Efficiency Vermont's Home Performance with ENERGY STAR® Program

REPORT AND ANALYSIS

For questions about this report, please contact:
Nancy Gamble
Home Performance with ENERGY STAR Program Manager
Efficiency Vermont

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Efficiency Vermont
888-921-5990 • www.efficiencyvermont.com

Key Findings

- There was a 377% increase in the number of homes retrofitted through Efficiency Vermont's program from 2008-2013
- There is a strong correlation between statewide marketing and customer interest in thermal efficiency
- Incentives are the single most important factor in converting energy audits into project completions

The Efficiency Vermont Home Performance with ENERGY STAR program officially launched in 2005. In 2008, when the Vermont Legislature set a statewide goal to weatherize 80,000 homes by the year 2020, the program was galvanized. The legislation sought to harness energy efficiency as a driver of savings for consumers and economic development in Vermont. In order to meet the goal, Vermont's residential retrofit programs would need to scale up.

There are three primary programs through which Vermonters can access comprehensive thermal efficiency retrofits, along with incentives to offset project costs: low-income weatherization assistance (for those who meet income qualification requirements, weatherization service is provided at no cost), the Vermont Gas retrofit program (for homes served by natural gas and with relatively high usage patterns), and the Efficiency Vermont Home Performance with ENERGY STAR program. Currently, the state is on track to meet only half of the 2020 goal.[1]

This report was prepared to provide an overview and analysis of results and lessons learned under Efficiency Vermont's program from 2011-2013. The aim was to explore the following questions:

- *What are the factors that motivate customers to initiate and complete retrofit projects?*
- *How did these factors influence the growth and development of the Home Performance with ENERGY STAR program through 2013?*
- *What are the best options for cost-effectively increasing project completions while maintaining a market-based program structure?*
- *What other opportunities exist to update and evolve the program, setting the stage to accommodate and encourage further growth?*

These are questions that are frequently posed to the staff of Efficiency Vermont by contractors, partner organizations, and others who are engaged in the broader effort to help Vermont meet the 80,000 homes retrofit goal by 2020. Several other studies in recent years have also sought to address these questions. The Public Service Department provides robust third-party evaluation and oversight of all Efficiency Vermont programs and in 2013 completed both an impact and process evaluation of the Efficiency Vermont Home Performance with ENERGY STAR program.[2] The High Meadows Fund also helped to conduct market research and convened focus groups exploring the barriers and potential motivations behind the decision-making of single-family homeowners to complete retrofits.[3] These studies have all provided valuable insights that Efficiency Vermont is currently working to incorporate into its program design and delivery.

This report was developed to complement that work by providing additional perspective from Efficiency Vermont, based on a detailed analysis of program data. It is not a substitute for independent evaluation.

It is our hope that the data and analysis included in this report will serve as a resource to inform the conversations that are taking place around the 80,000 homes retrofit goal, deepen engagement and collaboration among partners, and provide transparency about the operations and long-term strategy of the Efficiency Vermont Home Performance with ENERGY STAR program.

1 Thermal Efficiency Task Force Report
2 http://publicservice.vermont.gov/topics/energy_efficiency/eeu_evaluation
3 https://www.efficiencyvermont.com/About-Us/White-Papers/whitepapers/2014/02/05/market-research-on-barriers-and-motivations-for-home-energy-efficiency-improvements

History

Nationally, all Home Performance with ENERGY STAR programs follow the same basic structure, designed to ensure a comprehensive, whole-house approach to energy efficiency and maximize long-term savings for homeowners.

In 2000, when Efficiency Vermont was created, it was intended to focus primarily on reducing statewide electric usage. It was funded exclusively through an energy efficiency charge on electric bills and was designed to deliver value to ratepayers by reducing electric demand and deferring the need for expensive investments in new power plants and transmission capacity.

Over time, however, Vermonters began seeking information and support from Efficiency Vermont on issues related to thermal, as well as electric, energy efficiency. In recognition of these needs, Efficiency Vermont worked with regulators, stakeholders, and the Vermont Legislature to identify resources for Efficiency Vermont to support thermal efficiency measures. Over the course of 2008 and 2009, the Legislature dedicated proceeds from the state's participation in the Regional Greenhouse Gas Initiative (RGGI), as well as revenues from electric demand savings that are bid into the Forward Capacity Market (FCM). On the whole, funding for Efficiency Vermont's thermal efficiency programs has been somewhat variable from year to year, but has generally averaged around $4 million annually. Though the bulk of this funding supports the Home Performance with ENERGY STAR program, it is also used to offset the costs of thermal retrofits for multifamily buildings and businesses. It is worth noting that the variable nature of both the RGGI and FCM funding sources (they are both auction-based systems) can raise challenges for long-term program planning, particularly as it relates to customer incentive offerings, which will be discussed in later sections of this report.

The Home Performance with ENERGY STAR Approach

Home Performance with ENERGY STAR is a national brand managed by the U.S. Department of Energy (U.S. DOE). Across the United States, there are some 50 organizations that have signed on to sponsor local programs under this overarching brand. Although there are differences among those local programs, they all follow the same basic structure, designed to ensure a comprehensive, whole-house approach to energy efficiency and maximize long-term savings for homeowners. Below are the key components of the Home Performance with ENERGY STAR program approach, as outlined by U.S. DOE and implemented in Vermont by Efficiency Vermont.

Building Science and Contractor Training

The market-based program structure is designed to increase the number of contractors with advanced building science skills while simultaneously connecting them with customers who want to complete projects in their homes.

Approaching energy efficiency from a whole-house perspective requires an advanced understanding of building science and the complex interplay of moisture, air flow, and heat retention that is unique to each structure. In some cases, a contractor performing an energy assessment of a home may discover health and safety issues, such as moisture buildup or unsafe levels of carbon monoxide, that must be addressed before weatherization can be safely completed. If insulation and air sealing work are not completed correctly, they can cause long-term problems with moisture and air quality.

The Home Performance with ENERGY STAR program guidelines call for extensive training of contractors, as well as rigorous oversight and quality control of their work. They also require contractors to perform energy audits prior to beginning any work. Once a project has been completed, there is an additional "test out" inspection to determine how much air infiltration has been reduced and provide a final estimate of energy savings.

Another hallmark of the Home Performance with ENERGY STAR approach is that all work is generally performed by private, independent contractors who are not employed by local programs. This market-based structure is intended to help develop the marketplace by increasing the number of contractors with advanced building science skills while simultaneously

Every project completed under Efficiency Vermont's Home Performance with ENERGY STAR program is reviewed for quality and comprehensiveness of savings.

connecting them with customers who want to complete projects in their homes. As such, contractor training and quality assurance are a crucial responsibility of local Home Performance with ENERGY STAR programs.

Although this market-based model adds significant complexity to the program from an operations standpoint, there are substantial long-term benefits. Every project completed under Efficiency Vermont's Home Performance with ENERGY STAR program is reviewed for quality and comprehensiveness of savings. Efficiency Vermont engineers also conduct field visits on 5-10% of projects annually to confer with homeowners, review the quality of completed work, and monitor the progress of contractors within the program. The aim of this process is to ensure that contractors can develop their skills and knowledge of building science, while providing high-quality service and long-term energy savings for their customers. Contractors have consistently risen to the challenge of this oversight and continue to see value in participating in the program. There has been significant growth in the network in recent years, with contractors now positioned to serve virtually every corner of the state: In 2007, there were just 28 BPI-certified contractors participating in Efficiency Vermont's program; since 2009, the network has held steady at about 70 participating contractors.

