

# Moving Vermont Existing Homes to “Zero Energy Now” through a Comprehensive Retrofit Approach

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## ABSTRACT

Vermont has a lofty goal of achieving 90% renewable energy across *all* sectors by 2050. While programs have been effective at supporting energy efficiency, homeowners receive multiple mixed messages from solar installers, heat pump contractors, home performance contractors and others that result in inaction. With significant support from Vermont’s largest electric utility, Green Mountain Power, the Building Performance Professionals Association of Vermont (BPPA) has developed and is implementing the “Zero Energy Now” program, a comprehensive approach to moving existing homes towards zero energy. By combining a customer-focused and analytically-based approach that examines weatherization, cold-climate heat pumps, photovoltaics (both on-site and group-net-metered) and low-cost flexible financing products, BPPA contractors have been able to move homeowners to 50%-100% energy savings. By also integrating a space heat guarantee, building energy label, contractor sales training and media attention to create customer “buzz”, BPPA contractors have been able to sell these positive-cash-flow projects to homeowners. For the home performance contractors leading this effort, being able to offer a larger, more profitable project means a more sustainable business model. This paper outlines the program design elements, a sample project and present some of the lessons learned in developing and implementing the Zero Energy Now program for existing homes as it rolls out for the first time in 2016.

## Introduction

Vermont’s goal of achieving 90% renewable energy across *all* sectors by 2050 (Vermont DPS 2016) is going to be very challenging. At 45% renewable today (Vermont DPS 2016), the state is well on its way with the electric sector. But with one of the oldest housing stocks in the country (VHFA 2016), Vermont residents use nearly 43 trillion Btus (EIA 2016) and spend about \$3700 per household annually on energy (EIA 2013) (U.S. Census 2016). Efficiency Vermont has been effective at saving electricity and supporting energy efficiency since 2000, but, at the same time, homeowners receive multiple mixed messages from solar installers, heat pump contractors and home performance contractors that frequently result in inaction. Frustrated with a declining number of Home Performance with ENERGY STAR® jobs and a move to smaller piecemeal retrofit projects, Vermont home performance contractors have taken the initiative to secure funding and develop a program that combines weatherization, renewable heating systems (heat pumps and biomass) and photovoltaics (PV) to provide homeowners 50% - 100% net savings through a comprehensive energy savings approach. These projects promise significant savings and benefits to building owners, including the following:

- A single analysis that--for the first time--provides a comprehensive assessment of efficiency, heat pumps, biomass and photovoltaics from a single modeling tool;
- An opportunity to get off of fossil fuels for the eco-minded;
- An energy usage guarantee to help overcome customers' lack of confidence that savings will actually be realized;
- A home energy label; and
- One trained general contractor to manage all aspects of the project.

For contractors, the promise of profitable \$30,000 to \$50,000 retrofit jobs, along with the ability to meet their personal missions of saving energy, are very appealing. This Zero Energy Now program was developed in early 2016 and launched in April, with a goal of 50 completed projects by the end of 2016. It has been met with great enthusiasm from a core group of about 15 Home Performance contractors and a dozen solar contractors and is testing a model that could represent the future of “deep energy retrofits” by achieving significant energy savings through a balanced approach of efficiency, renewable heating systems and photovoltaics.

## Background

Vermont has one of the most aggressive suites of clean energy goals in the U.S. With goals of weatherizing 80,000 existing homes by 2020, zero energy new construction codes by 2030 and 90% renewable energy for all sectors by 2050 (Vermont DPS 2016), the state has set expectations very high. Vermont needs to weatherize more than 12,000 housing units annually and achieve an average of at least 25% savings per home to stay on track. At the same time, Vermont needs a thriving, eager and savvy home performance workforce to deliver the results.

