

⁹ Independent samples t-test, p<.05.

**Table 2-3: Reasons for Completing Home Energy Projects in Past Five Years
(Multiple Responses Allowed, n=444)**

Top Four Reasons	Count of Response	Percent Offering Response
To lower my heating and electricity bills	274	62%
Improve comfort of my home/ reduce drafts	80	18%
Save energy to help the environment/ reduce carbon impact	73	16%
Replace broken or failing equipment	49	11%

Nonparticipant respondents who completed a project in the last five years were also asked how they found the contractor to do the work. Forty-one percent reported doing the work themselves rather than using a contractor. When contractors were used, they were most commonly found based on a referral from friends or family (39%, or 106 of the 274 who sought a contractor).

Of 615 nonparticipant respondents, over half (56%) reported that they planned to make general improvements to their homes in the next two years, indicating a potential opportunity to embed energy efficiency in future home upgrades.

2.2 INTEREST IN ADDITIONAL ENERGY-EFFICIENT HOME UPGRADES

All nonparticipants were asked whether they were interested in making improvements to make their home more energy efficient. The Evaluation Team considered nonparticipants' reported interest in undertaking improvements to make their home more energy efficient by separating those that had done no projects in the past five years, and those that had completed projects:

- Among those reporting that they had done *no projects* in the past five years, about half (52%) indicated that they were interested in improvements to make their home more energy efficient. In this group, younger homeowners, households with more occupants, and homeowners living in older homes were more interested in making energy-efficiency improvements than others in this group.¹⁰
- Among those reporting that they *had done projects* in the past five years, many were interested in doing more – nearly 60% reported that they were interested in additional improvements to make their home more energy efficient.¹¹ In this

¹⁰ One-way ANOVA and Mann-Whitney U Test at $p < 0.05$.

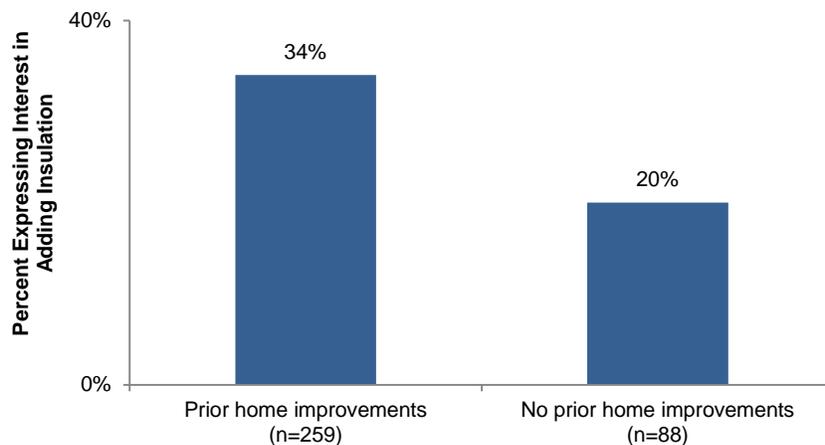
¹¹ Consistent with findings from ESource that those that had taken action (EE Achievers™) were likely to take subsequent or additional action. LeBlanc, William et. al. "Who wants efficiency? Americans' Attitudes and Actions around Energy Use." ACEEE Summer Study 2012.

group, younger homeowners, households with more occupants, and homeowners with more education were more interested in making energy-efficiency improvements than others in this group.⁸

Those expressing interest in any or additional improvements to make their home more energy efficient were asked about the projects they had in mind. The top four responses were: window replacement (offered by 34%), adding insulation (offered by 31%), installing solar electric or solar hot water (offered by 26%), and replacing heating equipment (offered by 14%).

Further, those who *had done projects* in the past five years and were interested in doing more were more likely to report an interest in adding insulation than those who had done *no projects* but were interested in making energy-efficient upgrades to their homes. (Figure 2-3, Pearson Chi Square at $p < 0.05$)

Figure 2-3: Interest in Adding Insulation by Prior Project Status



Nonparticipants *who expressed an interest* in undertaking improvements, but had *not* completed any projects most frequently cited lowering heating and/or electricity bills (reported 71% of the time) as the reason for interest in energy saving improvements, followed by saving energy for environmental reasons (reported 31% of the time), and improving the comfort of one's home (reported 14% of the time).¹² When asked about the primary reason (as opposed to all of the reasons), 56% of those expressing interest reported that their primary reason was to lower heating or electric bills.

¹² Consistent with results from participants and dropouts interviewed for Clean Energy Works Portland pilot, who reported seeking to save energy over increased comfort. Lowering heating bills received slightly higher ratings than increased comfort in that survey.

Table 2-4: Reasons for Interest in Completing Home Energy (Multiple Responses Allowed, n=347)

Reason	Count	Percent
To lower my heating and electricity bills	247	71%
To save energy to help the environment	107	31%
To improve the comfort of my home	47	14%

Anyone reporting that they were interested in undertaking improvements to make their home more energy efficient was asked why they had not already completed these projects. The most common response (offered 65% of the time) was that the project cost was too high. No other reason was offered more than 15% of the time (Table 2-5).

Table 2-5: Barriers to Desired Energy Improvements (Multiple Responses Allowed, n=347)

Reason	Count of Response	Percent Offering Response
Project cost too high	226	65%
Hassle/time constraints/time needed to complete project	45	13%
Not ready yet/prioritizing other repairs/ waiting for incentive, energy audit results, etc.	40	12%
Home is already efficient	11	3%
Did not know how to finance the work	10	3%
Pre-existing home conditions need to be resolved first (knob & tube, vermiculite)	9	3%
I just moved into the house	5	1%
In process of doing other work	5	1%
Working with the program was difficult/confusing	4	1%
I did not believe it would save enough energy	3	1%

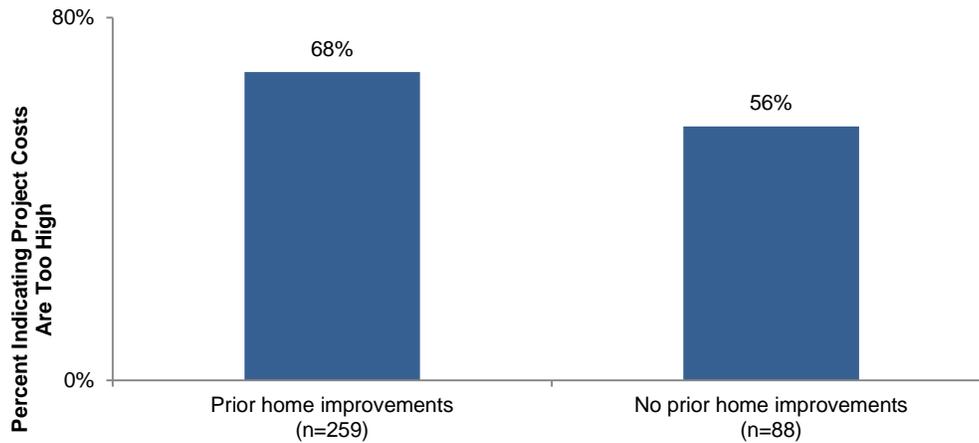
The evaluation team found no relationship between income and those who mentioned cost as a barrier versus those who did not. Specifically, respondents mentioning cost as a barrier were equally likely to have low incomes than high incomes.¹³

Those who had *done projects* in the past five years and were interested in making additional energy-related improvements were more likely to report that cost was a barrier

¹³ Pearson Chi-Square, p=.27

to completing more upgrades than those who had done *no projects* but were interested in making energy-efficient upgrades to their homes (Figure 2-4, Pearson Chi Square at $p < 0.05$).

Figure 2-4: Cost as a Barrier in Making Energy-efficient Improvements by Prior Project Status



Those *not* interested in making improvements (this group includes those who had and had not done *a project*) were asked why they weren't interested. The most common response (given by 58% of those asked) was that their home was already efficient. Respondents living in newer homes (homes built after 1980) rather than older homes (homes built prior to 1980) were more likely to give this reason (Pearson Chi Square at $p < 0.5$). The next most common response was that the project costs were too high (given by 22% of those asked).