Home Performance Participating Contractors

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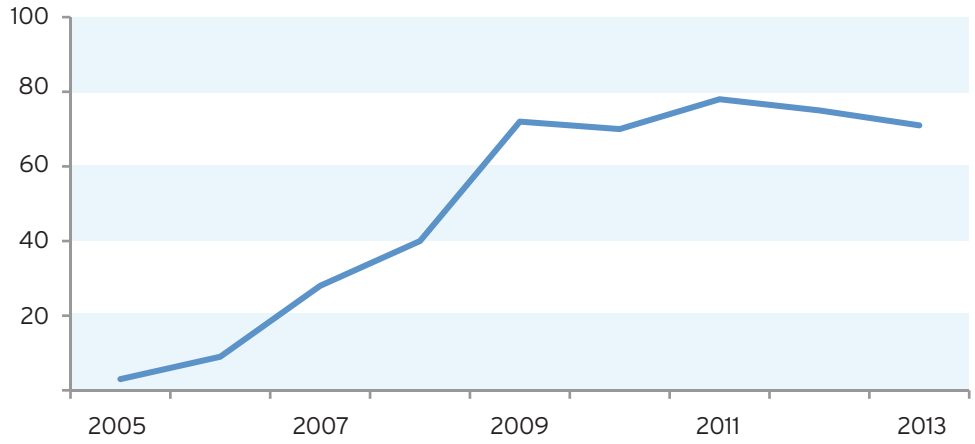

The network of BPI-certified contractors has grown significantly since the start of Efficiency Vermont's Home Performance with ENERGY STAR program.

Efficiency Vermont estimates that the building performance industry now supports more than 170 jobs and annual revenues of $40 million.

Thermal energy efficiency contracting — also known as building performance — has emerged as an industry in Vermont. Based on surveys conducted in 2012-2013, Efficiency Vermont estimates that the building performance industry now supports more than 170 jobs and annual revenues of $40 million. In 2013, contractors formed a new trade association, the Building Performance Professionals Association of Vermont, to organize and advocate for the building performance industry in the state.

Over the last decade, the statewide BPI contractor network has also helped support a corresponding increase in demand for thermal efficiency retrofits. In 2008, when the Legislature set its retrofit goal, roughly 300 projects were completed under Efficiency Vermont's Home Performance with ENERGY STAR program; by 2013, annual completions had nearly quadrupled, to 1,165.

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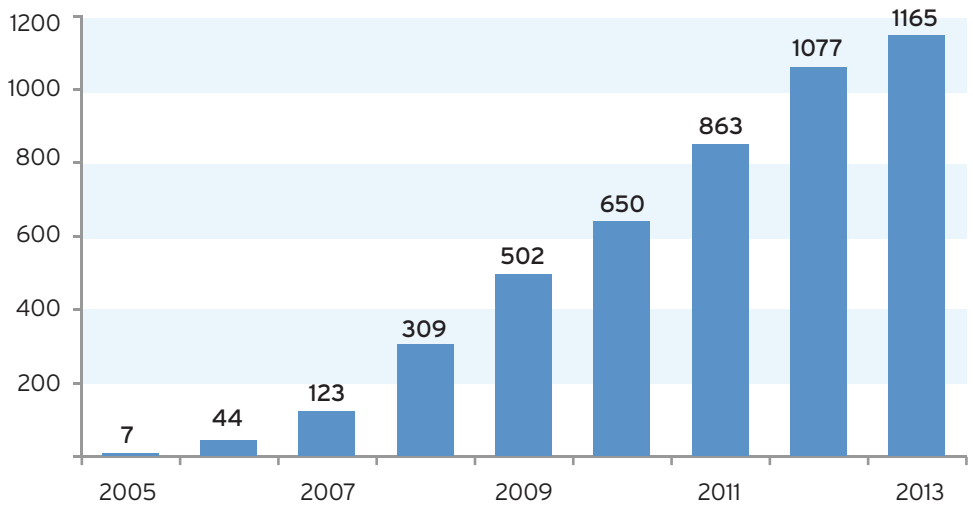
Completions by Year



Project completions have increased steadily over time—nearly quadrupling between 2008-2013.

Customer Incentives

The most widely recognized facet of Efficiency Vermont's Home Performance with ENERGY STAR program, and most other programs that operate under the U.S. DOE overarching brand, is the provision of incentive payments to customers following the completion of their projects. These payments help meet several important goals.

In recent market research, 65% of respondents who had not completed a comprehensive energy efficiency project in their homes identified 'project costs' as the reason they had not yet taken action.

Firstly, incentives reduce the bottom-line costs for homeowners who complete projects, which can reduce the "sticker shock" of an initial estimate from a contractor and make the decision to move forward with a project easier. In recent market research conducted for the Vermont Department of Public Service and the High Meadows Fund, 65% of respondents who had not completed a comprehensive energy efficiency project in their homes – but indicated an interest in doing so – identified "project costs" as the reason they had not yet taken action.[4]

Secondly, incentives help to encourage projects that are comprehensive and therefore more likely to generate long-term energy savings. Although there have been minor changes from year to year, Efficiency Vermont has always used a performance-based program incentive structure that gives the greatest weight to the most cost-effective and comprehensive measures, such as insulation and air sealing. This means that more comprehensive projects, which generate higher energy savings, will generally qualify for larger incentive payments.

Finally – and of critical importance in the context of Vermont's larger retrofit goal – incentives enable Efficiency Vermont to monitor and track projects that might not otherwise be reported. A majority of Vermont homeowners report an interest in energy efficiency[5], but very few have the skills or knowledge of building science to drive significant savings on their energy bills. For example, when asked about energy efficiency work they have completed on their own, many homeowners cite the replacement of windows as a key accomplishment.[6] In actual fact, window

4 Vermont Single-Family Retrofit Market, Market Research (GDS Associates: 2013)
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replacement is almost never a cost-effective option for energy savings; it makes much more long-term financial sense to invest in air sealing and insulation. With money on the table from Efficiency Vermont, homeowners are more likely to engage with skilled contractors, thereby obtaining support and technical guidance to ensure they get the most value for their energy investment.

Efficiency Vermont is a regulated utility and, as such, its activities and goals are overseen by the Vermont Public Service Board and Department of Public Service. This means that it must be able to verify that projects it has supported are actually generating energy savings and that it has spent its budget wisely and cost-effectively. Incentive payments, carefully structured to help homeowners maximize their energy savings and tracked through a statewide reporting system, accomplish that purpose, while also helping track progress toward Vermont's overall home retrofit goal.

Incentives have been capped at a maximum of $2,000 since June 2012, when program uptake was increasing and there were strong concerns that Efficiency Vermont would not have the resources to fairly and predictably meet customer demand.

Although average incentive payments have varied somewhat over the last several years, the maximum incentive level has changed only once in the last five years. This stability enables consistent messaging to customers, steady growth in completions, and helps insulate participating contractors from boom and bust cycles that would negatively impact their businesses. Incentives have been capped at a maximum of $2,000 since June 2012, when program uptake was increasing and there were strong concerns that Efficiency Vermont would not have the resources to fairly and predictably meet customer demand. In addition to the overall incentive, since February 2013, customers have received an immediate $100 discount on the cost of an energy audit.

Marketing and Customer Support

In keeping with the overarching Home Performance with ENERGY STAR program model, contractors who participate in Efficiency Vermont's network are able to benefit from statewide marketing and customer support services that help generate customer interest and drive jobs to completion. In practice, this means that an advertisement being run by Efficiency Vermont in a local paper, online, on the radio, or on a statewide television network helps seed interest in energy efficiency improvements. Efficiency Vermont customer support representatives can then connect those interested customers with participating contractors in their local area, provide an overview of the process for obtaining incentives, and help set priorities or answer questions as the work is being completed. Other offerings are designed to help contractors drive their own business directly, such as a co-op advertising program, which pays 50% of contractor advertising costs, up to $500 per year.

Contractors who participate in Efficiency Vermont's network are able to benefit from statewide marketing and customer support services that help generate customer interest and drive jobs to completion.