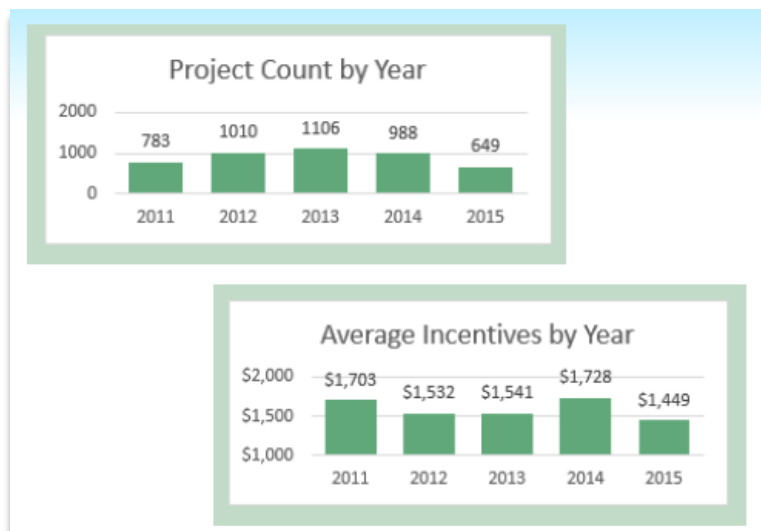


Figure 1. Vermont Home Performance Project Count and Average Incentives 2011-2015

However, as shown in Figure 1 (Banghart 2016), the reality is that participation in the Home Performance with ENERGY STAR program is waning, weatherization jobs are getting smaller (as evidenced by smaller incentives) and many certified Building Performance Institute (BPI)

contractors are moving away from the challenging and less profitable weatherization work and are now going back to building and renovations. Vermont is not going to achieve its lofty goals without bending the curve on these numbers and creating profitable and appealing business opportunities for contractors to re-engage with the residential energy market.

Meanwhile, Efficiency Vermont has been conducting market research (Banghart 2016) that concludes that customers desire smaller, incremental weatherization projects that lead them along a path towards energy efficiency over time. This approach has been coined as “meeting customers where they’re at”. While this may be what customers have told Efficiency Vermont researchers, it is unclear whether they were offered an alternative comprehensive approach that would achieve 50% - 100% savings. At any rate, this new “meeting customers where they’re at” approach is not a desirable direction for contractors with significant transaction costs who need larger jobs to ensure profitability to sustain their weatherization businesses. It also does not help in meeting the aggressive public policy goals set out by the state’s planners.

The Building Performance Professionals Association of Vermont (BPPA), Vermont’s trade association of home performance contractors and allied professionals, have been keenly aware of these decreasing job size trends and, wanting to ensure the future sustainability and profitability of their businesses, endeavored to take the program design issue into their own hands. Out of a BPPA board retreat in the summer of 2015 emerged the concept of a comprehensive approach to weatherization and renewable energy. Some of the BPPA board members had completed similar comprehensive projects for their customers and found that they could deliver positive cash-flow projects when the energy improvements were financed. That is, the energy cost savings could more than off-set any financing payments on an annual basis.

Armed with this comprehensive energy savings model and some real-life examples of older Vermont homes that have been weatherized and retrofitted with heat pumps and PV systems to achieve 90%-100% savings, BPPA was able to secure funding from the state’s largest utility, Green Mountain Power (GMP), to pilot this approach in 2016. The goal is to complete 50 projects by the end of the year and then to grow the program significantly in future years if successful.

We briefly outline the elements of what we are calling the “Zero Energy Now” program then discuss why Vermont electric utilities might be interested in Zero Energy Now, and how savings are claimed through such a comprehensive approach. The balance of this paper then goes into some detail on the program standards and incentives, shows how some different home configurations could comply, discusses the role of financing, reviews the modeling software developed for Zero Energy Now, presents the energy guarantee and building energy label offerings, offers a sample project, and concludes with some early lessons learned.

## **The Zero Energy Now Program**

A few Vermont Home Performance contractors who specialize in low-energy building have found a following of green customers who want to wean themselves off of fossil fuels. A “deep energy retrofit” approach of thickening walls and roofs in existing buildings combined with customer disruption has proven challenging to sell to any but the most committed. However, due to technology improvements and falling PV prices, a new strategy to meet the same low energy goals has helped to forge a new path to achieve “near zero energy” retrofits.