2.3 BARRIERS TO INVESTING IN HOME ENERGY EFFICIENCY IMPROVEMENTS

Respondents rated the extent to which they agreed with the statement "I intend to conserve on heating consumption in my home this winter." Respondents generally gave high ratings (average of 8.3 and median of 9 out of 10). While this intention is high, barriers continue to keep nonparticipants with high intention to conserve from making energy upgrades. To identify which barriers may inhibit a respondent from acting on their intention to conserve energy, the evaluation team explored differences in intention ratings and self-reported barriers. All nonparticipants were asked what prevented them from completing energy efficiency projects. Those reporting barriers due to project cost had higher intention scores than those that did not mention cost barriers.¹⁴ Intention scores

¹⁴ Independent samples t-test, $p < 0.05$

were similar for respondents that mentioned other barriers, such as not being ready to complete projects, already having an energy efficient home and wanting to avoid the hassle.¹⁵ Results suggest that respondents who might otherwise act on their intention to conserve energy may not be able to do so due to cost barriers.

Because comments about project cost were expected, the nonparticipant survey probed further into exactly what component of project cost created the barrier, including lack of access to financing. Among the 292 nonparticipants who mentioned project cost or financing as a barrier (this group includes those who had and had not expressed an interest in energy-efficiency projects), the top three most cited responses were: overall cost is too high, up-front cost of the improvements is too high, and other priorities for available funds (Table 2-6). The Evaluation Team found no relationship between the income level of nonparticipants who mentioned cost as a barrier and those that did not.

Table 2-6: Specific Cost Barriers (Multiple Responses Allowed, n=292)

Top 5 Reasons	Count of Response	Percent Offering Response
Overall cost is too high	108	37%
Up-front cost of the improvements is too high	51	17%
Other priorities for available funds	39	13%
Up-front cost of the energy audit is too high	32	11%
Don't know	31	11%

Those reporting that overall cost prevented them from completing projects scored marginally higher on intention to conserve rating than those that did not mention this barrier (8.6 and 8.2 respectively).¹⁶ Additionally, those that mentioned up-front improvement costs as being too high also had marginally higher intention ratings than those that did not (8.8 and 8.3 respectively).¹⁷ Respondents who mentioned having other priorities for their funds or the high up-front cost of audits as barriers showed no differences between their intention to conserve ratings.

Forty-four nonparticipants mentioned time constraints as a barrier to completing projects (this group includes those who had and had not expressed an interest in energy efficiency projects). Of the 44 nonparticipants, 29 provided an explanation as to what specifically

¹⁵ Independent samples t-test, all tests were non-significant.

¹⁶ Independent samples t-test, p=.09

¹⁷ Independent samples t-test, p=.08

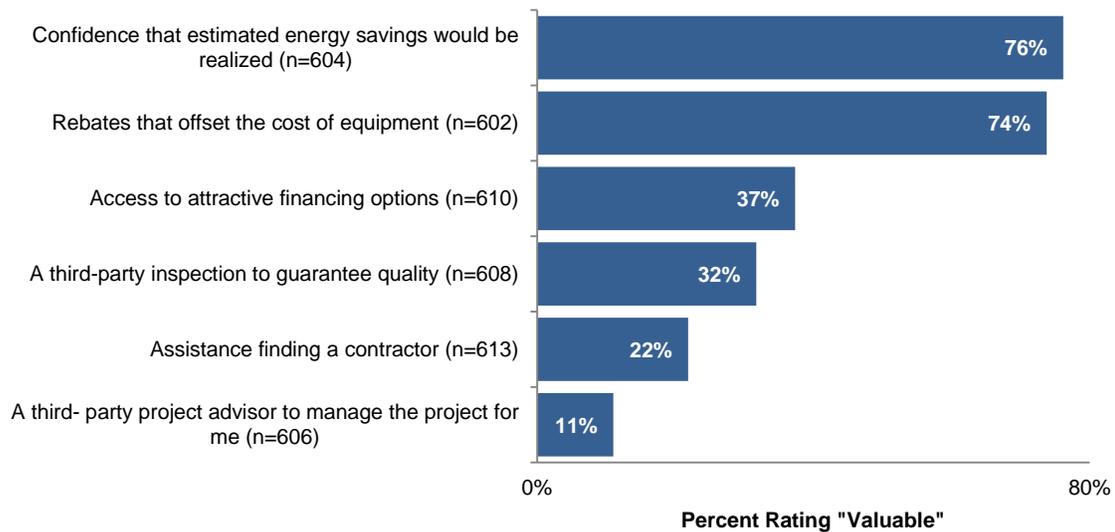
about the time needed to complete the project made it difficult to do so. Sixteen of 29 said that they had no time to do the work and nine said they had no time to manage the project.

2.4 AWARENESS AND PROGRAM SERVICES

More than half (60%) of the 615 nonparticipant respondents reported hearing of either EVT Home Performance or VGS Home Retrofit programs.¹⁸ Thirty-nine percent of the 56 nonparticipants living in the Rutland County reported hearing of the NeighborWorks H.E.A.T. Squad.

All survey respondents were provided a list of potential features or program services and asked to rate on a 1-to-5 scale how valuable each feature would be to them. Confidence in energy savings estimates and rebates that offset the cost of equipment emerged as the most valuable program services (Figure 2-5). Access to a third-party project advisor to manage the project on behalf of the homeowner received the lowest ratings, with 52% assigning a “1” or “not at all valuable” to this option.

Figure 2-5: Portion Rating Hypothetical Program Features as “Valuable” (“4” or “5” on a 5-point scale)



Older homeowners were significantly less likely to rate “access to attractive financing options” as valuable than younger respondents (Correlation (r) = .12 at p<0.05).

¹⁸ Respondents were asked whether they had heard of the Efficiency Vermont Home Performance with ENERGY STAR or Vermont Gas Home Retrofit program depending on who the respondent’s provider was.

2.5 PARTICIPANT AND NONPARTICIPANT DIFFERENCES

To further explore respondent motivations for conducting comprehensive home upgrades, the evaluation team analyzed data from a subset of questions asked the same way across process and impact evaluation surveys of participants, stalled participants, and in the market research with nonparticipants. This section documents notable differences between participants, stalled participants, and nonparticipants.

The variation in cost and complexity among energy efficiency behaviors means that not all energy efficiency behaviors are equal—installing a free light bulb is not equivalent to a furnace and duct system replacement. In order to identify nonparticipant respondents who had considered an energy efficient upgrade on a similar cost and scale as whole house participants the Evaluation Team divided nonparticipants into two groups using the following logic:

- If nonparticipants reported they had received an estimate for installation of a renewable energy system (solar electric, geothermal, or solar hot water), they were categorized as “Energy Engaged Nonparticipants,” and
- If nonparticipants reported they had not obtained an estimate for installation of a renewable energy system, they were categorized as “Standard Nonparticipants.”

Energy engaged nonparticipants comprised 17% of the nonparticipant sample.

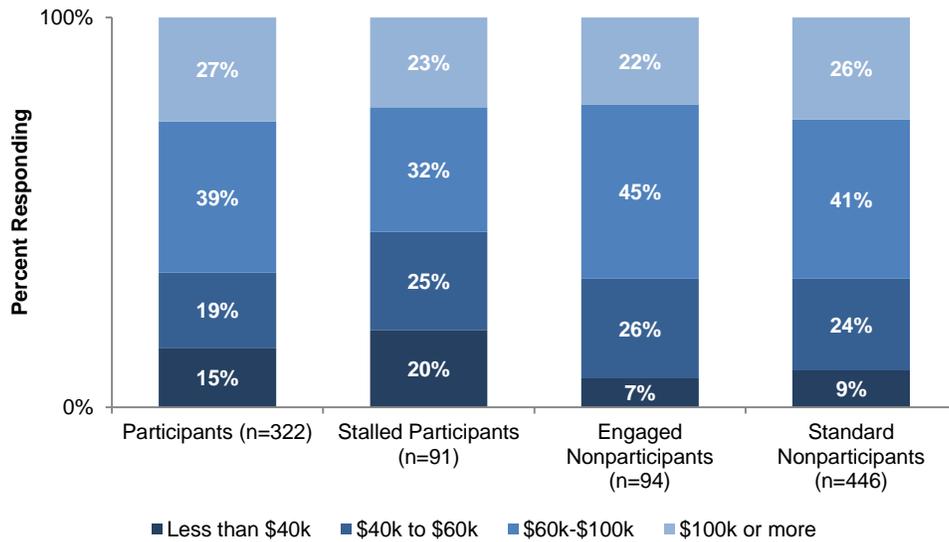
2.5.1 Group Differences in Economic Circumstances

To understand respondents’ economic circumstances, the Evaluation Team compared participant, stalled participant and nonparticipant groups by income, household size, age, age of home, length of homeownership, and level of concern about their personal economic situation. Differences between the groups are discussed below.