These statewide promotions are strongly complemented by a range of community-based outreach efforts that are spearheaded at the local level by several keystone organizations and partners. Originally based in Rutland County and supported through American Recovery and Reinvestment Act (ARRA) funding starting in 2009, the Home Energy Action Team Squad (H.E.A.T. Squad) program of NeighborWorks of Western Vermont (NWWVT) has shown impressive results. Their approach, which focuses on project management for both contractors and customers, along with integrated financing and local marketing efforts, generated a significant uptick in project completions in Rutland County between 2011 and 2013.[7] The project has since expanded to several additional counties throughout the state and focuses on providing a value-added structure on top of Efficiency Vermont's existing contractor network and customer incentive offering.

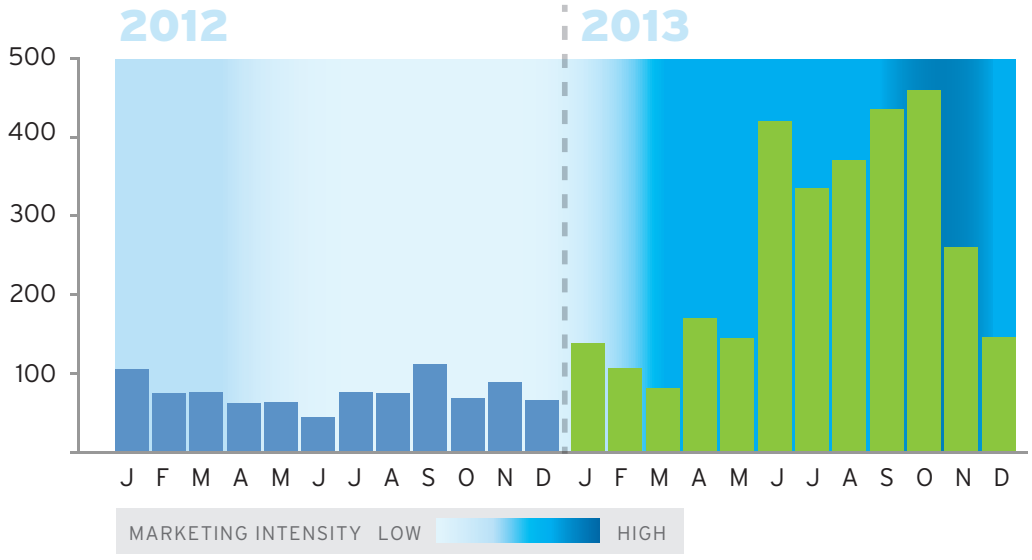
7 Evaluation of NWWVT's H.E.A.T. Squad (The Cadmus Group: 2012)

Another notable local outreach effort to drive home energy retrofits was driven by the Sustainable Energy Resources Group, which used limited-time ARRA funding to supplement Efficiency Vermont's incentive offering and has consistently engaged with residents of Vermont's Upper Valley region through events, door knocking campaigns, and community energy projects. Additionally, the Vermont Energy and Climate Action Network (VECAN) serves as a statewide umbrella network for more than 100 town energy committees and has been a crucial partner to Efficiency Vermont in promoting energy efficiency at the local level. This partnership culminated in the 2013 launch of a statewide "Home Energy Challenge" (modeled on a Rutland County town by town challenge effort led by NWWVT in 2011), which sought to test the potential of community-based efforts to drive completion of retrofit projects at the local level. Although the results varied significantly among communities, there were some towns where the effort appears to have produced significant results.[8]

There is a striking correlation between statewide marketing efforts and customer interest in home energy efficiency projects.

Beyond local outreach, there is a striking correlation between statewide marketing efforts and customer interest in the Home Performance with ENERGY STAR program. Data from Efficiency Vermont's Customer Support department, which consistently tracked incoming calls related to thermal and whole-home efficiency through 2012 and 2013, provides insights on the impact of statewide marketing campaigns. In the second quarter of 2012, Efficiency Vermont chose to suspend all marketing for the program for the remainder of the year out of concern that the budget would be exceeded and there would not be enough funding left to offer incentives to customers. By the end of the second quarter of 2013, the marketing campaign had resumed, accompanied by a $500 limited-time bonus incentive to help drive projects. The scenario provided a natural experiment to test the impact of marketing and incentive offers on customer leads.

Inbound Customer Calls on Home Thermal Efficiency



The launch of a statewide marketing campaign, in the second quarter of 2013, led to a strong uptick in customer interest.

8 Vermont Home Energy Challenge, Final Report (Markowitz: 2014)

A statewide marketing campaign, combined with a $500 bonus incentive, led to a 362% increase in customer calls on home thermal efficiency.

Over the course of 2012, with no active marketing of the program, Efficiency Vermont received an average of 73 calls per month related to residential thermal efficiency. This trend generally continued into the first several months of 2013, with an average of 124 calls on this topic from January through May. In June, coinciding with the ramp up of a statewide marketing effort and widespread promotion of a limited-time $500 bonus incentive, the number of incoming calls from customers on residential thermal efficiency spiked to 411. This customer interest remained strong through the rest of the year, with an average of 339 calls per month from June through December. This represented a 362% increase in call volume between June-December in 2012 and June-December of 2013, and demonstrates a clear relationship to the corresponding strength of the program marketing effort.

Data and Methodology

As noted in prior sections of this report, there are multiple customer touch points — from interest and awareness, to energy audit, to project completion — embedded in the Home Performance with ENERGY STAR process. In order to complete a comprehensive analysis of results under the program, it was necessary to consider all of those touch points in the context of over 3,000 unique projects (some of which were simply audits and others that had progressed to completion), all of which were initiated between 2010 and 2013.

Efficiency Vermont's tracking and reporting systems (including HERO, the contractor reporting tool) provide a wealth of information relating to specific projects, including incentives paid, measures installed, and recommended upgrades presented to homeowners following an audit. Timeline data in HERO, however, is not always a consistent reflection of the date when a customer chose to move forward with a project. In addition, contractors do not always submit audit data to Efficiency Vermont, particularly for projects that they feel are unlikely to move to completion. This was especially true for audits that took place prior to the 2013 launch of the $100 audit discount offer. For the purposes of the analysis, however, date information from HERO had to be taken at face value.

For this study, it was important to accurately classify historical projects into complete and incomplete categories. Project completion is clearly documented by contractors when they assign a project with complete status on a particular date. However, there is no formal approach to classifying projects as incomplete because there is wide variation in the length of time to complete a project. We observed from the data that historically 95% of all completed projects have had retrofit data reported to Efficiency Vermont within 380 days of the time that an audit was obtained. Therefore, based on this model, each project was given one of three classifications: "Complete," for projects where retrofit data was reported; "Incomplete," for projects where more than 380 days had elapsed beyond the audit date and no retrofit data had been reported; and "Unknown," for projects where less than 380 days had elapsed since the audit and there was no closeout data.

To determine the relative influence of various project-specific and community-level demographic factors on whether or not a project was completed, we used a powerful machine learning technique known as a random forest analysis. A random forest model compares a multitude (usually hundreds or thousands) of classification trees made up of random combinations of variables of interest and determines which of those variables most consistently contribute to overall prediction accuracy. For this analysis we used the random forest approach to determine which project- or community-specific factors contributed most consistently to the projects reaching complete status vs. incomplete.

The below factors were also weighed against each other to create a model for how they interact in the typical customer pathway for the Home Performance with ENERGY STAR program (all derived from Efficiency Vermont program data, unless otherwise noted):

- ***Incentive percentage:*** *the ratio of incentives offered to the cost of all efficiency and health and safety work associated with a project*
- ***Simple payback:*** *the number of years required for annual savings to pay for the upfront project cost*
- ***Installed project costs:*** *cost of all efficiency and health and safety work associated with a project*
- ***Annual savings estimate:*** *dollar value of estimated annual energy savings associated with the projects*
- ***Previous jobs per thousand homes:*** *the proportion of homes in an area that have been through the Efficiency Vermont Home Performance with ENERGY STAR program in the past, calculated at the zip code level based on jobs per zip code divided by households per zip code (from US Census 2010 and Efficiency Vermont data)*
- ***Auditor Access:*** *a metric based on geographic analysis of the proximity (based on driving time) of auditors to different areas of the state. Zip code centroids of ESRI GIS data were used to locate the contractor/auditor origins and also represented potential destination areas served within 30, 60 and 90 minute driving intervals from the origin points. The ArcGIS Network Analyst extension Origin-Destination cost matrix analysis was used, which is based on a modified version of Dijkstra's shortest path algorithm. Driving time calculations were based on ESRI Streetmap North America 10.1 network information representing streets, highways, access ramps, and ferries, including road network attributes such as arterial classification, speed, and direction of travel.*
- ***Median income:*** *the median household income for the zip code in which a project occurred, based on the last US Census (2010)*
- ***Number of households:*** *the number of households for the zip code in which a project occurred, based on the last US Census (2010)*

Among additional factors considered, but not found to be significant, were the percentage of owner-occupied homes and vacancy rates in a given ZIP code, home square footage, total population, total MMBtu savings, and the year in which the audit was conducted.