“Cold climate heat pumps” (NEEP 2016) have come onto the market that are 250% - 300% efficient on a seasonal basis and can deliver adequate indoor heat drawn from outside air down to 20 degrees below zero. This technology can be installed in homes that have received a reasonable amount of weatherization work<sup>1</sup> to displace a significant amount of the existing fossil fuel heating use (EMI 2014). The existing heating systems will generally be left in the house with the thermostats turned down so that they only come on when it’s very cold out or to supply an isolated zone in the house that calls for heat. Depending on the home’s configuration, these cold climate heat pumps can displace 70% or more of a home’s fossil fuel heating use. Heat pump water heaters have also come onto the market that are at least 200% efficient, dependable and relatively quiet.

By moving away from fossil fuels to electric heat pump technology, this has opened the door to powering these and most all other end-uses in homes with renewable PV systems. Dramatically falling PV costs, net metering laws, desirable solar pricing deals and the option of community solar<sup>2</sup> have paved the way for widespread use of PVs in Vermont. New clean and efficient automatic central wood pellet boilers (typically from Europe) are also part of the mix.

Availability of heat pumps and cheap solar have meant lots of new businesses springing up that promote their products. Solar deals that offer homeowners monthly payments less than their current monthly electric bills and heat pumps that deliver heat at “half the price of oil” (before recent oil price declines) can come across as too good to be true. Then, there is the less appealing, but most relevant message that efficiency advocates have been espousing for years: “efficiency first”. Customers are bombarded with these messages from multiple contractors and advocacy groups but don’t know who to believe or which path to take.

Zero Energy Now attempts to take the mystery out of this confusion by rolling all of these approaches together under one umbrella. With a new modeling tool and trained contractors, building owners<sup>3</sup> receive an audit and analysis that considers opportunities for weatherization, heat pumps, PV, and “modern wood heating” central pellet boilers. This eliminates the guesswork for the homeowner, provide an analytically-based set of recommendations, and provide a solution to customers who want to move to zero energy and off of fossil fuels. At the same time, they can take advantage of desirable financing products, a home energy label and have the energy use projections and work quality guaranteed to provide confidence that all of the promises will actually be delivered.

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<sup>1</sup> “Reasonable weatherization work” means ensuring they are relatively tight and fully insulated.

<sup>2</sup> Community solar is a shared arrangement that allows several energy customers to share the benefits of one renewable “group net metered” PV system that can be located anywhere else in the same utility service territory.

<sup>3</sup> Zero Energy Now is available for residential and small business customers.

## **Utility Obligations to Save Fossil Fuels**

Fortuitous timing of some new statewide legislation has kindled significant interest from the state's utilities and regulators in the Zero Energy Now program. Act 56 of 2015 (VSA 2015) is a landmark piece of utility legislation not only for Vermont, but nationally. Beyond clarifying next steps for Vermont's renewable energy portfolio standards (Tiers I and II), Act 56 establishes a Tier III "energy transformation" requirement in which all electric distribution utilities in Vermont are obligated to reduce--at an annually increasing rate--their customers' fossil fuel use over the next 15 years. Utilities are required to reduce two percent of their annual retail electric sales starting in 2017, increasing by an additional two-thirds of a percent each subsequent year until reaching 12 percent in 2032, or face making alternative compliance payments. GMP and the other utilities are very interested in finding ways to achieve deep fossil fuel savings from their customers to meet this obligation. In addition to promoting electric vehicles and heat pumps, utilities see Zero Energy Now as a way to meet this requirement while also increasing electric sales. At the same time, Tiers I and II ensure an increasingly renewable electric portfolio and Tier III encourages fuel switching from fossil fuels to electricity.