Stalled participants had slightly lower incomes than participants and nonparticipant groups¹⁹ (Figure 2-6). Participants and both nonparticipant groups had similar income levels. Recall that the market survey screened out households likely to qualify for assisted services, and thus low-income households are underrepresented relative to the population of Vermont, but similar to the participant population. The higher presence of lower income households among the stalled participant population could be explained in part by the stalled participants that received services from NeighborWorks of Western Vermont, an American Reinvestment and Recovery Act grant recipient with expertise reaching out to lower income households.

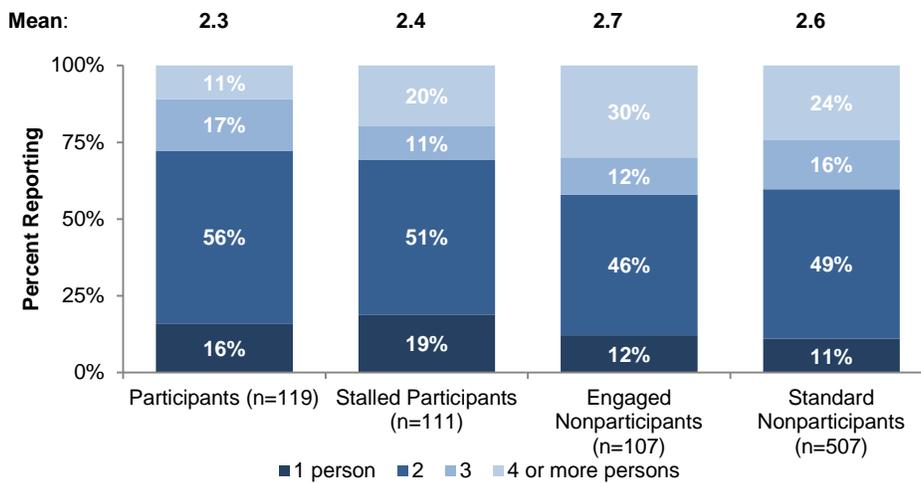
¹⁹ Pearson Chi-Square(N=953, 9)=16.74, p=0.05

Figure 2-6: Income by Group



Both nonparticipant groups (energy engaged and standard) have a higher average household size than participant and stalled participant groups²⁰ (Figure 2-7).

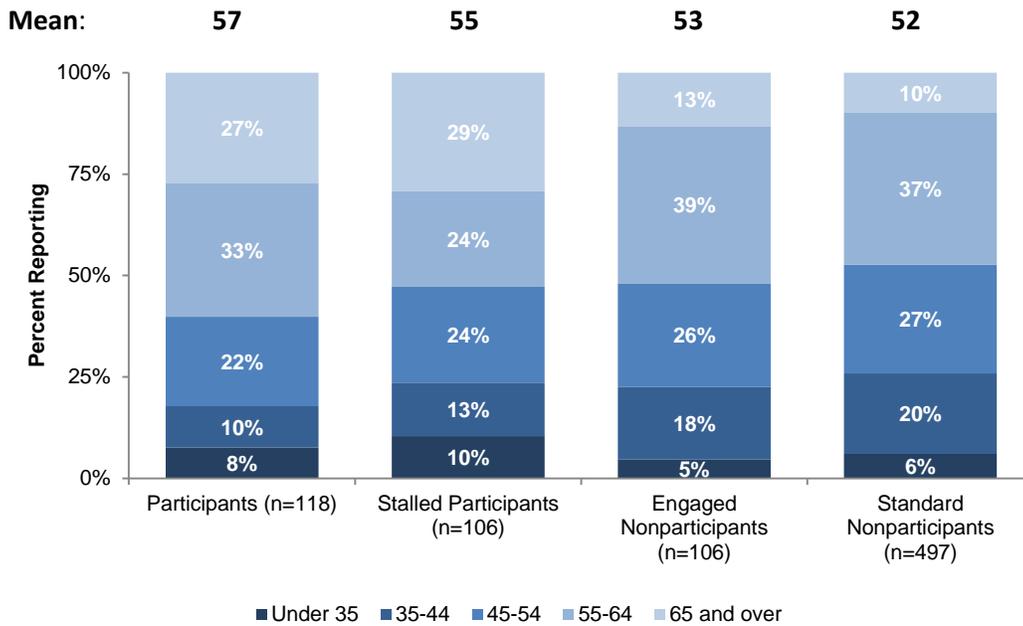
Figure 2-7: Household Size by Group



Similarly, both nonparticipant groups (energy engaged and standard) are younger than participant or stalled participant groups²¹ (Figure 2-8).

²⁰ One-way ANOVA shows a difference between groups, $F(3, 843) = 4.03, p=.01$. Planned contrast shows difference between participant groups (participant and stalled) and nonparticipant groups (energy engaged and standard), $t(354)=-3.26, p=0.001$.

Figure 2-8: Age by Group



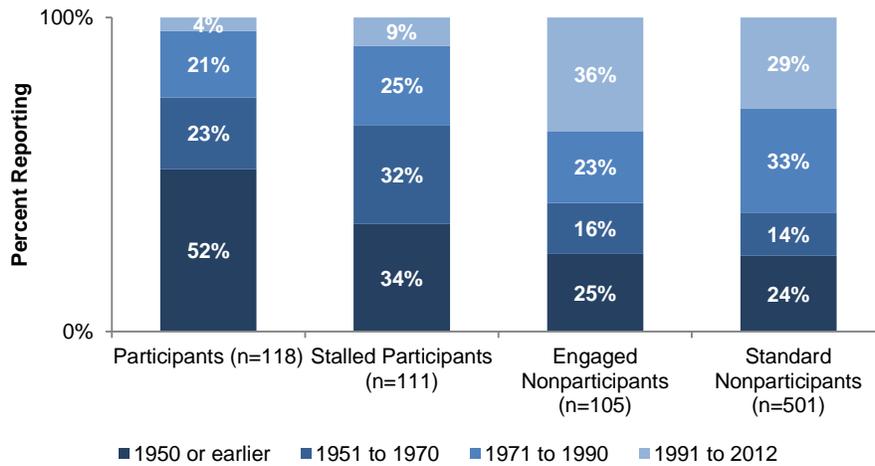
Stalled participants had a similar household size and age as participants, but lower incomes and thus may have less discretionary income than participants. Compared to participants, both energy engaged and standard nonparticipants have similar incomes, but are younger with larger households.

Participants reported living in older homes than stalled and nonparticipant groups²² (Figure 2-9).

²¹ One-way ANOVA shows a difference between groups, $F(3, 823) = 6.66, p < .001$. Planned contrast shows difference between participant groups (participant and stalled) and nonparticipant groups (engaged and standard), $t(335) = 3.2, p = 0.002$.