As noted above, geographic and demographic information presented in this report was obtained from 2010 U.S. Census data. In order to comply with Efficiency Vermont's customer privacy policies, all data presented in this report has been anonymized and presented at the level of census ZIP codes.

Analysis

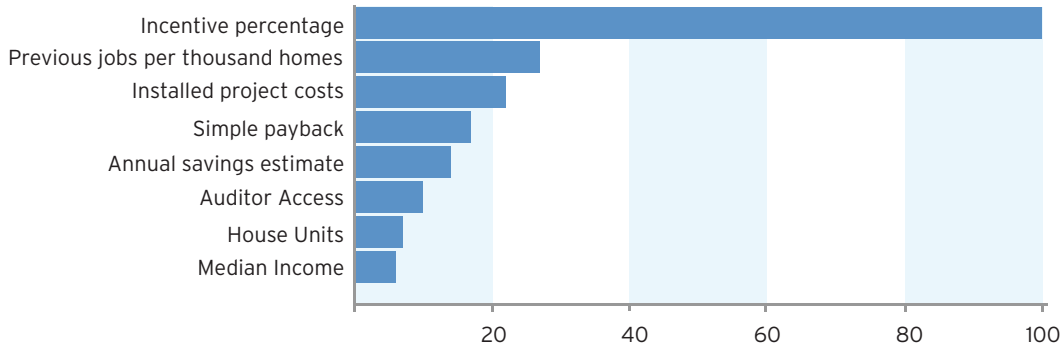
Of the factors considered for this analysis, there was only one that had a strong influence on whether a Home Performance with ENERGY STAR project was completed, once an audit had been performed. The most influential factor, by far, was the percentage of a project's total cost that was repaid by incentive dollars.

Unsurprisingly, simple payback — as predicted by contractors on audit and completion reports

Of the factors considered for this analysis, there was only one that had a strong influence on whether a retrofit project was completed, once an audit had been performed: the percentage of a project's total cost that was repaid by incentive dollars.

– was also a predictor of whether a project moved forward or not, perhaps due to the appeal to homeowners of projects that pay themselves off more quickly through reduced energy bills. There also appears to be a correlation between completion rates and communities with a history of retrofit activity. Perhaps this is evidence of strong community spirit and local energy engagement; however, further study would be needed to confirm that this is the mechanism driving this relationship.

Relative Importance of Factors in Converting Audits to Completed Projects



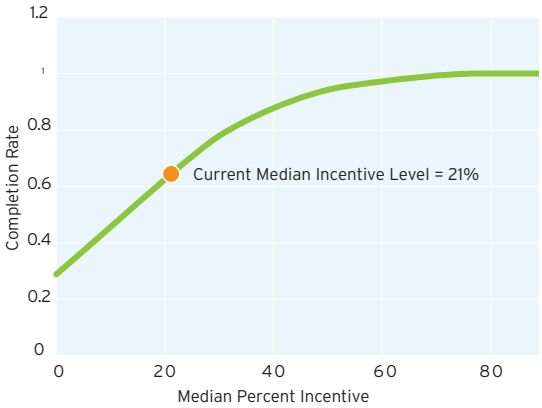
Of the factors analyzed incentive percentage was the strongest predictor of whether a project would move from audit to completion. In this graphic, the strongest factor is set at 100 and all other factors are weighed against it to show their relative influence.

...if the median Efficiency Vermont incentive offer was increased to comprise 31% of project costs, it would lead to a 30% increase in program completion rates.

The analysis revealed some surprises in terms of the factors that did not have a strong influence on whether projects were completed. In particular, access to energy auditors, the total number of housing units, and area median income did not appear to be significant factors in driving projects from audit to completion.

In order to explore the incentive factor at a deeper level, a logistic regression was performed to examine the influence of the percentage of project costs paid in incentives on completion rates. Based on the regression, it is worth noting that a portion of projects are likely to have completed even with very low incentives. However, as incentives increase, there is a very strong correspondence with increased completion rates.

Completion Rate Regression



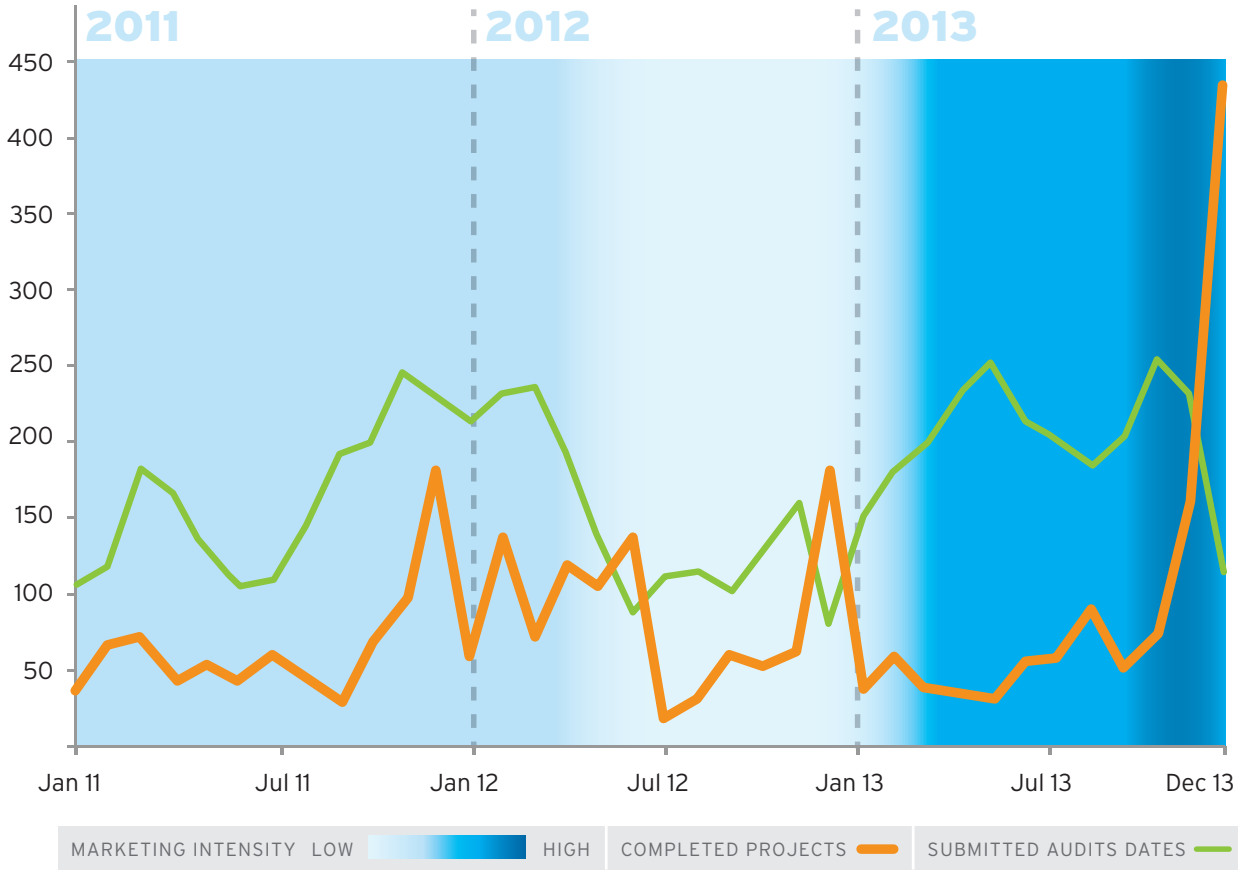
A logistic regression indicates that an increase in the median incentive offering would have a significant impact on completion rates.