## **Claiming Savings**

Promoting the Zero Energy Now program only works for GMP if they are able to claim savings to justify the program expenses. Efficiency Vermont has been offering a Home Performance with ENERGY STAR program in Vermont for years and claims the savings from reduced electricity and fossil fuels when homes are weatherized. Efficiency Vermont also claims savings for the incremental efficiency of cold climate heat pumps and heat pump water heaters over standard baseline equipment through an "upstream" program.

However, for this program, GMP is claiming all of the fossil fuel and electric savings due to the installation of heat pumps (or wood pellet boilers) used to displace fossil fuel heating and water heating. In addition, GMP is also claiming all of the electricity savings from installing PV. Over the course of 2016, these savings are expected to generate more than twice as much "net societal benefit" as the cost of the Zero Energy Now program. Each participant is run through a screening tool in order to calculate and report the net societal benefits to justify the program.

## **Program Standards**

In order to establish a meaningful standard that achieves significant savings through a comprehensive energy savings approach, the BPPA developed three thresholds that ensure minimum levels of efficiency, fossil fuel and electric reduction, and renewable energy contribution. The "10-50-50" standard includes the following elements:

- Test 1: At least a 10% reduction in envelope heat loss;
- Test 2: At least a 50% reduction in combined fossil fuel and grid electricity; and
- Test 3: At least 50% of a customer's total energy consumption is derived from renewable electric, biomass, or other renewable sources.

### **Test 1 - 10% Envelope Heat Loss Reduction**

This first standard is designed to ensure at least some building shell weatherization is achieved. The test is set at 10% to allow recently-constructed buildings to participate, when there may not be a lot of opportunity for savings if built relatively efficiently to code. Typically, meeting this 10% standard can be achieved through comprehensive air leakage reduction in an existing building. Keep in mind that this is just a threshold and we expect a significant number of buildings to achieve two or three times this savings from efficiency measures, which can all contribute to the Test 2 standards.

### **Test 2 - 50% Fossil Fuel and Grid Electricity Reduction**

All existing fossil fuel and grid electricity is converted to MMBtu and compared in the modeling software pre- and post-retrofit to determine whether 50% savings is achieved. For example, a 150 MMBtu/year consumption house would need to end up at 75 MMBtu/year or less. A 100 MMBtu/year house would need to end up at 50 MMBtu/year or less. This test does not include in the calculations any existing renewable energy usage, such as wood stoves, solar hot water systems or solar photovoltaic systems which are netted out in determining the 50% fossil fuel and grid electricity threshold target.

The BPPA board and the participating contractors discussed wood extensively and came to the conclusion that—as a local renewable resource--existing wood use should be netted out from the fossil fuel and grid electric use when determining compliance with Test 2.

### **Test 3 – 50% Renewable Energy**

As opposed to looking at just the envelope (Test 1) or just the fossil and grid electric energy usage (Test 2), Test 3 examines the total energy consumption of the building (in MMBtu) pre-retrofit, and the renewables contribution post-retrofit to determine whether at least 50% of the total usage will be met with renewables. Total energy consumption includes heating, cooling, hot water, lights and appliances.

If there is a non-automatic wood burning appliance, such as a wood or pellet stove, used in the pre-retrofit condition and the occupants plan to keep using it, it can be included in both pre- and post-retrofit calculations in the same quantity as had been used historically. Since wood is “renewable” it should receive credit towards the renewable contribution.

If customers plan to install a new wood system (chunk or pellet stove or central boiler that meets Vermont’s Renewable Energy Resource Center standards), a reasonable and realistic estimate of its future use can be included and credited towards the renewable contribution. Only EPA-certified equipment is recognized in the improved condition.

In terms of photovoltaics, only PV systems with Renewable Energy Credits (RECs) that are “retired” and not sold outside of Vermont are accepted. Either on-site or Vermont-based community solar systems can count towards the Test 3.

## Incentives

Incentives to participants are commensurate with the amount of savings delivered. Zero Energy Now is offering \$50/MMBtu saved. **Error! Reference source not found.** shows how much of an incentive is available, based on the depth of savings. For instance, a homeowner who uses 1100 gallons of oil per year could receive the maximum \$5,000 incentive if they are able to achieve 70% savings.