²² Kruskal-Wallis, $p < .05$

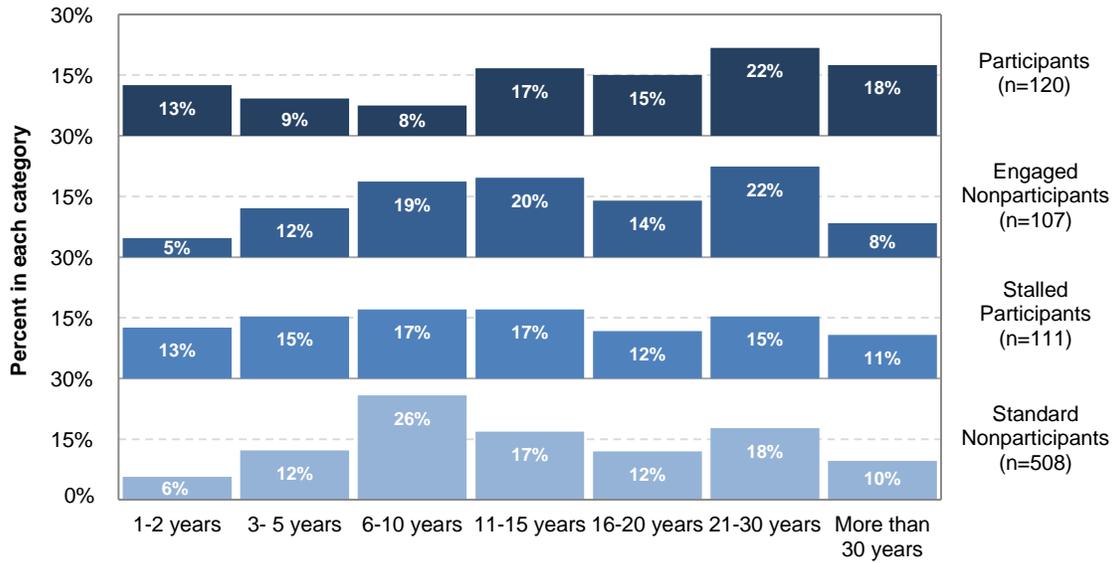
Figure 2-9: Age of Home by Group



Participants have also owned their homes for a longer period of time than stalled participants, and standard nonparticipants, but not energy engaged nonparticipants²³ (Figure 2-10). While there is no statistically significant difference in home tenure between participants and energy engaged nonparticipants, more participant respondents have owned their home for longer than 30 years than energy engaged nonparticipants (18% versus 8%). Interestingly, more participants have owned their home for less than two years than energy engaged nonparticipants (13% versus 5%).

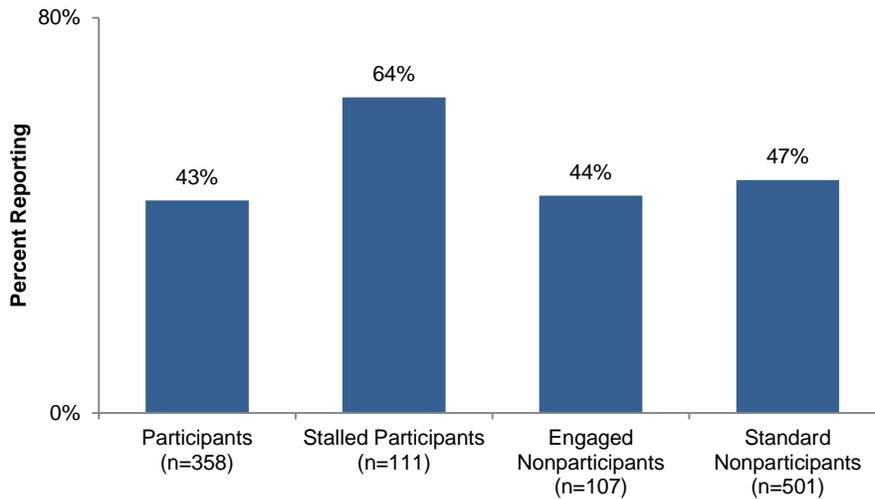
²³ Primary statistic, Kruskal-Wallis, $p < .05$. Post hoc tests showed statistically significant differences between participants and stalled participants, and participants and standard nonparticipants.

Figure 2-10: Length of Homeownership by Group



Finally, we asked respondents to rate their level of concern for their economic situation. A higher proportion of stalled participants identified with a statement about financial concern (offering a four or five on a five-point scale) than participant and both nonparticipant groups²⁴ (Figure 2-11). This finding is consistent with the differences identified by analyzing other indicators of financial concern.

Figure 2-11: Portion Expressing Concern for Personal Economic Situation



²⁴ Pearson Chi-Square (N=1077, 12)=34.18, p=0.001

2.5.2 Additional Quantitative Analysis: Predictors of Program Status

To assess whether participants, stalled participants, and nonparticipants had different motivations for conducting energy efficiency upgrades, the Evaluation Team asked all groups to rate their agreement to various statements²⁵ that measured the extent to which respondents were:

- Aware of the effects of energy use on the environment
- Concerned about the impact of energy use on the environment
- Concerned about the impact of energy use on their personal finances
- Personally responsible for using less energy to help the environment
- Personally responsible for using less energy to help their personal finances
- Intending to conserve energy at home

To examine these data, the Evaluation Team first created several environmental and financial indicators from these statements. This was done by averaging the responses to certain statements to create a score for each individual (each item was rated on a 0-10 scale). For example, respondent's ratings of "I sometimes worry whether there is enough money to pay my heating costs" and "I often worry that the cost of heating for my home will increase" were averaged to produce a "concern for the finances" score. Specifically, a lower score indicates that a respondent was less *concerned* about personal finances, while a higher score indicates that they were more *concerned*.

When comparing the indicators of environmental concern, the Evaluation Team found that standard nonparticipants were less *aware* of, *concerned* about, and had less *responsibility* for protecting the environment than participants, stalled participants and energy engaged nonparticipants (Figure 2-12).²⁶ These results indicate that energy engaged nonparticipants were similar to participants and stalled participants in their level

²⁵ Twelve statements about energy use issues, environment, and finances were included in all evaluation surveys. These statements measure awareness, knowledge, and attitudes that can lead to behavior change. For more details, see Appendix C.

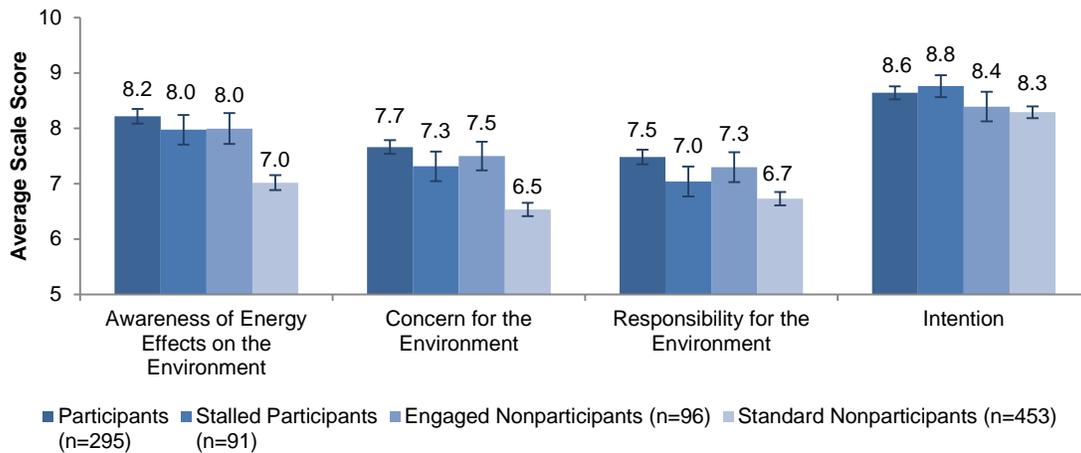
²⁶ Standard Nonparticipants vs. Participants - $t(421)_{\text{awareness}}=-7.1, p<0.001$; $t(422)_{\text{concern}}=-6.9, p<0.001$; and $t(412)_{\text{responsibility}}=-4.8, p<0.001$

Standard Nonparticipants vs. Stalled - $t(227)_{\text{awareness}}=-4.1, p<0.001$; $t(224)_{\text{concern}}=-3.6, p<0.001$; and $t(218)_{\text{responsibility}}=-1.7, p=0.092$

Standard vs. Engaged Nonparticipants - $t(125)_{\text{awareness}}=-3.1, p<0.001$; $t(124)_{\text{concern}}=-3.8, p<0.001$; and $t(123)_{\text{responsibility}}=-2.0, p=0.048$

of environmental awareness, concern and responsibility (those that had received a bid for a renewable energy system – an investment on a similar scale to a whole house upgrade).