The data indicate that, under the current incentive structure (which provides a median incentive of about 21% of project costs), 65% of projects are ultimately completed. That figure is high in the context of Home Performance with ENERGY STAR programs nationally, and it is therefore important to note that it is based only on audits that are reported to Efficiency Vermont. Contractors are significantly more likely to report audits they deem likely to convert to completed projects, which adds a positive bias to

conversion rates, but should not impact the trend of an overall regression. Based on regression data, we can conclude that if the median Efficiency Vermont incentive offer were increased by 50% (to comprise 31% of project costs), it would lead to a 30% increase in program completion rates.

Monthly completion and audit data, when plotted over time, provide additional context for the relationship between incentives, marketing, and completion rates. As noted previously, there were no statewide marketing promotions of Efficiency Vermont's Home Performance with ENERGY STAR program in 2012. Starting in the second quarter of 2013, however, an aggressive marketing campaign was launched in combination with a $500 bonus incentive for projects that completed by the end of the year. These promotions not only drove new energy audits, but they also made it more likely that projects would be completed. Marketing and promotional efforts encouraged more customers to begin the process by scheduling an energy audit. Once they received their audit results and understood their energy savings potential, customers were spurred to complete projects more quickly so they would not lose out on an additional $500 to help offset their costs.

Home Performance with ENERGY STAR audits and completions



There is typically a spike in project completions at the end of every year. In 2013, marketing efforts, in combination with a $500 bonus incentive, encouraged a strong increase in audits and the highest number of monthly project completions in the history of the program.

This pattern has been repeated at all levels when decisions are made that impact incentive offerings and marketing or outreach efforts. In December 2012, Green Mountain Power offered a $500 bonus to any of their customers who completed projects within that month. Efficiency Vermont promoted this bonus to customers who already had an audit and saw a significant increase in GMP customer completions. On a program-wide level, Efficiency Vermont customer support staff conducted phone and email outreach throughout 2013 on 1,500 projects that had "stalled" between audit and completion. This effort, combined with the bonus offer and marketing ramp-up, helped drive more projects and increase the program's overall conversion rate.

Driving Projects: What have we learned?

The data analyzed for this report indicate that incentive levels have the single greatest impact on whether a project ultimately moves from audit to completion.

Though there are many factors that influence customer decisions, especially on projects as costly and complex as whole-home energy upgrades, the Efficiency Vermont program data analyzed for this report indicate that incentive levels as a percentage of job costs have the single greatest impact on whether a project ultimately moves from audit to completion. Based on monthly audit and completion data, it appears that incentive and bonus deadlines help enhance this relationship, moving projects to complete more quickly. Marketing and promotional efforts, which raise awareness of home energy efficiency, savings potential, and incentive offerings, help drive audits and bring customers into the pipeline.

Efficiency Vermont currently devotes 66% of its Home Performance with ENERGY STAR program budget to incentive offerings and marketing promotion. In 2013, projects incentivized by Efficiency Vermont received an average of $1,555. It is worth noting that a portion of Efficiency Vermont's 2013 budget paid for investments in program research and infrastructure that will have long-term benefit. For example, the program procured new energy audit and program management software to support customers and contractors more efficiently and effectively. The program also contributed substantially to the development of a Vermont Home Energy Score and label to make energy efficiency investments visible when homes are sold and purchased.

...the 2012 decision to stop all marketing had a reverberating negative impact, which lasted well into 2013.

It also appears to be very important to maintain a consistent promotional presence in the marketplace. Whole-home energy projects typically take around six months from audit to completion, and they require significant time, money, and commitment. This means that the program must be structured to continually encourage new customers to enter the pipeline: In any given year, a high number of audits in July means more projects are likely to complete in December. Marketing and promotion are critical tools for keeping energy efficiency top of mind for customers who are unlikely to think about their heating bills when the weather is warm. As the monthly audit and completion data show, the 2012 decision to stop all marketing had a reverberating negative impact, which lasted well into 2013, by slowing the entry of new customers into the pipeline.

It also seems likely that word of mouth recommendations from satisfied customers have an impact on both audits and completions. Efficiency Vermont conducts regular surveys of customers who have completed projects, as well as contractors who participate in the program. Those surveys indicate a high level of customer satisfaction, at 98%, with an average satisfaction ranking of 4.64 on a scale of 1-5. In addition, these reports consistently note that recommendations from family and friends are the single most common source of referrals

to Efficiency Vermont's programs and to specific contractors.[9][10] These findings underscore a unique challenge — and opportunity — for market-based programs such as Home Performance with ENERGY STAR. The contractors who perform high quality work and are able to devote time and energy to promoting their businesses alongside their happy customers will tend to generate more audits and completed projects. In 2013, 73% of projects through Efficiency Vermont's program were completed by just 32% of contractors. The dual roles that contractors play in both performing and selling the work are key to building long-term customer demand for retrofits — and maintaining a program that is cost effective to operate.

Efficiency Vermont's Home Performance with ENERGY STAR Program: Plans for 2014 and beyond

The dual roles that contractors play in both performing and selling the work are key to building long-term customer demand for retrofits — and maintaining a program that is cost effective to operate.

Across the country, Home Performance with ENERGY STAR participating programs consistently note the challenges of converting customer interest into audits, and audits into completed projects. Whole-home retrofit projects are generally costly and time-consuming for customers, but they have long-term financial value and offer many benefits beyond energy savings, particularly in terms of health, safety, and comfort. Moving beyond the challenges of selling a complex product to customers, there are many ways to help ease the process and position Vermont's market-based retrofit program for growth over the next several years. Among other program changes being considered or put in place by Efficiency Vermont for 2015 and the latter half of 2014 are:

- *Allowing customers to "stage" their projects by setting priorities with their contractor that meet their budget over several years, while maintaining their eligibility for incentives. Seeking more opportunities to integrate promotion of Home Performance with ENERGY STAR into other Efficiency Vermont program offerings, particularly those for efficient consumer products.*
- *Continued follow-up with "stalled" customers who have completed audits, but have not yet followed through on retrofit projects. This tactic proved effective in 2013 as a means of notifying customers of the limited-time bonus incentive.*
- *System and process improvements to streamline the customer and contractor experience in the program. During 2013, Efficiency Vermont acquired new software to aid contractors in entering audit and project information and increase transparency for customers, while streamlining reporting and data analysis for program staff. The software will be fully implemented by the third quarter of 2014 and will provide:*
    - *Workflow management for contractors*
    - *Increased customer service engagement opportunities throughout the workflow*
    - *Online customer portal to guide homeowners step-by-step through their projects*
    - *Streamlined reporting and trend data for program staff.*

There are many ways to position Vermont's market-based retrofit program for growth over the next several years.

9 Efficiency Vermont Contractor Satisfaction (Caliri, et al: 2011)
10 Energy Audits & Home Improvements: Home Performance with ENERGY STAR (Sinkula Market Research and Consulting: 2010)

- *New partnerships between building performance contractors and fuel dealers, to encourage referrals for air sealing and insulation, as well as heating system upgrades.*
- *Delivery of a home energy score and label as part of each Home Performance with ENERGY STAR project, as a first step towards quantifying the value of energy efficiency upgrades.*
- *Providing contractors with opportunities for training in sales, promotion, and business development targeted at the home performance industry, as well as advanced technical and building science courses.*
- *Financing and other "concierge services" for customers to help overcome barriers to completing home energy upgrades.*

Over the last seven years, Efficiency Vermont's Home Performance with ENERGY STAR program has continued to serve increasing numbers of customers. As noted above, there are many opportunities to position the program for further growth. Some essential facets of the program, however, will remain in place. It is clearly critical that customer incentives are maintained at least at current levels, since they are a crucial driver of completed projects. They also encourage customers to first obtain an energy audit, a "roadmap" toward energy efficiency in their home, and then spend their energy dollars on the most cost-effective upgrades. It is also important to maintain a consistent promotional presence in the marketplace in order to generate audit activity and fill the pipeline with projects. These efforts will remain a top priority for Efficiency Vermont in the coming years as we continue to work with partners and contractors to improve the program, better serve Vermonters, and seek to drive progress toward Vermont's statewide retrofit goal.