The MMBtu reduction includes total home energy use (heating, cooling, hot water, lights and appliances).

Table 1. Incentive Amount based on Gallons of Fuel Used and % Saved

Fuel oil use		\$/mmbtu payment to contractor for savings									
gallons	mmbtu	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
500	70	\$ 350	\$ 700	\$ 1,050	\$ 1,400	\$ 1,750	\$ 2,100	\$ 2,450	\$ 2,800	\$ 3,150	\$ 3,500
700	98	\$ 490	\$ 980	\$ 1,470	\$ 1,960	\$ 2,450	\$ 2,940	\$ 3,430	\$ 3,920	\$ 4,410	\$ 4,900
900	126	\$ 630	\$ 1,260	\$ 1,890	\$ 2,520	\$ 3,150	\$ 3,780	\$ 4,410	\$ 5,040	\$ 5,670	\$ 6,300
1100	154	\$ 770	\$ 1,540	\$ 2,310	\$ 3,080	\$ 3,850	\$ 4,620	\$ 5,390	\$ 6,160	\$ 6,930	\$ 7,700
1300	182	\$ 910	\$ 1,820	\$ 2,730	\$ 3,640	\$ 4,550	\$ 5,460	\$ 6,370	\$ 7,280	\$ 8,190	\$ 9,100
1500	210	\$ 1,050	\$ 2,100	\$ 3,150	\$ 4,200	\$ 5,250	\$ 6,300	\$ 7,350	\$ 8,400	\$ 9,450	\$ 10,500

## The Role of Financing

Financing plays a key role in enabling customers to complete Zero Energy Now projects. By financing these expensive comprehensive projects, savings can be used to cover the loan payments. Vermont has been working for years to develop loan products that make it easy to finance clean energy projects, so the program has been able to take advantage of what already exists, train contractors on these loan products, and they in turn have offered them to their customers. At least half of the projects are expected to use the products presented in Table 2.

Table 2. Vermont Loan Products Available for Financing Zero Energy Now Projects

Feature	Heat Saver Loan	NeighborWorks Loan	V-Green Loan Products
<b>Sponsor</b>	Vermont Department of Public Service	NeighborWorks of Western Vermont	VSECU
<b>Description</b>	Secured and unsecured energy savings loan with interest rates bought down through state subsidies.	Comprehensive energy loan targeted at low/mod income offered through home ownership centers with interest rates bought down by the State	Suite of energy savings loans including: energy improvement, solar PV, community solar, efficient/electric vehicle, bicycle
<b>Lenders</b>	VSECU Opportunities Credit	NeighborWorks of Western Vermont	VSECU

	Union																			
<b>Eligible Measures</b>	Furnaces, boilers, heat pumps, wood pellet systems, solar domestic hot water systems, weatherization improvements, health and safety measures and repairs	Save as Heat Saver Loan plus PV	Same as NeighborWorks Energy Loan plus electric vehicles and even bicycles																	
<b>Interest Rates</b>	<table border="1"> <thead> <tr> <th colspan="3">INTEREST RATES</th> </tr> <tr> <th rowspan="2">Household Income Qualifications</th> <th colspan="2">Loan Term</th> </tr> <tr> <th>Up to 5 Years</th> <th>From 5 to 15 Years</th> </tr> </thead> <tbody> <tr> <td>Over \$96,240</td> <td>3.99%</td> <td>4.99%</td> </tr> <tr> <td>Between \$64,160 - \$96,240</td> <td>1.99%</td> <td>2.99%</td> </tr> <tr> <td>Below \$64,160**</td> <td>0.0%</td> <td>1.99%</td> </tr> </tbody> </table>		INTEREST RATES			Household Income Qualifications	Loan Term		Up to 5 Years	From 5 to 15 Years	Over \$96,240	3.99%	4.99%	Between \$64,160 - \$96,240	1.99%	2.99%	Below \$64,160**	0.0%	1.99%	4% - 6% depending on loan type
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<b>Loan Cap</b>	\$35,000	\$40,000																		
<b>FICO Score</b>	No minimum, considered in underwriting																			
<b>Loan Approval</b>	Usually less than 48 hours																			