Figure 2-12: Indicators of Environmental Concern, Responsibility and Intention to Act

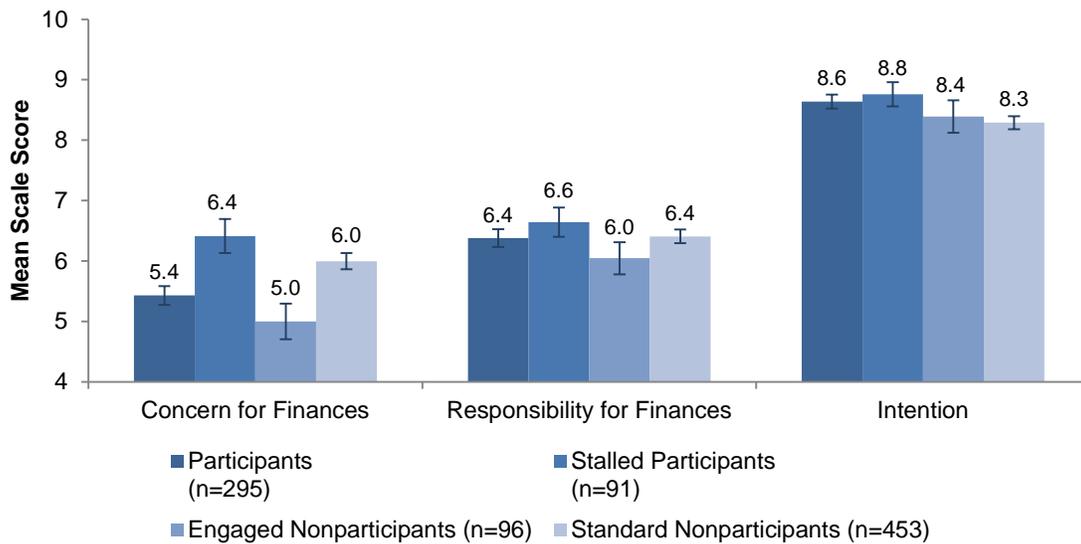


When comparing the financial indicators, the Evaluation Team found that stalled participants were more *concerned* about the impact of energy use on their finances than participants, standard nonparticipants and energy engaged nonparticipants (Figure 2-13).²⁷ Standard nonparticipants were more *concerned* about energy use impact on their finances than participants and energy engaged nonparticipants, but less so than stalled participants (Figure 2-13).²⁸ These results suggest that financial concerns affect stalled participants and standard nonparticipants more than participants and energy engaged nonparticipants.

²⁷ Stalled Participants vs. Participants - $t(107)_{concern} = 3.6, p < 0.001$; Stalled Participants vs. Engaged Nonparticipants - $t(97)_{concern} = 4.1, p < 0.001$; Stalled Participants vs. Standard Nonparticipants - $t(105)_{concern} = 2.1, p = 0.041$

²⁸ Standard Nonparticipants vs. Participants - $t(406)_{concern} = 2.6, p = 0.01$; Standard Nonparticipants vs. Stalled Participants - $t(105)_{concern} = -2.1, p = 0.041$; Standard Nonparticipants vs. Engaged Nonparticipants - $t(124)_{concern} = 3.3, p = 0.001$

Figure 2-13: Indicators of Financial Concern, Responsibility and Intention to Act



The Evaluation Team also examined the relationships between *awareness*, *concern*, *responsibility*, and *intention* indicators and demographic characteristics.²⁹ This analysis revealed several group differences when compared to program participants (Figure 2-14). The flat grey bar indicates that the group exhibited no difference to participants on a given factor.

Figure 2-14: Predictors of Group Membership When Compared to Participants

Compared to Participants...	Concern for Finances	Concern for Environment	Age	Size of Home	Age of Home	Duration Owned Home	Income
Stalled Participants	↑	—	—	—	—	—	—
Engaged Nonparticipants	—	—	—	—	↓	↑	—
Standard Nonparticipants	↑	↓	—	—	↓	—	—

More specifically, this analysis found that:

- Stalled participants had a higher *concern* about the effect of energy use on their finances than participants. There were no differences between these two groups with respect to age, size of home, age of home, duration of home ownership, and

²⁹ The logistic regression method was used to evaluate key differences between groups. For more details, see Appendix D.

- household income. In fact, stalled participants with higher *concerns* for finances were likely to have incomes similar to participants. This suggests that the *concern* for finances indicator could better predict which customers will be more likely to drop-out of the program than income level alone.
- Energy engaged nonparticipants (those that reported receiving a bid for a renewable energy system) were most similar to participants. Specifically, they had similar environmental and financial *awareness*, *concern*, and *responsibility* scores as participants. They were also demographically similar to participants. We found no differences in household income, size of home, and age between participants and engaged nonparticipants. Energy engaged nonparticipants lived in newer homes and had owned their homes longer than participants.
 - Standard nonparticipants had higher *concern* about the effect of energy use on their finances and lower *concern* for the environment than participants. These findings suggest that standard nonparticipants are more likely motivated by financial concerns than environmental. Standard nonparticipants lived in newer homes compared to participants. However, there were no differences between these two groups with respect to household income, age, size of home, and duration of home ownership.

2.6 SUMMARY

The market survey revealed that Vermonters are taking action to improve the energy efficiency of their homes, with more than 70% of nonparticipants reporting having completed an upgrade at some point in the past five years. Over half of all nonparticipants reported wanting to make improvements to their home to make it more energy efficient. Tapping into this desire to lower household energy costs and improve household efficiency will be an important strategy for Vermont thermal efficiency programs.

The market survey also confirmed that cost and/or lack of funds remains a fundamental barrier to investing in extensive home upgrades. Stalled participants, who had the lowest household incomes, were also the most concerned about their economic situation than any other group (64%).³⁰ Nearly half of the other groups reported a similar level of concern. This level of concern about finances may affect overall participation in whole house programs in the near term.

³⁰ Stalled participants were the only group where cost barriers related to income. Specifically, those making \$40,000 to \$60,000 were more likely to mention cost barriers than other barriers, and those making over \$100,000 were less likely to mention cost versus other barriers (Chi-square, $p < .05$). Nonparticipant groups did not show this relationship.

There is a notable interest in investing in solar measures. Nearly one-fifth of nonparticipants have received an estimate for installing a renewable energy system.

More than half of nonparticipants were aware of EVT or VGS programs. Confidence in energy savings estimates and rebates that offset the cost of equipment were rated as the most valuable program services, slightly more valuable than rebates to offset project costs.

Standard nonparticipants were significantly less aware of, concerned about, and had a lesser responsibility for the environment than any other group. In contrast, financial concerns affected standard nonparticipants more than participants and energy engaged nonparticipants.

There are substantial demographic differences between participants and other groups. Participants and stalled participants had fewer people living in the home than both nonparticipant groups. Participants and stalled participants are also, on average, older than both nonparticipant groups. Participants have owned their homes longer than stalled participants and both nonparticipant groups, and also live in older homes than stalled participants, energy engaged nonparticipants and standard nonparticipants.

CONCLUSIONS AND RECOMMENDATIONS

3.1 BACKGROUND AND RESEARCH OBJECTIVES

The research presented in this report includes market research designed to add insight and support the improvement of energy efficiency programs focused on making single-family homes in Vermont more energy efficient.

3.2 MARKET RESEARCH CONTEXT

The market research included a survey of Vermonters *not* known to have participated in either EVT's Home Performance program nor in the VGS Home Retrofit program. The Evaluation Team conducted this nonparticipant survey to better understand the barriers and motivation factors around home retrofit projects. Specifically, the survey sought to collect information on recent home energy upgrades; barriers to, and motivations for, pursuing energy-efficiency home improvements; awareness of the existing retrofit programs; and interest in potential program services.

3.3 CONCLUSIONS AND RECOMMENDATIONS

Conclusion 1: Vermont households are interested in and are currently taking action to reduce their energy use—for both economic and environmental reasons.

The single largest group in the market research was those that reported having taken some action already and remained interested in doing more. While improving the comfort of one's home was a reason for completing a project, this factor was dwarfed by a desire to lower energy costs. Households that reported having taken action were more likely to want to do additional projects than those that had not.

Vermonters are being exposed to many messages about the value of energy efficiency, and we do not mean to imply that program administrators should ignore nonparticipating households. Rather, we expect that the first step is unlikely to be a comprehensive whole house upgrade. As homeowners sign up for audits, purchase efficient appliances, receive home energy kits or apply for lighting upgrades, they should be flagged and contacted about how to pursue more extensive whole-house upgrades.

Recommendation 1: Be strategic with outreach. Focus on encouraging those that have taken action to take additional action. Target households that have installed insulation, windows or heating systems in order to convince them to take the next step.

Conclusion 2: Vermonters want to lower their energy costs but report the costs of upgrade projects are too high.

Concerns about project costs can be related to financial constraints. These concerns can also reflect skepticism in the overall value of the project, given the cost. Confidence in energy savings estimates was most frequently rated as valuable, ahead of access to rebates and lower project costs, indicating the need to vigorously avoid overpromising by contractors and equipment vendors.