APPENDICES

APPENDIX A
Audits and Completions by Town, 2011-2013

The project completion data in this table in not always consistent with data presented in the Vermont Home Energy Challenge (VHEC) Final Report, because it provides approximations based on the following different reporting criteria:

- *It is based on project completions, not unit counts, which means that projects involving multiple units in the same multifamily building are counted as one project. For the purposes of the VHEC, each unit would have been counted as an individual project.*
- *The year listed is based on the date projects were reported as complete and closed out within Efficiency Vermont's tracking systems. VHEC data was compiled based on the date projects were submitted to Efficiency Vermont, not when they were closed out.*
- *Since VHEC was designed to track total retrofit activity at the community level, VHEC data includes all projects that were completed through Efficiency Vermont and the Vermont Gas Systems retrofit program. This table only includes projects through Efficiency Vermont's program, or projects that were completed jointly through Efficiency Vermont and Vermont Gas Systems. It does not include Vermont Gas Systems projects where there was no involvement from Efficiency Vermont.*

		2011		2012		2013	
County	Town	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed
Addison	Addison	1	1	3	2	4	1
	Bridport	0	0	1	1	7	2
	Bristol	7	4	14	8	27	9
	Cornwall	3	2	2	0	13	4
	East Middlebury	2	1	3	2	10	3
	Ferrisburg	4	2	3	3	15	5
	Hancock	0	0	0	0	1	1
	Lincoln	1	0	2	3	2	0
	Middlebury	8	7	21	12	95	35
	Monkton	2	1	5	4	8	1
	New Haven	2	2	5	2	16	7
	North Ferrisburg	0	0	1	1	0	0
	Orwell	1	1	1	0	6	3
	Panton	2	1	1	0	3	1
	Ripton	1	1	2	1	5	2
	Salisbury	3	2	2	3	16	8
	Shoreham	0	1	7	1	5	3
	Starksboro	3	2	4	3	2	0
	Vergennes	2	2	2	2	11	2
	Waltham	0	0	0	0	2	1
	Weybridge	0	0	3	0	29	11
	Whiting	0	0	0	0	2	0

		2011		2012		2013	
County	Town	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed
Bennington	Arlington	5	5	5	2	14	6
	Bennington	9	7	23	13	45	15
	Bondville	0	0	0	0	82	81
	Dorset	12	7	4	5	20	14
	East Arlington	1	1	1	1	1	1
	East Dorset	0	0	1	1	7	3
	Manchester	8	4	7	9	7	3
	Manchester Center	12	8	13	10	23	14
	North Bennington	5	5	1	1	9	3
	Peru	2	2	4	2	7	3
	Pownal	2	2	2	1	5	2
	Readsboro	0	0	1	1	2	2
	Rupert	5	5	2	1	9	9
Bennington	Sandgate	1	1	0	0	1	0
	Shaftsbury	4	2	3	1	13	7
	South Dorset	1	1	2	1	3	2
	Stamford	2	1	1	0	1	2
	Sunderland	0	0	3	2	4	0
	Winhall	1	1	1	1	7	6
	Woodford	1	1	1	0	1	1
Caledonia	Barnet	0	0	1	1	4	4
	Danville	1	1	3	1	2	1
	East Burke	2	2	1	1	1	1
	East Hardwick	1	1	2	0	1	2
	East Ryegate	0	0	1	0	0	0
	Groton	0	0	2	1	0	0
	Hardwick	0	0	1	0	8	4
	Lyndon	1	0	3	1	4	4
	Lyndonville	1	1	3	3	0	0
	Mc Indoe Falls	0	0	0	0	1	0
	North Danville	0	0	0	0	1	1
	Passumpsic	0	0	0	0	1	0
	Peacham	2	0	0	0	1	0
	Ryegate	1	0	1	0	3	1
	Saint Johnsbury	4	2	8	4	8	4
	Sheffield	0	0	2	0	0	1
	South Ryegate	0	0	0	0	1	0
	Sutton	0	0	0	0	1	0
	Walden	0	0	0	0	1	0

		2011		2012		2013	
County	Town	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed
Caledonia	Waterford	0	0	0	0	2	1
	West Danville	1	1	0	0	0	0
Chittenden	Bolton	2	2	0	0	0	0
	Burlington	40	31	38	25	40	30
	Charlotte	11	8	10	13	20	4
	Colchester	8	7	14	9	13	3
	Essex	10	7	11	11	7	1
	Essex Junction	14	8	12	13	17	8
	Georgia	2	2	7	3	1	1
	Hinesburg	3	2	12	9	11	6
	Huntington	4	3	2	3	7	3
	Jericho	13	8	10	9	22	13
	Jericho Center	0	0	0	0	1	0
Chittenden	Jonesville	1	1	1	1	1	0
	Milton	7	7	5	3	15	3
	Richmond	10	7	10	11	19	8
	Saint George	0	0	2	2	6	2
	Shelburne	16	10	12	13	28	11
	South Burlington	11	9	16	11	34	17
	Underhill	8	5	8	8	13	5
	Underhill Center	0	0	0	0	1	1
	Westford	3	3	3	2	4	4
	Williston	12	9	16	12	15	10
	Winooski	2	1	1	2	7	6
Essex	Canaan	1	1	1	0	0	0
	Concord	0	0	0	0	1	0
	East Haven	0	0	1	0	0	0
	Guildhall	2	1	0	1	0	0
	Island Pond	0	0	0	0	1	1
Franklin	Bakersfield	0	0	0	0	1	1
	East Fairfield	1	1	0	0	3	2
	Enosburg Falls	0	0	2	1	2	2
	Fairfax	1	1	3	1	3	1
	Fairfield	2	1	1	1	0	1
	Fletcher	2	2	1	1	6	3
	Franklin	0	0	2	0	1	2
	Montgomery	1	1	1	0	0	0
	Richford	1	0	0	1	0	0
	Saint Albans	1	0	7	2	7	4

		2011		2012		2013	
County	Town	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed
Franklin	Sheldon	1	0	3	1	2	1
	Swanton	1	1	3	1	2	1
Grand Isle	Alburgh	1	1	0	0	1	1
	Grand Isle	3	3	3	2	0	0
	North Hero	0	0	1	0	1	0
	South Hero	2	1	4	5	3	2
Lamoille	Cambridge	2	2	2	1	8	2
	Eden	1	1	0	0	2	0
	Hyde Park	5	3	9	7	6	6
	Jeffersonville	0	0	3	0	2	1
	Johnson	2	1	1	0	3	3
	Lake Elmore	0	0	0	0	1	1
	Morrisville	6	3	7	4	15	7
Lamoille	Stowe	22	8	24	19	19	6
	Waterville	1	0	0	0	1	1
	Wolcott	1	0	0	0	4	3
Orange	Bethel	1	1	2	0	3	4
	Bradford	1	0	1	1	18	5
	Brookfield	6	4	6	5	2	4
	Chelsea	5	4	1	0	7	4
	Corinth	2	0	5	3	4	1
	East Corinth	1	1	0	0	2	0
	East Orange	1	0	0	1	0	0
	Fairlee	1	1	2	2	4	0
	Newbury	2	2	1	0	0	0
	Randolph	8	7	11	6	16	12
	Randolph Center	1	1	0	0	0	0
	South Strafford	0	0	0	0	2	1
	Strafford	1	1	5	2	24	10
	Thetford	23	7	8	18	33	13
	Thetford Center	2	1	0	0	2	2
	Tunbridge	0	0	0	0	6	1
	Vershire	0	0	0	0	1	1
	Washington	3	1	0	0	0	0
	Wells River	0	0	1	0	0	0
	West Topsham	1	1	0	0	0	0
	Williamstown	3	3	2	0	3	1
Orleans	Albany	1	0	0	0	0	0
	Barton	0	0	1	0	1	0