## Software

The “Energy Use, Savings, Analysis, and Valuation Estimator” (EUSAVE) analysis software is a web based tool developed by Parsec Energy of Calais, Vermont that allows users to quickly and accurately model and evaluate building energy improvements while considering building enclosures, mechanical systems, lighting, appliances, plug loads and renewable energy systems. The tool provides savings estimates through straight-forward modeling, allows for the adjustment of important efficiency parameters, and also offers a “true-up” function so that savings are based on actual energy use history. EUSAVE contains separate modules for various efficiency improvement categories and is designed to deliver meaningful results while requiring only the most important inputs. Once a few basic entries are completed, minimal user input is required to characterize and analyze each subsequent measure.

## Guarantee

Zero Energy Now projects are backed by energy usage and quality guarantees. Extensive research both in Vermont and nationally has shown that confidence in projected energy savings is a significant barrier to energy efficiency adoption. Survey results of Vermont residents have shown that 76% would rank “confidence that estimated energy savings would be realized” as an important factor in moving forward with home performance projects, higher than any other



option (including greater rebates) (GDS 2013). Similar research nationally has indicated that 92% of residential customers cite the lack of an energy and cost reduction guarantee as one of their top three barriers to energy efficiency program participation (KSV 2014).

At the same time, guarantee programs have been shown to be highly effective and financially viable. A survey of 33 residential guarantee programs found a claims rate against guarantees of under 1% (E Source 1995). A previous program in Vermont found a similar experience, with approximately 75 guarantees provided and only a single claim that was settled for \$60. Anecdotally, guarantees have been found to be valuable from a marketing perspective in helping move customers toward “yes” when contemplating an energy efficiency project.

Building on this research, as well as a series of findings from four stakeholder groups around Vermont and a series of stakeholder meetings over the past several years, a guarantee feature should help overcome the confidence barrier and motivate customers to move forward (CRPP 2013). The guarantee includes aspects of both total energy usage and quality assurance, to ensure that customers can be confident in energy usage projections while also seeing the tangible benefits of energy efficiency projects.

## **Guarantee Features**

The guarantee features two core aspects: a one-year “usage guarantee” backed by \$50,000 of GMP funds (limited to a maximum of \$1,000 per customer and paid out on a first-come, first-served basis as necessary), and a “quality guarantee” backed by participating contractors. The usage guarantee covers the building’s total energy usage, as projected by the EUSAVE energy modeling software.<sup>4</sup>

In order to make a claim against the usage guarantee, customers will be informed to follow these steps: 1) the customer should compare all combined energy bills to the projections in EUSAVE to determine whether actual total energy usage exceeded projected usage; 2) if actual usage exceeded projections, the customer may file a claims form, which should include all energy bills for one year following the completion of the retrofit; 3) the claim will trigger an inspection by the Zero Energy Now program to verify the claim and identify the source of the usage exceeding projections; 4) after the inspection, the claim is calculated according to the terms of the guarantee as stated on the Zero Energy Now program website, and any claim amount is paid to the customer within 60 days of the claim filing.

Customers may also choose to make a claim against the quality guarantee. In the case of a quality guarantee claim, the steps in the claims process would be as follows: 1) the claim would automatically trigger an inspection by the Zero Energy Now program; 2) the participating contractor will fix the deficiency, and 3) the problem will only be deemed “fixed” and the contractor released from any further obligation to fix deficiencies once the customer signs off that they are satisfied via communication to the Zero Energy Now program. Contractors who

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<sup>4</sup> When presented to the customer, total energy usage may be projected as a dollar amount, with language clarifying that the projection will be adjusted according to certain terms and limitations of the guarantee, including adjustments for changes in energy prices, weather, and building occupancy. Other terms and restrictions will also apply. The full terms of the guarantee are posted on the Zero Energy Now program website, [www.zeroenergynowvt.com](http://www.zeroenergynowvt.com).

fail to fix a deficiency or receive a customer sign-off may be subject to removal from the program, at the discretion of Zero Energy Now program staff.