Recommendation 2: Investigate strategies for increasing overall confidence in project quality and expected savings. Confirm that program-supported energy savings estimates are reliable and promote specific high leverage activities that should be done in tandem with other home upgrades—for example, insulating and sealing sill plates when windows are replaced and sealing exterior penetration points during insulation projects.

Conclusion 3: Overall and upfront costs associated with energy efficiency projects continue to present the most substantial barriers to completing comprehensive home upgrades.

Financing can be an attractive strategy for households that want to defer payments, but will not be attractive to everyone. Breaking projects into manageable pieces could provide motivated households with a strategy for getting everything done without straining tight household budgets. The comprehensive, house-as-a-system approach may be ideal; but if energy upgrades are pitched as all-or-nothing projects, many households will drop out without substantial incentives or attractive financing options. Shifting to a step-by-step strategy could create opportunities and challenges for both homeowners and market actors:

- Creating an action plan for homeowners that fits within tight household budgets and obtains homeowner commitment to work through each step should enable homeowners to make comprehensive upgrades in a step-by-step process.
- Communicating a step-by-step approach will create marketing challenges in that sponsors must avoid creating disillusionment while convincing households that have already taken action that they are “not done yet.”
- Developing this commitment to long-term services could provide contractors with an additional incentive to do high quality work and avoid overpromising as contractors encourage people to do the best first thing, and then strategize with them to do the next thing to realize additional savings at appropriate times in the future.
- This approach could help contractors minimize the costs of new customer acquisition and instead approach their customers with the expectation that they are likely to have additional projects in the future.

Recommendation 3: Maximizing energy efficiency usually means touching three to five household systems. Create a framework for breaking projects down without creating lost

opportunities. Encourage program administrators to set up and host portals that allow households to develop a step-by-step plan for customer's homes. Encourage contractors to develop longer term relationships with customers and prospective customers that allow them to complete a project now and schedule the next step for the following year.

Conclusion 4: Reaching the substantial goals established for residential building efficiency in Vermont will likely require engaging market actors throughout the weatherization industry. Home Performance will continue to provide a high-quality option for a certain portion of the market, but reaching deeper and more broadly into the market will likely require expanding the number of market actors to include insulation, HVAC, general contractors, and even services provided by big box stores (41% of nonparticipants with recent projects reported doing the work themselves). Encouraging a growing pool of contractors and materials suppliers (often those trusted with existing direct professional working relationships with customers) to learn proper energy efficiency measure specification and installation skills will increase the capacity of the supply chain to deliver energy efficiency to all Vermont homeowners.

Recommendation 4: Develop processes for tracking and counting out-of-program upgrades while encouraging additional action. Given the level of existing action reported in the nonparticipant market surveys, it will be important to maximize the efficiency obtained from non-program projects. Consider community-based engagement strategies that could encourage Vermonters to register their projects and help the State meet its goals. Assuming there continues to be a high level of energy efficiency actions taken in the general population—potentially increased if proponents launch a substantial and radical marketing strategy—key stakeholders in the State should collaborate to devise a process to ensure the resulting projects will be tracked.

APPENDIX A:

NONPARTICIPANT SURVEY

Single-Family, Existing Homes Market Research

(August 28, 2012)

BACKGROUND AND PURPOSE

Nonparticipant phone survey guide prepared by Research Into Action for the single-family, existing homes market in Vermont. The survey will:

- Ask about interest in home performance type improvements,
- the hypothetical need for program services,
- barriers that may or may not prevent homeowners from pursuing energy efficiency home improvements,
- motivators that might induce action, and
- demographics for comparison with participants.

The survey will require approximately 10 minutes to complete.

INTRODUCTION

Hello, my name is _____. I'm calling on behalf of the Vermont Department of Public Service. We are conducting a study in Vermont to understand homeowner attitudes about energy use in their homes. Your opinions are very important to this effort as they will inform the design of Efficiency Vermont and Vermont Gas Systems energy efficiency programs and develop options to help homeowners save money and lower their home heating fuel and electricity needs.

This is not a sales call and all responses will be kept confidential. Is this a convenient time for you to talk or is there a better time to reach you? [IF THEY ASK HOW LONG WILL IT TAKE, SAY "This survey will take about 10 minutes"; SCHEDULE CALLBACK IF NECESSARY].

[If needed: Efficiency Vermont and Vermont Gas Systems help Vermont homeowners and businesses save money and energy through technical assistance, rebates, and financing to help them do energy efficiency work.]

[ASK ONLY IF CALLING A CELL PHONE]

11. I know I'm calling you on your cell phone, but we are conducting an important survey. Are you in a safe place to talk right now?

- a. Yes, safe place to talk
- b. No, call me later [SCHEDULE CALLBACK]
- c. No, call back on land-line [RECORD NUMBER AND SCHEDULE A CALLBACK]
- d. Cell phone for business only [THANK AND END- BUSINESS#]
- e. Refused [THANK AND TERMINATE]

SCREENING

S1. We are interested in talking with homeowners. Do you own your home?

1. Yes
2. No [THANK AND TERMINATE]
98. Don't know [THANK AND TERMINATE]
99. Refused [THANK AND TERMINATE]

S2. I have a few questions about you and your household to see if you qualify for our survey.

Are you the person in your household who pays the most attention to the household heating fuel or electricity use?

1. Yes
2. No [Ask for that person, potentially arrange call back]
3. We are equal
98. Don't know
99. Refused

S3. Were you born before 1947?

1. Yes [MONITOR QUOTA – IF OVER QUOTA, IF OVER QUOTA THANK AND TERMINATE]
2. No
98. Don't know [THANK AND TERMINATE]
99. Refused [THANK AND TERMINATE]

S4. About how many square feet is your home?

1. [NUMERIC] _____
 99. Refused
- S5. Including all adults and children, how many people currently live in your household year-round (more than nine months out of the year)?
1. [NUMERIC] _____
 99. Refused [THANK AND TERMINATE]
- S6. About when was this home built? [DO NOT READ, CHOOSE ONE]
1. 2001 to 2012
 2. 1991 to 2000
 3. 1981 to 1990
 4. 1971 to 1980
 5. 1961 to 1970
 6. 1951 to 1960
 7. 1941 to 1950
 8. 1940 or earlier
 98. Don't Know
 99. Refused
- S7. How long have you owned this home? [DO NOT READ, CHOOSE ONE]
1. 1-2 years
 2. 3- 5 years
 3. 6-10 years
 4. 11-15 years
 5. 16-20 years
 6. 21-30 years
 7. More than 30 years
 99. Refused

S8. Is your total household income greater than [PIPE IN \$ AMOUNT DEPENDENT ON HOUSEHOLD SIZE IN THE # OF ADULTS/CHILDREN QUESTION ASKED EARLIER]?

1. Yes
2. No [THANK AND TERMINATE]
98. Don't Know [THANK AND TERMINATE]
99. Refused [THANK AND TERMINATE]

HOME ENERGY IMPROVEMENTS

P1. Over the past five years, have you completed any projects to reduce the amount of heating fuel or electricity your home uses? [DO NOT READ, CHOOSE ALL THAT APPLY]

1. None
2. Added Insulation
3. Air sealing / duct sealing
4. Replaced heating equipment / furnace
5. Replaced cooling equipment / AC
6. Replaced appliances
7. Installed energy efficient lighting (CFLs, "twisty" bulbs, LED)
8. Installed solar PV or solar hot water
9. Replaced windows
00. Other, specify:_____
98. Don't know
99. Refused

P2. [If P1 <> NONE OR DK OR REF] Did you receive a rebate from Efficiency Vermont or Vermont Gas Systems for this work?