		2011		2012		2013	
County	Town	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed
Orleans	Brownington	0	0	0	0	1	0
	Craftsbury	3	1	1	0	7	6
	Craftsbury Common	2	2	3	2	2	2
	Derby	0	0	3	1	4	3
	Glover	1	1	1	1	2	1
	Greensboro	1	0	2	0	5	4
	Greensboro Bend	1	1	0	0	0	0
	Irasburg	1	1	0	0	2	0
	Jay	0	0	0	0	1	0
	Morgan	0	0	0	0	1	0
	Newport	5	1	1	1	4	3
	Orleans	1	1	1	1	0	0
	Troy	0	0	0	0	1	0
	West Glover	0	0	0	0	1	0
Rutland	Belmont	0	0	6	4	4	6
	Benson	3	0	2	1	4	1
	Bomoseen	2	1	5	4	2	2
	Brandon	26	12	22	9	16	6
	Castleton	8	1	11	6	12	4
	Center Rutland	0	0	3	2	3	0
	Chittenden	7	3	14	7	12	4
	Clarendon	11	5	16	10	16	8
	Cuttingsville	14	4	7	2	9	7
	Danby	11	5	8	6	5	3
	East Wallingford	4	2	4	0	4	1
	Fair Haven	11	4	18	10	13	7
	Florence	0	0	2	0	1	0
	Goshen	1	0	1	0	1	0
	Hubbardton	2	1	5	5	6	0
	Hydeville	1	0	2	2	6	2
	Ira	3	1	3	1	0	0
	Killington	5	0	14	9	9	4
	Leicester	2	0	1	1	1	1
	Mendon	6	1	11	6	12	4
	Middletown Springs	19	10	20	15	8	2
	Mount Holly	25	11	13	14	27	19
	Mount Tabor	0	0	1	0	0	0
	Pawlet	8	4	18	11	13	6

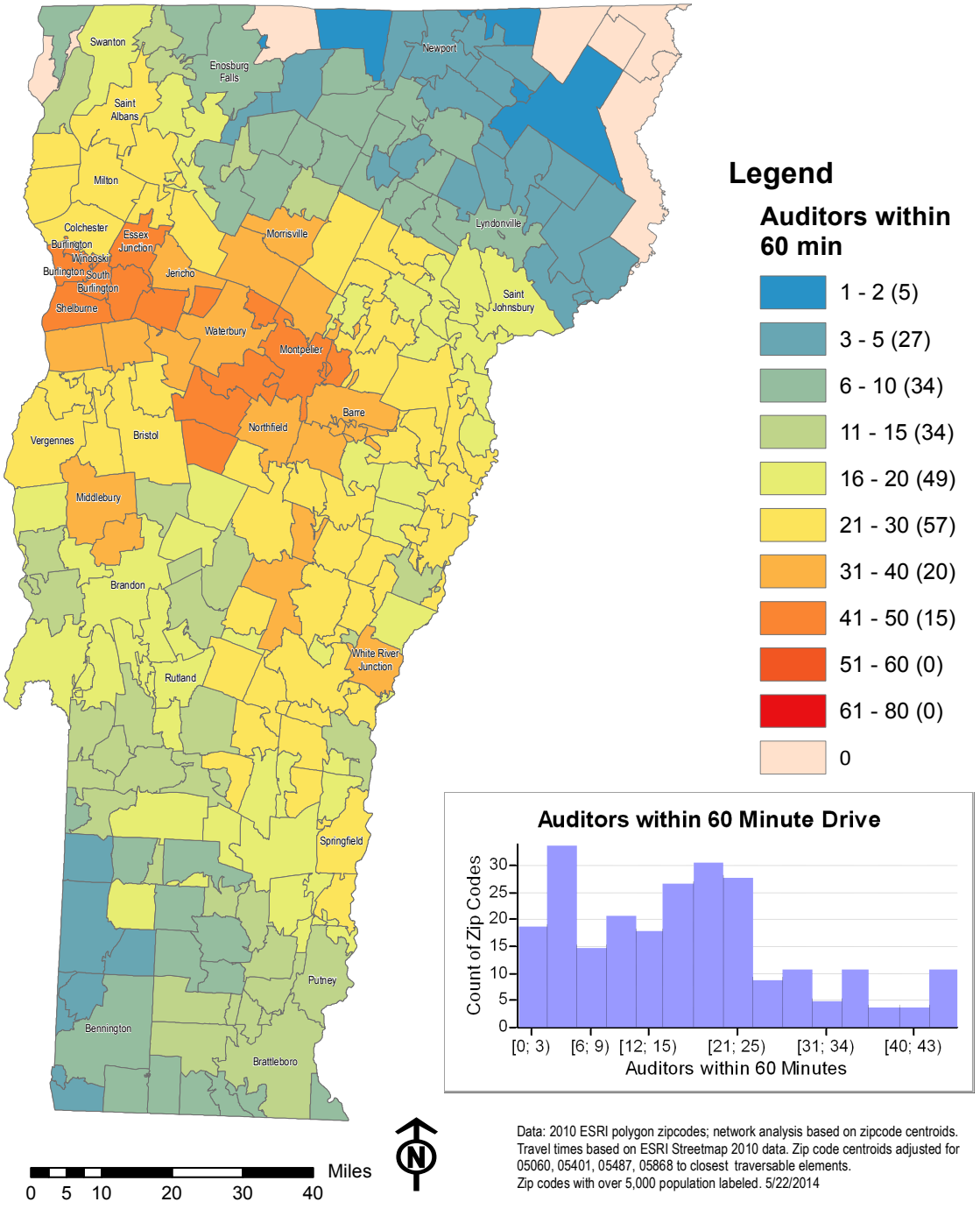
		2011		2012		2013	
County	Town	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed
Rutland	Pittsfield	3	1	4	2	1	0
	Pittsford	21	7	27	19	17	10
	Poultney	7	3	24	9	16	12
	Proctor	11	5	16	12	9	5
	Rutland	140	47	160	85	157	73
	Shrewsbury	26	9	9	7	10	9
	Sudbury	4	1	7	3	1	1
	Tinmouth	3	1	5	3	5	2
	Wallingford	23	8	21	17	22	11
	Wells	4	2	6	4	5	3
	West Haven	0	0	3	0	0	0
	West Pawlet	3	0	2	2	3	1
	West Rutland	19	3	19	9	24	12
Washington	Adamant	1	0	2	2	0	0
	Barre	21	7	26	21	55	20
	Berlin	7	7	6	3	8	6
	Cabot	1	1	6	5	2	2
	Calais	3	4	7	5	7	5
	Duxbury	2	2	2	1	2	0
	East Barre	1	1	4	3	2	1
	East Calais	5	4	6	4	0	0
	East Montpelier	9	8	6	4	10	7
	Fayston	1	0	1	1	3	3
	Marshfield	4	3	3	3	9	1
	Middlesex	18	7	8	10	3	2
	Montpelier	78	40	69	63	77	55
	Moretown	14	11	2	2	9	4
	North Middlesex	0	0	1	0	0	0
	Northfield	10	4	6	7	6	4
	Northfield Falls	0	0	1	1	4	2
	Plainfield	8	6	6	5	17	8
	Roxbury	0	0	2	0	2	1
	South Barre	1	0	1	2	1	0
	Waitsfield	7	3	9	7	14	8
	Warren	5	4	5	6	11	5
	Waterbury	24	15	21	20	22	10
	Waterbury Center	5	4	3	2	5	3
	Websterville	0	0	2	2	3	2
	West Berlin	1	0	0	0	0	0