## Labeling

A critical challenge to increasing customer uptake in weatherization is that the efficiency work is, essentially, “invisible” unless quantified and labeled. However, if labeled, this information can help to financially quantify the customer’s investment and enhance their home’s future resale value. Scoring these highly-efficient buildings provides yet more value to homeowners as they consider participating.

Efficiency Vermont has rolled out a pilot program utilizing U.S. Department of Energy’s Home Energy Score (DOE 2016) and a locally-designed “Vermont Home Energy Profile” label design (PSD 2016). Part of this roll-out has involved trainings for contractors to become DOE Home Energy Score Qualified Assessors. Most of the Zero Energy Now contractors are participating in this statewide pilot and offer the Home Energy Score as part of their completed projects.

## Sample Project

The inspiration for Zero Energy Now were a few projects completed by one of the BPPA contractors. The details of one of these projects is summarized below.

Table 3. Example Zero Energy Now Case Study

Recommendations for Weatherization and Energy Work	Estimated Cost	
A. Building Shell - insulation, air sealing, fans & audit	\$ 8,000	
B. Ductless Heat Pumps	\$ 14,000	
C. Heat Pump Water Heater	\$ 2,200	
D. Solar PV System	\$ 20,000	
<b>Total</b>		<b>\$ 44,200</b>
<b>Potential Credits/Incentives (EVT &amp; PV; no CVPS)</b>		<b>\$ (6,200)</b>
<b>Net Project Cost</b>		<b>\$ 38,000</b>

Recommendations would replace the existing annual \$3,000 in fuel and electric costs with building shell improvements, a multi-head cold climate heat pump and heat pump water heater, and solar PV system for a total net cost of about \$38,000 after tax credits and incentives.

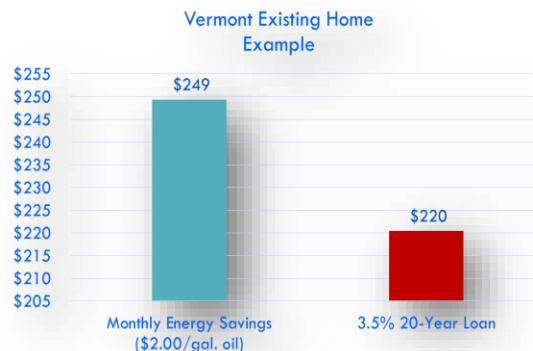


Figure 2. Vermont Sample Project Cash Flow Example

At \$2.00/gallon for oil plus electric costs, the homeowners currently pay about \$275/month in energy costs (or about \$3300/year). These improvements would save about 90% of their current energy costs, generating about \$249/month in savings. A 3.5%, 20 year home equity loan to finance the \$38,000 project would cost about \$220/month. Therefore, they would experience about \$29/month in “positive cash flow” savings (\$249 minus \$220). Guaranteed energy savings would pay for their \$38,000 improvement and after the loan is paid off, their energy costs will be minimal.

## Conclusions

Home Performance programs, heat pump initiatives, modern wood heating efforts and solar PV offerings have for too long each remained isolated. By combining all of these efforts into a single package, the Zero Energy Now program has been able to leverage the consumer interest in solar with the savings attributes of weatherization and heat pumps to deliver a comprehensive package that can achieve 50%-100% savings. These efforts can go a long way towards meeting Vermont’s goals of 90% renewables by 2050. By guaranteeing the results and marketing the offering as a way to get off of fossil fuels to reduce one’s carbon footprint, homeowners have all of a sudden become interested. Of course, Zero Energy Now couldn’t work without low-interest, long term, flexible financing, so having those tools certainly helps contractors sell the deals.