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

P3. [If P1<> NONE OR DK OR REF] How did you find the contractor who did the work? [DO NOT READ LIST, PROBE TO CODE, MULTIPLE RESPONSES ALLOWED]

1. NA - I did it myself
2. I found the contractor on the Efficiency Vermont website
3. I found the contractor from yellow pages of a phone book/online search
4. Referral from friend/family/other
5. I knew the contractor
00. Other
98. Don't know
99. Refused

P4. [If P1<> NONE OR DK OR REF] Why did you decide to make these home energy improvements? [DO NOT READ LIST, CHOOSE ALL THAT APPLY]

1. To lower my heating and electricity bills
2. Improve the comfort of my home/reduce drafts
3. To solve building problems (mold, ice dams)
4. Increase the value of my home
5. Save energy to help the environment/reduce carbon impact
6. Replace broken or failing equipment
7. Switch to different heating fuel
8. Already doing a home project (such as remodel)
00. Other:_____
98. Don't know
99. Refused

P5. When faced with a household equipment repair or replacement do you typically:

1. Do it yourself
2. Hire a contractor
3. Ask a friend/family member

- 00. Other: _____
- 98. Don't know
- 99. Refused

- P6. [If P1= NONE OR DK OR REF] Are you interested in making any home improvements to make your home more energy efficient?
 - 1. Yes
 - 2. No
 - 8. Don't know

- P7. [P1<> NONE OR DK OR REF] Are you interested in making additional home improvements to make your home more energy efficient?
 - 1. Yes
 - 2. No
 - 9. Don't know

- P7a. [If P6="No" or DK OR P7 = "No" or DK] Why not? DO NOT READ, PROBE AS NECESSARY. CHECK ALL THAT APPLY
 - 1. Project cost too high
 - 2. Pre-existing home conditions need to be resolved first (knob and tube, vermiculite)
 - 3. Not ready /prioritizing other projects
 - 4. Home is already efficient
 - 5. Hassle/time constraints/time needed to complete project
 - 6. I did not believe it would save enough energy
 - 7. Concerned about the quality of the work/equipment
 - 8. Did not know how to finance the work
 - 9. Working with the program was difficult/confusing
 - 10. Planning to sell home
 - 00. Other, specify: _____
 - 98. Don't know

99. Refused
- P6a. [If P7 or P6=1 (“Yes”), OTHERWISE, SKIP TO P12]
- What improvements are you thinking about? [DO NOT READ, CHOOSE ALL THAT APPLY]
1. None
 2. Insulation
 3. Air sealing / duct sealing
 4. Heating equipment / furnace
 5. Cooling equipment / AC
 6. Appliances
 7. Energy efficient lighting (CFLs, “twisty” bulbs, LED)
 8. Solar PV or solar hot water
 9. Windows
 00. Other, specify:_____
 98. Don’t know
 99. Refused
- P8. [IF P7 or P6=1 (“Yes”)] Why are you interested in making these improvements? [DO NOT READ, CHOOSE ALL THAT APPLY]
1. To lower my heating and electricity bills
 2. To improve the comfort of my home/reduce drafts
 3. To solve issues with my home (mold, ice dams)
 4. To increase the value of my home
 5. To save energy to help the environment
 6. To switch to different heating fuel
 7. To replace broken or failing equipment
 8. Already doing a home project (such as remodel)
 00. Other:_____
 98. Don’t know

99. Refused
- P9. [SHOW LIST SELECTED IN P8] What is the primary reason you would be interested?
- P11. Why haven't you made these energy improvements in your home? [DO NOT READ, CHOOSE ALL THAT APPLY]
1. Project cost too high
 2. Pre-existing home conditions need to be resolved first (knob and tube, vermiculite)
 3. Not ready yet/prioritizing other repairs
 4. Home is already efficient
 5. Hassle/time constraints/time needed to complete project
 6. I did not believe it would save enough energy
 7. Concerned about the quality of the work/equipment
 8. Did not know how to finance the work
 9. Working with the program was difficult/confusing
 10. Planning to sell home
 00. Other, specify:_____
 98. Don't know
 99. Refused
- P12. [If P11 OR P7a=1 ("project cost too high"), OR P11 OR P7a=8 ("Did not know how to finance the work")] What, specifically, about the cost or financing of the work makes it difficult for you to complete the project? [DO NOT READ, PROBE TO CODE, CHOOSE ALL THAT APPLY]
1. Up-front cost of the energy audit is too high
 2. Up-front cost of the improvements is too high
 3. Other priorities for available funds
 4. Overall cost is too high
 5. Wasn't aware of financing options
 6. Couldn't qualify for financing

7. Didn't want to deal with hassle of arranging financing
 8. Didn't want to take on debt
 00. Other: _____
 98. Don't know
 99. Refused
- P13. [If P11 OR P7a=5("Hassle/time constraints/time needed to complete project")]
What, specifically, about the time needed to complete the project makes it too difficult to do so? [DO NOT READ, PROBE TO CODE, CHOOSE ALL THAT APPLY]
1. Don't have time to think about it/manage the project
 2. Don't have time to do the work myself
 3. Hassle of locating a contractor
 4. Hassle of having a contractor in the home
 5. Don't want the mess / disruption in the home right now
 6. Other ____
 98. Don't know
 99. Refused
- P14. There are programs that provide a variety of services to help customers complete these types of projects. I'm going to list six typical services for each one please tell me, on a scale of 1 to 5, where 1 is not at all valuable and 5 is extremely valuable, how valuable each one might be for your household.
- a. Rebates that offset the cost of equipment
 - b. Access to attractive financing options
 - c. Confidence that estimated energy savings would be realized
 - d. Assistance finding a contractor
 - e. A third-party inspection to guarantee quality
 - f. A third- party project advisor to manage the project for me
- P15. Do you plan to make any general improvements to your home in the next 2 years?
1. Yes

- 2. No
 - 98. Don't know
- P16. [If P15=1 ("Yes")] What are you planning on improving? [DO NOT READ, CHOOSE ALL THAT APPLY]
- 1. Kitchen
 - 2. Bathrooms
 - 3. Bedrooms
 - 4. Living rooms
 - 5. Roof
 - 6. Window replacement or repair
 - 7. Water heater
 - 8. Heating source
 - 9. Garage
 - 10. Extra living space
 - 00. Other:_____
 - 98. Don't know
 - 99. Refused
- P17. Have you heard of the [Autofill: Efficiency Vermont Home Performance with ENERGY STAR/ Vermont Gas Systems Home Retrofit. Fill based on zip code list provided by client] program?
- 1. Yes
 - 2. No
 - 98. Don't Know
- P18. [IF RUTLAND COUNTY] Have you heard of NeighborWorks H.E.A.T. Squad?
- 1. Yes
 - 2. No
 - 98. Don't know

akAB

Next, I want to ask you a few questions about heating and electric energy-related issues and actions you might have taken.

akAB1. First, I'm going to read a few statements. Using a scale of 0 to 10 where 0 means "Not at all agree", and 10 means "Completely agree", please tell me how much you agree with each statement. [ROTATE; SCALE 0-10, 98=Don't Know, 99=Refused]

- a. I sometimes worry whether there is enough money to pay my heating costs.
- b. I often worry that the cost of heating for my home will increase.
- c. I am very concerned about how energy use affects the environment.
- d. It is my responsibility to use as little energy as possible to help the environment.
- e. I feel guilty if I use too much energy.
- f. I intend to conserve on heating consumption in my home this winter.
- g. If my heating fuel costs go up, I feel like I must do something to reduce them.
- h. I have to take the lead in my household if we're going to keep our heating costs down.
- i. If others in my household can't or won't change their behavior to lower our heating fuel costs, I feel I should do even more to control these costs.
- j. Heating my house has an impact on the environment.
- k. Conserving the energy used to heat my house will help reduce global warming.

akAB2. How worried are you about global warming? Would you say you are....[READ CHOICES except DK or REF]

1. Not at all worried
2. A little worried
3. Somewhat worried
4. Very worried, or
5. Extremely worried

98. Don't Know

99. Refused

akAB3. Next, I am going to ask you a few questions about heating and electric energy-saving actions you may have taken in your home.

What percent of clothes do you wash in cold water?

1. Percent: _____

98. Don't Know

akAB4. What percent of clothes do you dry on a line or drying rack either indoors or outside?

1. Percent: _____

98. Don't Know

akAB5. When buying an appliance, how often do you choose energy efficient versions of that product?

1. Always

4. Most of the time

2. Sometimes

3. Never

98. Don't know

akAB6. Have you gotten an estimate for installation of any type of renewable energy system for your home (solar electric, geothermal, solar hot water)? [If needed: bid for installation AND system]

1. Yes

2. No

98. Don't know

99. Refused

akAB7. Since 2008, many Americans have found themselves concerned about their economic situation. This includes households in Vermont. Using a scale of 1-5, where 1 means "not at all concerned" and 5 means "extremely concerned", to what extent does this apply to your household?

1. 1 – Not at all

- 2. 2
- 3. 3
- 4. 4
- 5. 5 - Extremely
- 98. Don't know
- 99. Refused

DEMOGRAPHICS

I just have a few more questions left.