		2011		2012		2013	
County	Town	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed
Washington	Woodbury	0	0	2	0	1	0
	Worchester	5	3	3	3	7	6
Windham	Bellows Falls	1	1	0	0	11	6
	Brattleboro	48	28	33	33	60	33
	Brookline	1	1	0	0	0	0
	Dover	1	1	3	4	1	0
	Dummerston	5	3	5	7	5	4
	East Dover	0	0	0	0	1	1
	East Dummerston	1	0	0	1	0	0
	Grafton	1	0	1	2	3	2
	Guilford	5	1	3	3	4	2
	Halifax	1	1	1	1	8	5
	Jacksonville	0	0	2	1	0	0
Windham	Jamaica	7	6	23	11	18	22
	Landgrove	0	0	2	1	1	1
	Londonderry	4	2	10	6	11	3
	Marlboro	6	4	1	1	3	1
	Newfane	2	1	2	2	7	3
	Putney	21	12	22	27	9	3
	Rockingham	0	0	0	0	1	0
	Saxtons River	2	1	1	2	4	2
	South Londonderry	0	0	3	0	3	3
	South Newfane	1	1	0	0	1	0
	Stratton	1	1	1	1	7	6
	Townshend	0	0	2	0	2	2
	Vernon	0	0	0	0	4	0
	Wardsboro	2	2	1	0	0	0
	West Brattleboro	1	1	0	0	0	0
	West Dover	4	3	37	36	8	4
	West Dummerston	1	1	0	0	8	2
	West Townshend	0	0	2	2	2	1
	Westminster	5	2	2	2	7	3
	Westminster Station	0	0	0	0	1	0
	Williamsville	0	0	2	2	2	0
	Wilmington	9	5	8	8	11	4
	Windham	1	1	2	1	1	1
Windsor	Andover	1	1	0	0	1	1
	Athens	0	0	1	1	0	0
	Baltimore	1	1	0	0	0	0

		2011		2012		2013	
County	Town	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed	Audits Reviewed	Projects Completed
	Barnard	2	1	2	1	3	1
	Bridgewater	0	0	2	0	3	3
	Cavendish	0	0	2	2	6	4
	Chester	8	5	11	6	9	7
	Hartford	3	0	5	3	2	0
	Hartland	5	3	2	3	13	5
	Ludlow	2	0	7	5	9	6
	North Pomfret	0	0	1	1	1	1
	North Springfield	1	1	0	0	3	2
	Norwich	8	2	18	14	47	15
	Perkinsville	0	0	0	0	1	0
	Plymouth	2	2	0	0	1	1
	Proctorsville	0	0	1	0	0	0
Windsor	Quechee	1	1	1	0	8	3
	Reading	0	0	0	0	1	1
	Rochester	1	0	3	2	4	1
	Royalton	1	1	0	0	1	1
	Sharon	0	0	0	0	8	3
	South Pomfret	0	0	0	0	1	0
	South Royalton	0	1	4	1	5	3
	Springfield	5	4	11	7	19	9
	Stockbridge	0	0	1	1	1	0
	Taftsville	0	0	0	0	1	0
	Weathersfield	1	1	2	1	8	8
	West Hartford	2	1	2	0	0	0
	West Windsor	0	0	1	0	1	0
	Weston	2	2	3	2	3	3
	White River Junction	2	1	0	0	2	1
	Wilder	2	1	0	1	4	2
	Windsor	2	1	0	1	11	6
	Woodstock	3	3	11	7	25	11

APPENDIX B

Energy Auditors within 60 Minute Drive of Vermont Zip Codes (2013)

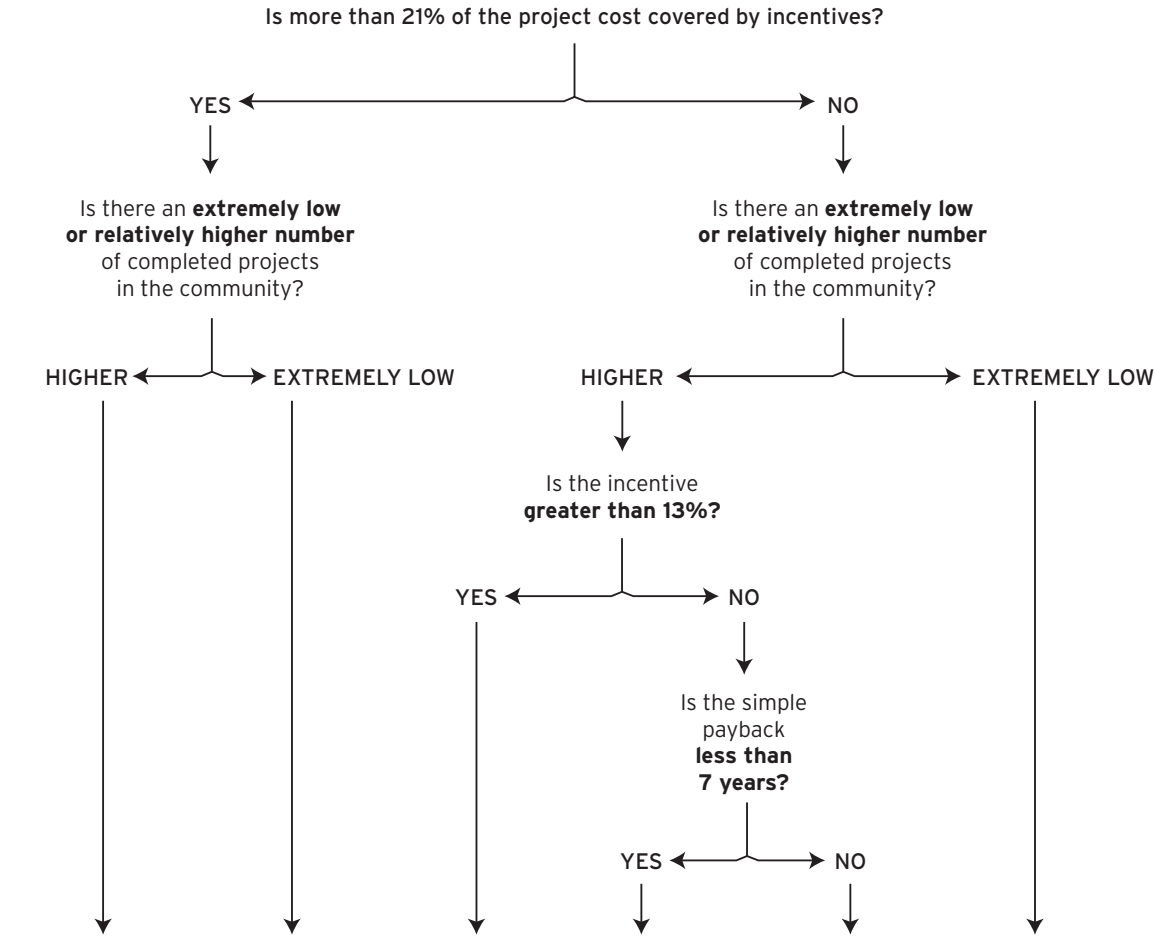


Data: 2010 ESRI polygon zipcodes; network analysis based on zipcode centroids. Travel times based on ESRI Streetmap 2010 data. Zip code centroids adjusted for 05060, 05401, 05487, 05868 to closest traversable elements.
Zip codes with over 5,000 population labeled. 5/22/2014

APPENDIX C

Decision Tree: How likely is this project to complete?

This decision tree was generated as part of the random forest analysis of Efficiency Vermont's Home Performance with ENERGY STAR program data. It represents how different project- and community-level factors can interact to move an individual project from energy audit to completion. The chart at the bottom shows the percentage of total completed projects that followed each path from 2011-2013.



Categories of Home Performance with ENERGY STAR Projects