In addition to a sound program design and features, there appears to be another element that has contributed to contractor engagement and interest in Zero Energy Now; the fact that the program was conceived and was developed by the home performance contractors themselves. Instead of some agency or utility designing a program without significant contractor input, the BPPA has felt a sense of ownership and responsibility throughout the program development process. While there is certainly some element of risk that comes with ownership, ultimately it is about knowing that the program is controlled by the contractors themselves. With that commitment and investment, Zero Energy Now was launched in early 2016 with a goal of 50 completed jobs by the end of the year. The expectation is that these early goals will be easily achieved and Zero Energy Now will grow to become the standard-bearer for residential retrofit programs going forward on the path towards Vermont’s aggressive clean energy goals.

## References

Banghart, B. and Cathcart, J. 2016. Efficiency Vermont, *Presentations to High Meadows Fund*, Montpelier, Vermont, March 7, 2016.  
<https://static1.squarespace.com/static/51b0ce25e4b0e8d244de368b/t/56df04b340261dffa672863f/1457456322653/March+7+Seamless+Path+PPT+PDF+slides.pdf>

Center for Research and Public Policy (CRPP). December 2013. Confidence Qualitative Research. Study for Efficiency Vermont.

E Source. 1995. Assessment of Residential Comfort and Energy Bill Guarantee Programs.

EIA (Energy Information Administration). 2016. State Provide and Energy Estimates – Vermont. <http://www.eia.gov/state/?sid=VT#tabs-2>

EIA. 2013. Residential Sector Energy Expenditure Estimates. [http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep\\_sum/html/sum\\_ex\\_res.html&sid=VT](http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_sum/html/sum_ex_res.html&sid=VT)

EMI Consulting. 2014. Emera Maine Heat Pump Pilot Program. <http://www.emiconsulting.com/assets/Emera-Maine-Heat-Pump-Final-Report-2014.09.30.pdf>

GDS. 2013. Vermont Single Family Retrofit Market Research. Prepared for the High Meadows Fund. <http://static1.squarespace.com/static/51b0ce25e4b0e8d244de368b/t/51ffb096e4b0af1f5ce8d79a/1375711382183/Market+Research+-+Vermont+Single+Family+Energy+Efficiency+Retrofit+Market.pdf>.

KSV Communications. 2014. Energy Wire. October 16, 2014, <http://www.ksvc.com/energywire/2014/10/16/your-customers-dont-trust-your-ee-financial-messaging>.

Northeast Energy Efficiency Partnerships (NEEP). 2016. Cold Climate Air Source Heat Pump website. 2016. <http://www.neep.org/initiatives/high-efficiency-products/emerging-technologies/ashp/cold-climate-air-source-heat-pump>

U.S. Census Bureau. 2016. Quick Facts. <http://www.census.gov/quickfacts/table/PST045215/50>

U.S. Department of Energy (DOE). 2016. Home Energy Score. <http://energy.gov/eere/buildings/home-energy-score>

Vermont Department of Public Service (DPS). 2016. Vermont Comprehensive Energy Plan, [http://publicservice.vermont.gov/publicationsresources/publications/energy\\_plan/2015\\_plan](http://publicservice.vermont.gov/publicationsresources/publications/energy_plan/2015_plan)

\_\_\_\_\_. 2016. Heat Saver Loan web site. <http://heatsaverloan.vermont.gov/>

\_\_\_\_\_. 2016. Home Energy Labeling web site. [http://publicservice.vermont.gov/energy\\_efficiency/buildingenergy\\_labeling](http://publicservice.vermont.gov/energy_efficiency/buildingenergy_labeling)

Vermont Housing Finance Agency (VHFA). 2016. <http://www.housingdata.org/profile/resultsMain.php>

Vermont Statutes Annotated (VSA). 2015. Act 56 (H.40), An Act Relating to Establishing a Renewable Energy Standard. <http://psb.vermont.gov/docketsandprojects/electric/8550>