D1. What is your primary heating fuel? [DO NOT READ, CHOOSE ONE]

- 1. Fuel Oil
- 2. Natural Gas (not propane)
- 3. Liquid propane gas
- 4. Electric
- 5. Wood
- 6. Wood pellets/bricks
- 7. Kerosene
- 00. Other, specify:_____
- 98. Don't Know

D2. Do you have any supplemental heat sources? [If needed: such as a woodstove, space heaters, or a gas fireplace? [DO NOT READ, CHOOSE ALL THAT APPLY]

- 1. None [SKIP NEXT QUESTION]
- 2. Woodstove or wood fireplace insert
- 3. Pellet stove or pellet fireplace insert
- 4. Wood fireplace
- 5. Gas fireplace
- 6. Propane fireplace
- 7. Electric baseboards or plug in heater

- 8. Kerosene space heater
 - 9. Oil furnace or boiler
 - 10. Propane furnace of boiler
 - 00. Other:_____
 - 98. Don't Know
 - 99. Refused
- D3. [If D2<>NONE] Would you say that you use your supplemental heating:
- 1. Rarely
 - 2. Only on the coldest days
 - 3. Only during the coldest months
 - 4. Only in the Spring and Fall
 - 5. Throughout the entire heating seasons (September through May)
 - 00. Other:_____
 - 98. Don't Know
 - 99. Refused
- D4. What is the highest level of education you have completed? [DO NOT READ, CHOOSE ONE]
- 1. Less than high school
 - 2. High school graduate
 - 3. Some college/vocational or technical school (including Associate degree)
 - 4. College graduate (Bachelor degree)
 - 5. Some graduate school
 - 6. Post graduate degree
 - 99. Refused
- D5. In what year were you born?
[RECORD, 9999=refused]_____

D6. I'm going to read a list of options. Please stop me when I reach the range that includes your annual household income from all sources in 2011, before taxes?
[READ LIST]

1. Under \$20,000
2. \$20,000 to under \$30,000
3. \$30,000 to under \$40,000
4. \$40,000 to under \$50,000
5. \$50,000 to under \$60,000
6. \$60,000 to \$75,000
7. \$75,000 to \$100,000
8. \$100,000 to \$150,000
9. \$150,000 to \$200,000
10. Over \$200,000
98. Don't Know
99. Refused

D7. GENDER [RECORD, DO NOT ASK]

1. Female
2. Male

F1. Any final comments? _____

F2. That is all of the questions I have for you today. But, it is possible that we might be conducting a follow-up survey, or more in-depth interview. Would you be willing to participate in such an interview down the road?

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

Thank you very much for your time.

APPENDIX B:

AKAB THEORY

In addition to nonparticipant market research results discussed in the body of this report, another objective of this study was to assess Vermonters' motivations for adopting energy efficient behaviors using measures developed for the akAB model of change. Previous research suggests that the Awareness-Knowledge-Attitude-Behavior (akAB) model of change is a useful model to explain factors that influence customers' decisions to participate in programs.³¹ The akAB model, which is depicted in Section X, is grounded in years of social science research on how individuals make energy conservation and efficiency choices, as well as "green" choices more generally. It includes five stages of energy-efficient behavior change.

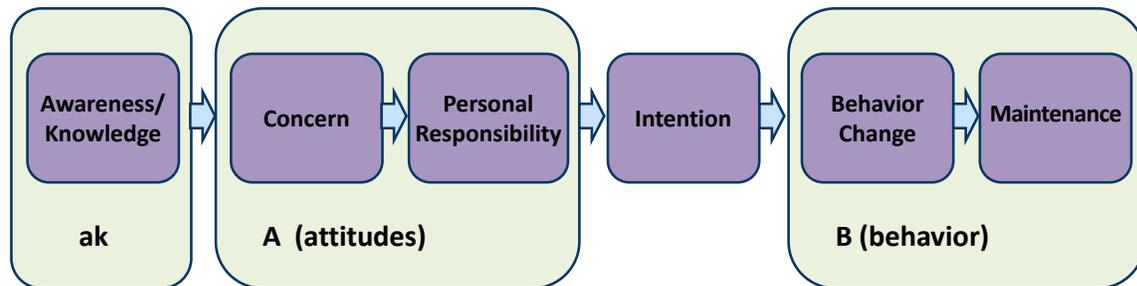
- **Awareness/Knowledge:** People must be aware or know of the possibility of change and the benefits of change before they can deliberately change their behavior based on that knowledge. For example, for people to invest in a new efficient technology to help the environment or their own finances, they need to be aware of this technology and the environmental, financial, or other benefits associated with it.
- **Concern:** To change behavior deliberately, a person must exhibit a concern about a perceived problem that the behavior change would address. For example, concerns associated with energy use can be altruistic or environmental (such as being concerned about the impact of energy use on the environment), or financial (such as worrying about paying electricity bills).
- **Ascription of Responsibility to Self (Personal Responsibility):** A person also needs to recognize that they can make a change and realize that they are responsible to do so. They may feel personally responsible to change due to environmental or financial concerns.
- **Intention to Conserve:** Intention to change a behavior is the final step before a durable behavioral change is likely to occur.
- **Maintenance:** Maintenance occurs after an individual or household adopts a behavior. It is necessary to maintain an energy efficiency behavior if long-lasting energy efficiency behaviors are desired.

The Evaluation Team compared participant (including those in process and impact evaluation survey samples), stalled participant, and nonparticipant akAB responses to

³¹ http://www.calmac.org/publications/GPS_Report_08302012_FINALS.pdf

examine whether there are any meaningful differences in awareness/knowledge of energy-related issues (**ak**), attitudes toward energy use (**A**), and intention to conserve energy at home (**B**). Notable findings are summarized in the body of the report. The akAB items measuring these constructs had been developed in a prior 2011-2012 akAB research study for the California utilities.^{32 33}

Figure C-1: Environmental & Financial akAB Constructs



³² http://www.calmac.org/publications/GPS_Report_08302012_FINALS.pdf

³³ Kruskal-Wallis, $p < .05$

APPENDIX C:

LOGISTIC REGRESSION METHOD

Logistic regression methods are statistical approaches that examine whether there are any significant associations between a discrete outcome such as group membership and other variables. In this study, the Evaluation Team used a multinomial logistic regression to assess how demographic variables and *awareness*, *concern*, *responsibility*, and *intention* indicators are associated with participants, stalled participants, and nonparticipants. The results are displayed in Table D-1.

Table D-1 displays odds ratios, which measure how likely are participants to be different demographically and in *awareness*, *concern*, *responsibility*, and *intention* scores compared to other groups. Specifically, values above and below 1 mean that other groups are more likely or less likely, respectively, to have certain characteristics than participants. For example, for each unit increase in *concern* score, the odds of being a stalled participant increase by 1.2 times when compared to participants. Similarly, when looking at differences between participants and standard nonparticipants, the odds of being a standard nonparticipant increases 1.1 times when *concern* increases.

Table D-1: Multinomial Logistic Regression Results

Variables Included in the Model	Odds Ratios		
	Stalled Participants vs. Participants	Engaged Nonparticipants vs. Participants	Standard Nonparticipants vs. Participants
Awareness, Concern, Responsibility, and Intention Indicators			
Aware of energy use impacts on the environment	1.15	1.15	1.00
Concern for environment	0.88	0.92	0.83**
Personal responsibility for environment	0.96	1.08	1.06
Concern for finances	1.16**	1.01	1.13**
Personal responsibility for finances	0.96	0.95	1.05
Intention to conserve energy at home	1.10	1.03	1.02

Variables Included in the Model	Odds Ratios		
	Stalled Participants vs. Participants	Engaged Nonparticipants vs. Participants	Standard Nonparticipants vs. Participants
Demographic Variables			
Age (in years)	1.01	0.98	0.99
Size of home (in square feet)	1.00	1.00	1.00
Age of home (Eight categories: 1="2001-2012 (newest)" to 8="1940 or earlier (oldest)")	0.90	0.65**	0.68**
Duration of home ownership (Seven categories: 1="1-2 yrs" to 7="More than 30 years")	0.84	1.23*	1.10
Household Income (Ten Categories: 1="\$20K or less" to 10="\$200K or more")	0.97	0.937	1.06

* Significant at $p < 0.1$

** Significant at $p < 0.05$